

# THE APOSTOLIC TALES



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## Introduction

Dear Friends,

I was not surprised to see that most of the condolences sent after Alberto's passing away stressed Alberto's unique personality.

Alberto was a scientist who contributed some seminal insights to pattern matching, for example the Augmented Suffix Tree, parallel algorithms for Stringology, or the study of quasiperiodicity. He was also one of the founders of our community.

Nevertheless, what everyone remembered and reminded was his generous personality: generous to students and colleagues, generous to the field and to the founding of other fields. Computational Biology started at the pattern matching community, and Alberto always wanted to encourage growth and collaboration with others. We all know of research areas where one needs to constantly walk with one's back to the wall, lest he be stabbed in the back by a colleague. Pattern Matching is the opposite of that! My wife, who joined us this year for CPM, and who is used to medical conferences, remarked with amazement at what a great atmosphere there was at the conference!

Friends, this is clearly a result of the years of personal example shown by Alberto. We all grew up soaking that kind of behavior, and we all emulate it.

About 1700 years ago, a rabbi came from Israel to Babylonia. He was asked to teach some new insight about the Torah. He started out by saying: "Jacob the Patriarch did not die!". You have to understand that there was an inherent difference in the way the Talmud was studied in Israel and the way it was studied in Babylonia. In Israel the study was more allegorical whereas the Babylonians were more technical and literal. Thus, when this famous rabbi from Israel proclaimed that Jacob the Patriarch did not die, the Babylonians immediately asked him: "it says in the Bible that Jacob was mummified, and interned - did they mummify him for nought? Did they bury him for no reason?". So the Israeli rabbi explained to them what he meant: "As long as his descendents are alive - he is alive".

As long as there is a string to be matched, a periodicity to be recognized, a genome to be sequenced, an LCS to be computed - Alberto is alive. As long as we meet, help our colleagues, support the junior researchers, teach the students with love and care - Alberto is with us.

And now for a more practical proposition:

Another trait of Alberto that has been mentioned is that he was not a narrowly focused scientist but a true intellectual. It was always a pleasure to discuss with him all topics - from art to literature, music, and philosophy. All this was well packaged in the mind of an orator. It was a pleasure to hear Alberto discuss a topic, not only for the insights, but also for the presentation. While some people with such talents are pompous, Alberto was easygoing and fun. He could use his oratorical skills for any topic, and the famous stories that grew from this talent are witness. I propose, in Alberto's honor, that we collect the Apostolic Tales for posterity.

-- *Amihood Amir*

# Zvi Galil

## How it All Began

I met Alberto late in 1983. He came to see me in New York City with the following proposition: "*Let's organize a workshop in Italy. I believe we can get funding from NATO.*" As an Italy lover, I agreed immediately, and indeed we got full funding for a number of participants. In June 1984 we had the Advance Research Workshop on Combinatorial Algorithms on Words, in Maratea, Italy. It was a star-studded affair; among those who took part were Andrei Broder, the late Renato Capocelli, Maxime Crochemore, Aldo de Luca, the late Shimon Even, the late Philippe Flojolet, Aviezri Fraenkel, Leo Guibas, Abraham Lempel, Dominique Perrin, Michael Rabin, Antonio Restivo, Wojciech Rytter, Micky Rodeh, Jim Storer, Mark Wegman, Andy Yao, and Jacob Ziv. Alberto organized a fantastic meeting.

Alberto had written the preface for the Maratea workshop proceedings. As some of you may know, Italian is a very rich language in both content and length. Alberto's version was over 4 pages long. Since I am somewhat attention-span-challenged, I rewrote it to about one page, sacrificing Alberto's beautiful but long introduction.

Years later, I've spoken to some of the people who were there (two of them in the last month), and they fondly remembered the workshop, which can take credit for several developments. Renato Capocelli followed by organizing two workshops in Positano and Amalfi (both on the beautiful Amalfi coast); they were called Sequences I and II.

In 1990, Maxime Crochemore, Alberto and I organized the first CPM (Combinatorial Pattern Matching) conference in Paris. Earlier this summer, the 26th CPM was held in Ischia, Italy. It was the last time I saw Alberto. The Maratea Workshop can probably be considered as CPM 0. The three of us became the steering committee of CPM, though Alberto was really in charge.

The Maratea workshop also led to something else. Alberto had asked me to give the opening lecture, but I had no new or otherwise appropriate results to present. So I decided to give a list of open problems and named the resulting paper "Open Problem in Stringology." "Stringology" is shorthand for combinatorial algorithms on strings. The term stuck, and now the word stringology appears in titles of at least one book, over 100 articles and in names of conferences. There is even a stringology club in Prague. In some sense Alberto deserves credit for coining this term. Each time stringology is mentioned, I remember Alberto.

In 1985, Alberto sent me Raffaele Giancarlo (his best student) to be my Ph.D. student. Raffaele was Alberto's student as an undergraduate. At the time, undergraduate studies in Italy were five years, about the equivalent to a B.S. plus an M.S. degree. Alberto and Raffaele had published a couple of papers in stringology, one of them on the Boyer-Moore-Galil string-searching algorithm. Raffaele went on to produce an excellent Ph.D. thesis at Columbia University in, of course, stringology. Now he is a full professor at the University of Palermo.

Alberto took us to some terrific restaurants, though initially this led to a problem: He always paid for the meals. One day I decided not to get mad, but to get even. I snuck out at the end of the meal and paid. The trouble was, this only worked once. After the next meal, when I tried to sneak out again, Alberto joined me. So the next time I took no chances: When we arrived at the restaurant, I handed my credit card to the waitress. After that trip, we reached a compromise and went Dutch.

Alberto loved sailing, and he invited my wife and me many times to sail with him. It's no small regret to me that I never took him or Titti up on that offer. I would have loved to see Alberto on the open water, doing what he loved to do.

After the initial meeting in 1983, we would see Alberto and Titti every few years, and we wrote a number of papers together. In Fall 2009, Alberto was instrumental in bringing me to Georgia Tech. I was at Tel Aviv University, and he and Ellen Zegura called to ask if I wanted to be considered for the position of dean of the College of Computing at Georgia Tech. Because I didn't know Ellen, I can only guess it was Alberto's idea.

Last year Alberto and Titti helped me bring Nobel Laureate Michael Levitt to Georgia Tech. Mike and Rina Levitt participated in a number of workshops in the island of Lipari. This is the very same workshop where Alberto spent his last days. It was kind of interesting that Titti and Alberto introduced an Israeli Nobel Laureate to an Israeli. Mike's visit to campus was great. In addition to a beautiful lecture, he met with about a dozen faculty members from our College and the College of Science.

Amihod Amir and Gadi Landau have had a U.S.-Israel binational grant with Alberto and would come to Atlanta once or twice a year. We all convened at Alberto's home and immensely enjoyed Titti's great Italian dinners. As an honorary Italian, several times I joined Alberto, Titti, and other Italians in Atlanta to their Fridays pizza dinner at Varuni (see Rich DeMillo's story).

Since Alberto's passing, I have been amazed by the large number of people who loved and admired him. It's very clear that Alberto's memory will be with us for a long time.

-- *Zvi Galil*

## **Raffaele Giancarlo**

### **Buon Vento Alberto**

Dear All,

This is a message from an undergraduate at University of Salerno. I met Professor Apostolico in November 1978.

He was teaching a first year course in the Computer Science Curriculum at Unisa: Teoria e Applicazioni delle Macchine Calcolatrici. It became immediately clear to all of the student body that Professor Apostolico was very special. Indeed, over the next few years, in addition to this new thing of pattern matching and compression algorithms, his storytelling was a strong magnet for many of us.

As many of you in this list, I had the privilege to listen to his stories, work with him, even meet during Christmas vacations for a chat in Salerno. For many many years.

The last story comes from Lipari. It is short chronicle. After CPM in Ischia, an island that he was very close to, he sailed for a couple of weeks the Eolian Islands, with friends and family. He went from Salerno to Maratea, then crossed to Stromboli. Finally, he got to Lipari for the school. When I saw his boat docking in the harbor my undergraduate heart started beating very fast: more stories, more fun and more things to do.

More Alberto!!!

I called him up immediately.

Unfortunately, last night, this came to an end and I went through moments that I do not wish to anyone.

I feel a void, but thanks to you this undergraduate does not feel lonely tonight.

I can still see Obliqua docked, so the only thing that I can say is:

Buon Vento Alberto.

-- *Raffaele Giancarlo*

## Maxime Crochemore

### What would be the Life without Prosecco

*"What would be the life without Prosecco!"* - A motto I enjoyed hearing from Alberto when relaxing in front of a glass after a working session. It will always be linked to him.

I think Alberto and I first met during a Summer school in Udine in the late 70s or early 80s. The main speakers were Rivest, Rabin, Vuillemin, and certainly other prestigious people in our field.

It was the starting point of a long collaboration with Alberto leading us to Maratea, Positano, Paris, L'Aquila, Padova, Santiago, London, Haifa, and many other places where he could "evangelise" people to stringology.

Among other research projects we had, one was funded by NATO Obviously he could not resist entitling the resulting article "Canonization of All Substrings", example of his charming mischievous spirit.

We know all that life is dangerous and how it ends  
So better keep the wonderful souvenirs Alberto left to us.



Alberto, Maxime, Gonzalo drinking whisky with ice from the glacier of Laguna di San Raffaele (Chili), SPIRE 2001



back: Ricardo, Gadi, front: Maxime, Alberto, Gene, (Jeju), CPM 2004.



Gadi Titti Alberto Roberto Maxime ( Jerusalem), SPIRE 2013

## Rafaele Giancarlo

### The Raincoat of a Lifetime.

In 1991, Costas organized the second of the meetings that would become CPM. It was in London, It was at the beginning of summer and there was a perfect English rather: rainy and kind of cold. I had finally gotten my Ph.D. and I had a real salary. The trip to London and the new economic status gave me opportunity to plan to buy a Brit raincoat. The real "in" Italians would buy Burberry, so I was sure of my choice.

I met Alberto at the meeting, which was indeed small. Livio Colussi was also there. I sat at the lunch table with them and shared with them that a dream was just going to come true: the Burberry raincoat.

As usual, Alberto, very politely and sensibly, decided that matter needed a more careful investigation. It became evident that I wanted a real Brit raincoat, Burberry being a special case. So, Alberto suggested, with Livio fully endorsing each word, that WE should not make such an important choice without proper documentation. I thought...well, let's hope that Greek philosophy does not come up.

A professor from the hosting university was sitting in front of us, listening to the conversation. Alberto, with Livio completely agreeing, asked the gentleman whether he could offer advice for the successful achievement of OUR goal. Now I had a team of advisors. The gentleman replied very politely that he was not an expert on raincoats, but he would certainly get information to help. Sure enough, next day he told us that he had asked his wife. A real Brit would never buy Burberry, which at the time had just been acquired by SEARS. The real thing was Acuascutum and the proper thing to do was to buy it at Harrods. So, Alberto, Livio and I went shopping: my raincoat first and then shoes and cashmere for Alberto. Livio kindly allowed our urgent clothing needs to take precedence over his, that could wait until his return to Padova.

When we reached the right section of Harrods, I started trying raincoats on, with Alberto and Livio giving me opinions on how the particular coat would wear: the shoulder is not right, a bit too long etc etc. Finally, the perfect one materialized. Really beautiful in each and every detail. Well, we were all very happy. The price even fit into four digits only. I felt a little unsure, not really though. Alberto and Livio shared with me experiences of analogous spendings of theirs, praising the many virtues of what they had bought. I bought the coat. I still have it and wear it regularly, even if in Palermo we do to have much rain.

Never regretted my choice, never had senses of guilt.

When I wear it, I think of a very pleasant day at Harrods, with two exceptional human beings. Just by looking at it, puts me in a good mood.

P.S. Do you know that, the bigger the geometric figures of different colors making up a cashmere sweater, the more expensive it is ? Some of them can even exceed 7000 dollars.

## Tennis Balls

I got my Bachelor Degree in Salerno, with Alberto. He was my undergraduate mentor. My BS thesis was entitled "Algoritmi Combinatori su Parole". After I graduated, he encouraged me to apply for admission in a Ph.D. program in the US.

I was admitted at Columbia University where my new mentor would be Zvi. Alberto had played an important motivational part in my choice, so when I left my small village in Italy for the city that never sleeps, I thought that paying a visit to Alberto in West Lafayette was the thing to do. I expressed this desire to him and he communicated that Titti and he would be pleased to host me for a few days.

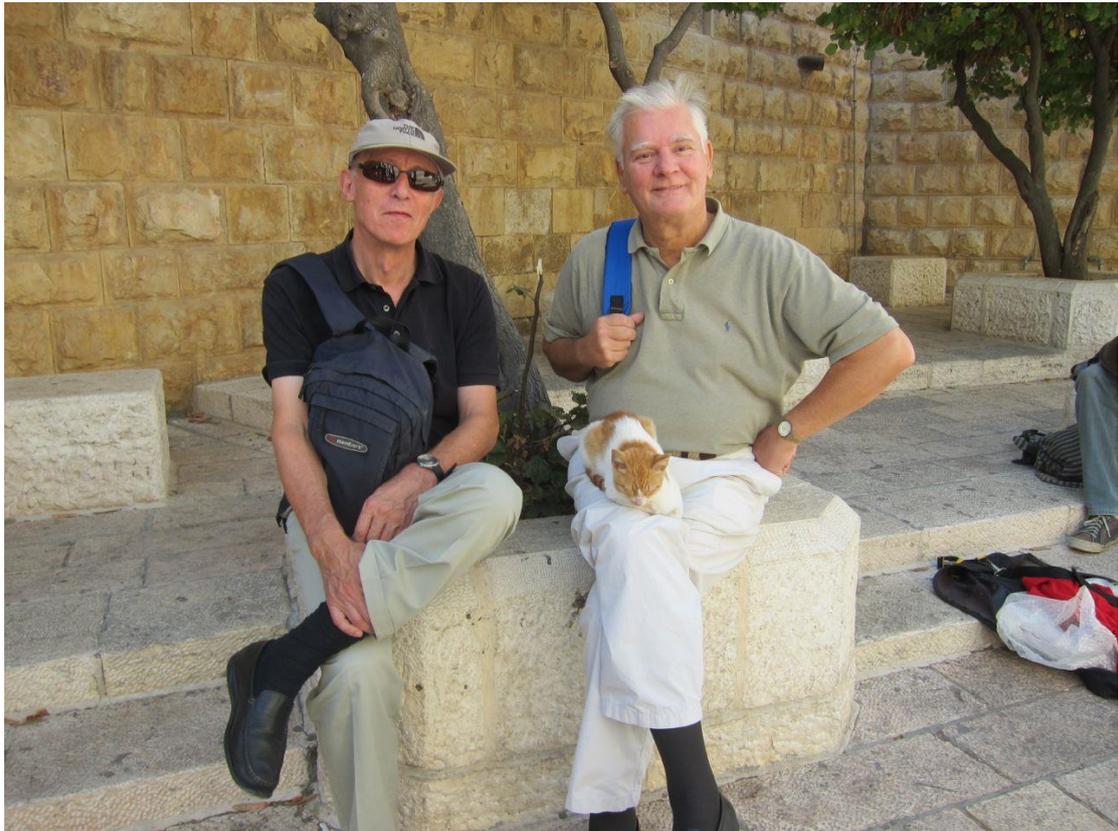
Before leaving, as a sign of appreciation for the hospitality, I bought a present for both, which was carefully packed because it had to travel.

After a couple of days in Titti and Alberto's house, I decided that I should give them the present. So, I did. I handed the present to Titti. In seeing the outside of the present, Alberto said, with delicate humor: "did you bring us Tennis Balls..how nice!!" Titti opened the containers, that indeed resembled tennis balls cans in their geometric look.

A Swarovski cat and a dog came out. They thanked me and Titti pointed out to me that Alberto loved cats. The other night, Titti told me that the cat and dog are still in their apartment  
in the US

## Gregory Kucherov

After reading this, I cannot refrain from sending this picture of Alberto, with Maxime (and a cat), that I took at SPIRE'13 in Jerusalem and that I personally like very much.



## **Mikhail Atallah**

### **The \$1400 Cashmere Sweater**

Alberto had a few hours to kill before his flight from Heathrow, so he decided to spend some time at Harrods. While looking at a cashmere sweater, a salesperson invited him to touch it and feel how soft it is. Alberto obliged, at which point she invited him to try it on. He said he would, but warned her that he was not buying, only looking until the time came for his flight. She thanked him for the full disclosure, and said “try it on anyway”. So he did, and as he was looking in the mirror she said “you look so good in this!”. When someone half your age tells you that you look great in a sweater, how can you disagree? He did look good in it. So he said “yes, this looks and feels great, but it is too expensive” to which she replied “yes it is very expensive, but you deserve it!”. Alberto knew how hard he worked, the salesperson was right: He did deserve it. He bought the sweater, and thereafter had a case of “buyer’s remorse” that lingered for years.

### **Cashmere Sweater, part 2**

Alberto was heading for lunch wearing the cashmere sweater, when he ran into a colleague in the corridor of the Haas building that housed the Purdue CS Department at the time.

After a brief chat, the colleague said “this is a very nice sweater, I would like to buy a similar one of a different color: where did you buy it from?”. Alberto said “I do not want to talk about this sweater, it is a sore topic for me because it was sinfully expensive and I should never have bought it”. The colleague was offended because he perceived Alberto’s reply as implying that that Alberto thought that the sweater was above the colleague’s budget and price range. He said “if you can afford it then I can afford it, just tell me where you bought it and how much you paid”. Alberto again was evasive about providing the price he paid, so the colleague tried to remove the reluctance by guessing a price that, he was sure, would be an over-estimate:

“How much could it be? Could it be, could it be ...” he said, as he tried to remember the price of the most expensive sweater at the most expensive store in the local Lafayette, Indiana mall, “Could it be \$50 ?”

## The Flight from Paris

As a teen-ager Alberto visited Paris on a shoestring budget, and when the time came to leave he had spent all his money. He arrived late at the airport: The boarding gate was already closed, and the plane detached from the terminal. It was against policy un-do these operations. Alberto explained to the airline agents that he was completely out of money, that unless he could get on that plane, his life would be forever ruined: He would either starve to death, freeze to death, or resort to desperate measures that would make him a fugitive from the law. He was so persuasive that the airline agents talked to their superiors, who authorized re-attaching the plane and re-opening the gate for Alberto to board.

## Amihood Amir

### The Barber of Salerno

The above accounts of the cashmere sweater and English raincoat finally led to my understanding a deep mystery.

Alberto would tell of his barber, who was very meticulous about proper dress and would not give service to any riff-raff who was not elegantly dressed. Alberto had a story about a colleague of his that needed a haircut. Alberto's barber refused to cut his hair since he was wearing un-matching pants, shirt and shoes, and besides, his jacket was some Sears off-the-shelf.

It was only after earnest entreaties of Alberto, exhorting him to make an exception since this is a famous scientist, and it is not his fault that he is not Italian and thus has not had any teaching in the proper way to dress, that the barber relented and gave him the haircut.

However, it took Alberto a while to win back the confidence of the barber, who looked askance at the fact that Alberto fraternizes with such uncouth individuals.

This story made such an impression on Gadi, that on many occasions when appropriate dress code was necessary, he would ask Alberto: "*would your barber approve?*"

This story also explains another incident. I picked Alberto up at his house to go to his office at Georgia Tech and do some work under the auspices of our joint BSF grant. At that time Alberto had some rash in his foot and thus had to wear sandals.

The first thing he said to me was: "*Ami, you have to excuse me for looking like a German. I have no choice because of the eczema on my foot.*"

## The Mormon Conversion

While attending a conference in Salt Lake City, Alberto had a free afternoon and went to visit the great Mormon Temple.

He was assigned a dutiful young guide who showed him around and expounded the basics of the Mormon faith.

At the end of the visit his guide asked him if he would consider converting to Mormon.

Alberto's response, to the best of my recollection, was:

"Young lady. You were indeed very eloquent. Your explanations were faultless and one can not deny the cogency of your arguments.

However, I carry a heavy mantle of historical duty. As you can see, my name is Apostolico, with all that it implies. You can easily imagine the consternation of the leaders and fathers of the Church, if I converted to Mormonism. In fact, I don't doubt that the disappointment of the Pope himself would be immense. Thus, it should not be taken personally by you that, notwithstanding your excellent exposition, I shall need to decline your generous offer to join the Mormon faith".

<try to imagine Alberto saying the above sentence, and you will be, if only for a brief moment, back in his presence.>

## A Kosher Experience

The late Renato Capocelli is still remembered by us for the lavish dinners in the meetings he organized.

On one of the first such meetings, he invited Aviezri Fraenkel.

Alberto prepared Renato in advance for the fact that Aviezri only eats kosher food, and told him to not take it personally, but he has religious restrictions and will not be partaking in the banquet.

Renato heard, and agreed, but such heresy could not penetrate deeply into his psyche.

Throughout the meal he tried to contain himself but, as time went on, as everyone was getting happier and fuller, and all this while Aviezri was just eating his tomato and cucumber, the superego was burst and Renato reverted to his gregarious hospitable self. "Avitsri", he said (Renato never mastered the pronunciation of Aviezri's name) "try this food, it is very good!". Aviezri, with his quiet smile declined, saying he is assured it is good but, unfortunately, he can not eat it. This calmed Renato for a minute only. A moment later, he exclaimed: "Atsivri - you must try this, it is excellent!!!". Again Aviezri quietly and politely declined. Finally, Renato could not take it any longer. He speared some morsel with his fork, grabbed Aviezri by his shoulders and waved the fork back and forth in front of Aviezri's face and toward his mouth crying with exasperation: "Azviri - eat, eat, THIS IS MARVELOUS!"

## **Gadi Landau**

I first met Alberto in ICALP85, in Nafplion, Greece. The result of this meeting was our first joint paper (with Uzi, Baruch and Costas) and much more importantly, 30 years of a wonderful friendship. Now, thirty years later I am left with a huge hole in my heart, great memories and three unfinished papers.

Alberto was an excellent scientist, he was an old timer, in the good sense of the phrase, in addition to a deep understanding of our field he had a broad knowledge in many other fields of science. Alberto was, as many noticed, a wonderful story teller, but for me, above all he was a friend.

Alberto's contributions to the scientific world are enormous. It is too early to recognize all of them. I would like to state one such contribution, out of many, Alberto, cleverly, was the first to notice that our Stringology field deals not only with alignments between strings, which was known, but also with discovery of motifs and regulations inside strings. Alberto's papers on discovery were the foundation stones of the entire field.

I would like to share with you two stories that Alberto told me that I have shared with others dozens of times. The first short story explains why one comment from Alberto will cost me a fortune for my entire life. This version is the politically correct version, the real version can be told only in private.

### **Suits for a Lifetime**

A few years ago Ami and I visited Alberto, as we did many times.

Alberto and some other faculty had a meeting with one of the top officials of the university. He returned with a big smile. This was unusual, since Alberto did not like such meetings. Sure enough, we requested an explanation.

Alberto had a short comment: The high official came wearing a suit that if he would wear it in Padova his (Alberto's) barber would not let him in his shop since the barber does not want to hurt his reputation.

Since then, instead of buying 50\$ suits in Walmart I buy handmade suits from the tailor of the provost of the university of Bologna.

## Italian Efficiency

The second short story is a story that Alberto told me. This story explains what efficiency is in the Italian way.

One day an Italian reporter (I assume that Titti knows his name) visited his friend in southern Italy. The reporter told his friend that the people of southern Italy are not efficient and therefore the entire country suffers and it will be for their benefit to improve their efficiency.

The reporter claimed that if an average person in Italy contributes to the economy of Italy  $x$  euros, then an average person in the south contributes only  $0.6x$ . On the other hand, if Italy spends  $y$  euros on average on each citizen, it spends only  $0.9y$  on average on each citizen in the south.

The friend's response was fast "What is inefficient here?"

Titti and Rosa, Alberto is one of very few that their legacy will stay forever, and I hope that knowing it makes his death a little bit easier for you.

Orith, I, and our entire family would like to offer our deepest condolences to you and the other members of the family.

What a loss!

## Ricardo Baeza-Yates

### The Tourist

In 2001 we invited Alberto to give a keynote at SPIRE 2001 in Santiago. He thanked me for the great time he had but the last day his wallet was stolen, including passport, and, more complicated for him, the green cards of his daughter and his.

After telling him that I was really sorry of the incident and that the police had recovered the passport and his driving license, he wrote to me something that only Alberto could write:

*"First let me say that I should take at least half the blame for what happened as I would not walk around my hometown in Italy in such a blatantly touristish attire and attitude. "*

The last time I saw Alberto was in 2013, again at SPIRE. I will remember him as in the second picture attached, in the center of our community, relaxed and apostolic in the perfect place, Jerusalem.

We will surely miss and remember him.





## Sharma Thankachan

Another apostolic picture from Jerusalem (SPIRE 13).



## David Sankoff

### The Tourist Guide

When I came to Rome for the first time a few years back to speak in Alberto's seminar, he picked me up in his car at the hotel and asked me which of Rome's grand sites I wanted to see first. I insisted that I just wanted to hang out, and that I wasn't interested in seeing antiquities; we could just go for a coffee. Images of Rome and her monuments were familiar throughout the world and I was a particularly jaded traveler. No Colosseum, no Forum, no Spanish Steps, etc. Alberto listened patiently, leaned over, locked my passenger-side door, calmly warned me not to touch it, and proceeded to drive me by the Colosseum and various other glories, all for my own good.

And it was good.

I regret I didn't get to spend more time with Alberto the way many of you have. Nevertheless, his generosity toward me emerged at critical points every five years or so, and I got to think of him as a mentor, though substantially my junior. I will never forget his magnificent but genial presence at RECOMB 2006 in Venice, where he turned me on to Prosecco long before it became the "in" drink in North America. I still always have a bottle in my fridge.

## **Simona Rombo**

### **Gastone and the Boating License**

The story started to be told because Professor Apostolico said that he had renewed his boat license recently. Then, he started to remember when he was an undergraduate student and he used to repeat several times the notions he was studying, before taking the examinations.

Often he used to repeat in front of one of his friends, Gastone, who was attending his same classes. Now, Professor Apostolico was very curious not only about the technical matters of what he was studying, but also about historical anecdotes related to those matters, which he usually recounted to Gastone as well. And Gastone was very good at memorizing what he had listened. So, you can imagine how much the teachers were impressed when Gastone answered questions they posed, starting from historical tales colorfully recounted. Too bad that, as it came to the more technical issues, the memories of Gastone were more and more blurred. But anyway, how a great success passing the examination without reading a book!

The best of the tale comes when Gastone told Alberto that he had decided to get a boating license. Luckily for sailors and seafarers, in that case the usual approach was not successful, since in addition to the theoretic test, there was also the practical one.

## Nivio Ziviani

### The Antique Furniture Connoisseur

I first met Alberto in 1995 at the second Spire in Valparaiso, Chile. He loved old furniture and he new a restorer in Cerea, near Verona, named Silverio Ziviani. He gave his card (attached), which gave me the opportunity of finding out precious information about my relatives in Italy.

My great-grandfather came from Veneto around 1870 and we did not know where he came from. I went to Cerea and discovered the place my great-grandfather came from, and was able to search and recover his birthday registration in Cerea.

I now have an Italian citizenship thanks to Alberto.

Alberto hosted Spire 2004 in Padova and invited some of us to his house, where he was very proud to show a very old furniture that he exchanged by his BMW!



## **Arlindo Oliveira**

### **The Race Car Driver**

Actually, I remember very vividly this particular event. Alberto pointed to an classic dresser he had on one of the rooms and said: Do you see that dresser? It used to be a BMW!

Surprised, we asked how that singular transformation took place. He then clarified that he had crashed a BMW in an accident, a car that he shouldn't have bought in the first place, and that with the insurance money he decided to buy that dresser

It was a much better and much safer investment!

## Amihood Amir

### A New Antique Furniture Connoisseur

Whenever Gadi and I travel somewhere, our plans diverge on Saturdays. I find the local Jewish community and go to the synagogue and Gadi indulges himself with local amusements (e.g. a *Yellowjackets* game when we are in Atlanta).

One such visit to Padova, Alberto took Gadi to an antique furniture show. Since I was not there, I was regaled to the account of the experience by the story master himself. This is, to the best of my humble recollection, how Alberto described it:

*"Ami, you will not believe it! We come to the show. Gadi walks in as if he has in his pockets multimillion Euro cheques. He walks over to a Louis XIV 50,000 Euro chair, sits on it, moves a bit to see how comfortable he is, and then inquires of the thunderstruck dealer "how much is it?". When he hears the price, he thinks a bit, clicks his tongue and says to me: "let's move on".*

*Before long, all the dealers believe that a new oligarch has shown up and they all rush up to him, make him sit on priceless divans, explain the virtues of their merchandise, and fawn all over him.*

*Meanwhile Gadi nonchalantly moves on from display to display, checks the items, and discusses prices with the dealers.*

*I followed him mortified and tried to gently hint to him that perhaps we should depart honorably before we are discovered and escorted out by the police. However, Gadi had a great time strutting around. By the time we went home he could look at an item and appraise it accurately before even asking the price!"*

## The New Rabbi in Town

This is the companion story to the above. While Gadi was causing Alberto consternation in the antique furniture show, I was equally contributing to his unease in the synagogue. Since the following story happened to me and I also heard Alberto recount it afterwards, it serves as an excellent case study of why Alberto's retelling of events made them a lot more interesting than in reality. Thus, this story is divided into two parts:

### Part I – the Bland Reality

Aviezri Fraenkel told me that the Rabbi of the Padova Jewish community is Rabbi Viterbi. That I should call him and he would give me Shabbat hospitality. I called the synagogue on Wednesday and asked to speak to Rabbi Viterbi. The person I spoke to inquired why I need the Rabbi and I told him that I am an Israeli scientist who is in Padova and would like hospitality for Shabbat. The flustered person said to me: "No, no! Go to Venice! The Rabbi is in Israel and the cantor is in Rome so we are cancelling this Shabbat. Go to Venice!"

I thanked him and hung up the phone. Venice is close enough to Padova and there are a number of synagogues there, as well as opportunities for Shabbat hospitality, so I would certainly be OK. But then I reconsidered. I felt bad that I am going to have a good time and the community will not have the Shabbat services. So I called the synagogue back. I told the guy that if they are cancelling because they have no one to lead the prayers and read the Torah, I will be willing to do it.

He told me to come over and we'll discuss it (a sensible thing to do. At least interview your volunteer cantor before accepting his services). Indeed that Saturday I led the prayers and read the Torah.

### Part II – the Exciting Apostolic Tale

(I do my best to try to recall the exact words)

*"Ami caused a total panic in the Jewish community of Padova. They still tremble every time Saturday comes around. In fact they exhorted me to inform them in advance if Ami is coming to town and perhaps they'll be able to hide somewhere.*

*These poor souls. Here is the opportunity of a lifetime! The Rabbi is away, the cantor is out of town. Free! Vacation!! They can have a quiet relaxed Shabbat. But then what happens? This computer scientist strolls in, kills all their joy, and tells them: "No, you can not play hookey! You have no choice. Come into the synagogue and pray!"*

*These people are living in fear to this day. The cautionary tale of the Israeli praymaster is passed from generation to generation. I am mortified at the way they look at me for bringing this scourge among their midst."*

# Laxmi Parida

## Alberto, the Perfect Gentleman

I formed an indelible bond with Alberto ever since his visit to the IBM Research lab, in 2001-2002. He spent roughly six to eight months at the institute and I got to know him at many different levels: a collaborator, a friend, a mentor, a confidant. He helped me buy my car. Quickly realizing my ignorance on the subject, one fine afternoon he drove me to the dealer and did all the negotiating. The result: I drove home a brand new BMW. He warned me not to wiggle in my car since "*the BMW, being the fine piece of engineering that it is, would wiggle with you*".

Later, during that visit I once invited Alberto and family home for dinner. In the foolishness of my youth, I made the error of serving some Italian inspired dishes (I remember what I had cooked but will spare you the details). A few days later two Italian-Cooking magazines mysteriously appeared in my mailbox. I now shudder to think that I even served him some local wine. It was later that I was to learn about his taste in wine (and food). And, somewhere along the line, like David Sankoff, I have also become a regular consumer of Prosecco.

The year 2008 was special. I missed the celebration in CPM at Pisa. I organized a small surprise birthday party for Alberto at the Trieste School.

I had the good fortune of staying at his place in Padova during my birthday, where he had a surprise cake for me.

Sometime, between the two celebrations, I was on his boat.



## A Penchant for Positivity

I have never ever heard Alberto say a negative thing about anything. He had this uncanny knack for giving a positive spin to all.

Once I had worked for weeks on a proof of a theorem, but, as luck would have it, it all collapsed. I was very disappointed and when I told Alberto about it, he said, again in a style that only he can say, "*a lot can be salvaged from the rich debris of a wreck*". Sure enough, he joined me in the rescue effort.

Here is a hilarious one, that always brings a smile to my face.

Once after a week in DIMACS, where we had co-organized a workshop, I came home to a very tall pile of dishes in my kitchen sink. Later I was complaining to Alberto about this and he said "*You are lucky that the dishes were not all over the house-- under the sofa, behind the TV, on the bed, etc etc where they could very well have been. At least, they were neatly placed in the sink for your convenience.*"

Well, there is one exception. Even Alberto could not get himself to say something nice about yogurt. He did not like yogurt. He was only too happy to give the credit for inventing yogurt to the Greeks (or, Indians when I so insisted).

## Simply Funny

Alberto loved to spend the month of August sailing. I have heard great many boat stories from some of you and from Alberto. Here is a little one of mine:

Once I had to reach him during the month of August and needed his signature urgently for a document. Given his location, he said that I should feel free to replicate his signature (let me assure the reader that this was for a very innocuous purpose) and so I did. A few more times as well. Then later he came back to me saying if I could send him a copy of his signature, so that he could study it and replicate his own signature, for the future.



## The Perfectionist

People who know me also know of my strange desire to get one in a real or fake tango pose for a Kodak moment. Alberto always dodged my request, perhaps because the perfectionist in him didn't like the idea of faking, and pushed someone else to oblige me. But finally, he gave in at one of our Dagstuhl workshops (maybe because Titti silently insisted- attached picture).

As I recall and write these, I realize how he touched our lives in so many ways.

Unquestionably, a great scholar with depth as well as breadth- almost an impossibility to achieve. I continue to work closely with many of his academic descendants. At a personal level, he was a perfect gentleman and the nicest man I have ever known. I will always miss him.



## Ayelet Butman

### The Gentleman with the Spicy Fowl

On one of the Israel Stringology workshops in Haifa we were sitting at a lunch table together with Alberto. We were served a very spicy chicken.

I am used to spicy food, but I found that dish to be extremely spicy. All of us at the table were getting redder as we were suffering from the spicy dish, but Alberto carried on the conversation with aplomb, as if he is eating bland English food.

At some point he wanted to tell us a particular joke. He started to tell it, but then noticed that I was the only woman at the table. Oblivious to the spicy chicken he was eating (which, at that point I gave up on) he declared in his dramatic deep voice:

*"I have a great joke to tell you, but I can't tell you because we have a woman here".*

I always remembered that situation with admiration for his total lack of excitement with the spiciness I could not eat without tears in my eyes, as well as his gentlemanly demeanor.

However, unfortunately, I will now never know what was the joke we missed...

## **Sharma Thankachan**

### **Good Cop – Italian Cop**

A few months back, I was having a discussion with Alberto about how to act nice if a cop stops you for a traffic violation. He told me a funny story that happened during his younger age.

Once a cop stopped him for speeding, in the US. When they asked him questions (in an American accent), Alberto replied in broken English with a strong Italian accent as if like he did not understand English well. The cop thought this guy is new to the US or a tourist or probably the cops during that time were super nice, consequently, Alberto didn't get any ticket.

Interestingly, this trick worked well for him more than once. However, once this trick failed miserably, because the cop who stopped Alberto was originally an Italian and he let Alberto defend himself in Italian.

We had a nice laugh after this story.  
R. I. P. Alberto

# Andrea Pietracaprina

## Hungarian Cop

I met Alberto 22 years ago and worked in the same department for almost 15 years. I have many memories Alberto and decided to share with you the one that, although a long time has passed, is still the most vivid in my mind.

July 1995. We both were in Padova at that time: I was an Assistant

Professor in the Math department and he was Full Professor in the Electrical and Computer Engineering department. The two of us were going to attend ICALP in Szeged (Hungary) and, after checking different travel options, decided that the most convenient thing to do was to drive there. Right away the trip ahead appeared somewhat challenging: about 1000km, 15h drive - with the road conditions of that

Time - to cover twice (back and forth) in a 5-days period with my not-so-comfortable, non-airconditioned FIAT UNO. Although Alberto had been always extremely friendly to me, still I was a junior faculty and I was clearly a bit intimidated by Alberto, who was already a very well known and charismatic leader of our community. So, during the days preceding our journey I felt a bit nervous and I "prepared" for the long drive reviewing possible topics of conversation.

In fact, none of this was at all necessary. The journey turned out to be among the most pleasant I can remember. Alberto had a distinctive, I'd say unique, ability to put other people at ease. It's been like traveling with an old friend, talking about work, life, food, vacations, whatever came to our mind and, sometimes, just looking silently at the landscape around us.

But the true anecdote comes in the return leg of our journey. It was midday (about 1 pm), and we had just left Szeged, happily heading north-west towards the beautiful Balaton lake. We were discussing some of the results that we had just heard at the conference (I was impressed by Alberto's ability of distilling the key aspects of those results, as if they had been his results), when the police stopped us.

I (the driver) stepped out of the car trying to make sense of the accusations that, in broken English, the policeman was making against us. Apparently, our fault was that our headlights were off, whereas in Hungary it was compulsory to have them on also during the day. Although this seemed to me a somewhat minor fault the policeman, at least judging from his gaze, did not seem to share my evaluation of the gravity of our offense. So, sweating profusely, I started analyzing possible worst-case scenarios when Alberto, very calm, also stepped out of the car, and with a serene, yet slightly annoyed gaze on his face, looked firmly into this guy's eyes and told him, in a low voice, as stating the obvious, that we were world-famous scientists, guests of the Hungarian government, and that any controversy would have to be resolved directly by the local government officers. I am not sure whether it was more the content of his statement or the way it was delivered (probably both), but for sure the policeman was stunned, and at that point - I thought - only two of the options that my mind had scanned before Alberto intervention, were left: either we would be immediately released and be able to continue our journey back home, or we would soon find ourselves locked behind bars for life. Since I'm writing this story comfortably seated in my office in Padova, you can guess which of the two options turned out to be correct.

Thank you Alberto, it's been a great pleasure to know you.

# Matteo Comin

## The Chiarissimo Debate

December 2006.

I was finishing my Ph.D. under Alberto's supervision, and I was preparing my thesis. Towards the end of my Ph.D., Alberto and I had several meetings to discuss how to write the thesis, till in December I was able to prepare the final draft.

After so much work I was quite nervous for his final approval and Alberto was reading silently every paragraph. Everything was ok, until he finished to check the last paragraph and he closed the thesis. He looked at the cover for quite some time, till he found something that appeared to be terribly wrong to him.

The last line was "Supervisore: Chiarissimo Prof. A. Apostolico". The problem was that he really don't liked to be called *Chiarissimo*, and he ask me to remove it. I told him that every thesis that I have seen has this adjective. *Chiarissimo* literally translates as *enlightened* or *extremely clear* which, indeed, was one of the many talents of Alberto. To me that adjective seemed quite appropriate and I didn't see the problem.

Yet Alberto pointed out that I should remove it. He justified his request by describing the many qualities of Leonardo.

*"Everyone knows that Leonardo was a fine painter and sculptor. He was also known for his ability to design machines and to design buildings. A few people also know that he wrote excellent poetry, amonh his many other talents.*

*However we do not call him painter, sculptor, architect, scientist, engineer, inventor, or poet... We call him just Leonardo. Who am I to be called Chiarissimo?"*

He was more than just a mentor to me, a bright and humble human being. I will miss Alberto deeply.



## Nadia Pisanti and Ugo Vaccaro

### One Can be Really Stupid when One is Young!

The first time I heard Alberto talking, I immediately recognized his Southern Italy accent, even though he was speaking in English. As a daughter of two Neapolitan parents, I loved it. His accent was intentional, or at least so it was in my opinion. Sure enough, he had this accent when he told us the following story a few weeks ago at CPM in Ischia.

It was evening, after some Ischia good food, in a beautiful garden of an Ischia hotel, with the perfect weather of an Ischia summer night. Alberto started saying “*One can really be stupid when one is young... I don't know whether it gets really better when one is old, but for sure, one can be really stupid when he is young!*”

The story starts some forty years ago, when Alberto's uncle (his father's brother) passed away. The two brothers owned together a pastry [production and/or shop, we don't really know, nor do we recall whether/where this was precisely located in Ischia]. It was a small but valuable family-run enterprise. Or, at least so it was until then, because to Alberto's father surprise, the half owned by the deceased was sold to a big and very famous pastry chef and entrepreneur named *Calise* [now by far the main pastry production and sale in Ischia]. As a result, Alberto's father was left with a business that was no longer a family one, and as such it had lost most of its interest as a job. Nevertheless, he exhibited a major resistance to selling his other half to Calise, whose offers were bearing a certain pressure.

One day - and in this occasion Alberto was present - there was yet another session with Mr. Calise trying to convince Alberto's father to sell, and Alberto's father sinking in his armchair finding it more and more difficult to resist to the unrelenting attack. Mr. Calise was a clever man, and therefore he soon understood that it was not a money issue, but just that Alberto's father did not want to give away a family business he was proud of. Then he came up with the following offer:

“I can build you a villa wherever you want in Ischia, just tell me where!”

Alberto's father was then clearly tempted, and turned to Alberto who was sinking even deeper in his armchair.

“You know”, he told us, “*I was already quite regularly in the US, wasn't really interested at that time in a house in Ischia....*”

So the half-pastry was sold via another deal, which included that from then on, every Easter and every Christmas, a package full of Calise's pastry was delivered to them.

Mr. Calise never forgot his promise, and the package kept on arriving twice a year as long as Alberto's father was alive. But... “*no villa in Ischia after all*”, said Alberto. And he added: “*One can be really stupid when one is young!*”



## Steven Skiena

### The Ill-timed Flush

I was blessed to spend the Summer of 2002 visiting Padova. Alberto was a very gracious host during my visit. I will always treasure memories of that time: lunches with Alberto trying to explain to me how Italy did and didn't work, and a special dinner at his and Titti's lovely home.

My wife Renee has always dreamed of owning a boat, and hoped in vain that I would eventually come to share this dream. Soon as Alberto got wind of this he immediately invited us on an overnight trip on his boat. *"Surely Steve will have such a wonderful time he will run to buy a boat the instant he gets back to the United States."*

I warned him that Renee had tried this strategy with her nautical friends twice before, to no avail. I even warned him that both of those trips ended up with the boat being towed to port. I am a jinx at sea.

But Alberto waved this off, and we had a wonderful time cruising the Adriatic Sea. On the second day at sea a passing boat asked to borrow a corkscrew, and rewarded Alberto's gallantry by dragging along a line which hopelessly entangled the propeller of his boat.

But Alberto knew what to do. He repeatedly dived off the boat and worked underwater to try to cut the cord loose. This was hard work, and I was impressed with his strength and stamina as he tried to clear the propeller.

Then a party (to remain nameless) stepped out of the little toilet we had onboard. At that exact instant Alberto came sputtering to the surface, a lesson in what happens to waste at sea. But the real lesson was Alberto's grace in accepting apologies for this transgression. He was a true gentleman in all senses of the word.

Our boat trip together that was no less wonderful for us because we had to get towed back into port.

My memories of seeing Alberto and Titti in Israel this January will endure as the last time I saw them together.

We will miss him.

## Esko Ukkonen

### The Phone Call in Paris

My very first contact with Alberto was unplanned but the set-up was appropriate.

In the summer of 1987, I visited Maxime in Paris and was in his office at Paris-Nord. Suddenly the phone in the room was ringing. I answered and said that Maxime was temporarily away.

The deep bass-baritone voice on the phone was not satisfied with that but was curious about me: “*May I ask with whom I am talking?*” It was Alberto, and as you know, just one example of his characteristic talking is enough for that you remember.

Since then I learned to know Alberto as a colleague and friend who was not only a top scientist and a visionary organizer as well as a verbal perfectionist but also a warm-hearted human being whom all love as he loved the life.

### Discussing Suffix Trees in Dagstuhl

A memorable meeting with Alberto was in Dagstuhl in the early 1990’s.

I had started teaching string algorithms in Helsinki and had also to cover suffix trees. Now, finally, I could not any more avoid understanding this structure with “myriad virtues”. It turned out that the construction algorithms in the literature were far beyond my capacity. If at all possible, I had to develop the linear-time construction for my lectures from scratch.

The outcome of my preparation was the ‘on-line’ algorithm, to my mind the natural one which makes the suffixes grow at the tips. I was a bit excited about my discovery and wanted to give a talk in Dagstuhl where both Alberto and Maxime were present. I was sure that my result is correct, I even had a proof!

So, I started describing what is the order in which Weiner and McCreight add the suffixes to the tree in their algorithms, and how I will do it. At this moment Alberto interrupted and wanted to discuss. I think he was skeptical about the linearity I promised. But as I am a Finn, and hence not too communicative, I asked him just to listen - the proof will come, trust me.

Afterwards, Alberto sometimes recalled our fruitful non-discussion.

## The Communicative Finn

In 2002, we invited Alberto to the Scientific Advisory Board of the Helsinki Institute for Information Technology (HIIT), a joint research institute of the University of Helsinki and the Aalto University. Alberto joined the SAB and served as a valuable member until this year.

The SAB was chaired by Randy Katz (Berkeley). When the SAB started operating, Randy had already learned that there is some truth in the reputation of Finns being people who are “silent in two languages” (Finnish and Swedish are official languages in Finland). Hence he didn’t expect too much of the SAB discussions as some Finns were supposed to be present.

In the first meeting it turned out, however, that there will certainly be discussion. Referring to Alberto Randy said: “At last, we have a communicative Finn!” – “Yes, sure, of course, but not a Finn...”

## Giuseppe Lancia

### Is this Work?

On a sunny afternoon in 2006 Alberto and I had to go through a few hundred submissions for the Venice RECOMB conference, look at each of them, sort them by topics and decide the referees. A lot of work, so I guessed we should have met early at his office, in our department at the University of Padova. Right? Wrong. He had a better idea.

At an harbor by the sea, near my hometown, he was keeping his boat, a nice catamaran with plenty of space and a big table in the interior. That was the perfect place to look at our big bag of papers. And so we did (not before he had put on some classical music for the background and poured us a glass of wine).

Now I wish my current office were on a catamaran too.

It isn't but at least thanks to Alberto I lived the experience of working on a boat. He surely knew how to enjoy life and I will miss him.

## Cinzia Pizzi

### First and Last

There are two memories that immediately came to my mind when I've heard Alberto left us: the first and last time I saw him. I'd like to share them, together with a story. They are just a little addition to all that has already been said about Alberto, but it is a little addition that counts a lot to me.

At the beginning of 2002 Alberto and Titti played, what I would definitely call, a crucial role in my life. After my Masters degree in 2001 I started to work in the industry, at Telecom Italia Labs. An interesting job, but I felt that I was missing something. So I applied for the PhD program in Padova. When I was admitted I started to seek a PhD advisor. But for one reason or the other my search was not as successful expected. So, I went to Titti, who was the PhD program coordinator, to tell her I will stay in the industry. She suggested talking to Alberto, whom I hadn't consulted yet, before making a final decision, and led me to his office. That afternoon I had a long chat with Alberto. I found myself in front of someone not only highly knowledgeable, but so passionate and enthusiast about research to be contagious. He helped me ponder pros and cons of my alternatives, with deep argumentations, and finally he gave me a paper, "Of maps bigger than the empire", saying if I had liked it, I would have known what to do. The following day I returned to Turin, where I was working, and told my boss I made up my mind. My PhD with Alberto had just begun.

As a side note, when we left Alberto's office it was dark outside. Considering the area nearby the university is not exactly the safest in Padova, Alberto, being the gentleman he was, waited with me at the bus stop, although he did not need to take the bus.

Two years ago I met Alberto at his hotel in Lipari, to discuss with him some problems that would lead, a few months later, to my joint paper with both Alberto and Titti! Then we were joined by my husband, with my son, and by Titti, and we had a nice drink together on the terrace.

I remember Alberto showing his boat to my son, explaining to him (who was not even two years old) that this one was indeed a very good boat, while those on the horizon were all "ugly" boats (or whatever the translation of "schifezze" is!).

That was the last time I saw him in person. It was a really nice afternoon, and I will treasure it forever.

## The Tomato Sauce

Alberto liked to play jokes on me about a few things. His favorite was definitely cooking, although he never ate anything cooked by me (while I ate something cooked by him, but this is another story). Here is how it all began.

Towards the end of my PhD I visited Alberto in West Lafayette and he was so kind as to help me settle in. One day he drove me to buy some food and then we went separately to search for what we needed. It was my first time in the States and I was looking, without much success, for familiar brands. When I had to choose some tomato sauce I was really lost. I usually buy “passata di pomodoro” without any addition, which is the basis for the tomato sauce. But I could not find it. The choice was between ready-to-use tomato sauces, or to buy some tomatoes and make the sauce myself. Now, I have to admit I am a bit lazy when it comes to cooking, so I picked what looked to me as the simplest ready-to-use sauce (i.e. tomato and basil).

At that precise moment I felt another presence. Alberto was in front of me, with a look of great disapproval: “*Not even I would ever buy something like that!*” he declared. Quickly I put the sauce back to the shelf, and asked him what he usually bought (note that Titti, a more reliable culinary advisor, was not there that semester).

Alberto browsed the shelves and moved further in the aisle till he found what he was looking for: “*Ah, there you are!*”, and put a couple of cans in my shopping cart. Then he left with a smile of satisfaction, maybe because he saved me from a deadly sin for an Italian or, most likely, because he had found something to playfully tease me on for the years to come.

In any case, I was curious to see what he put in my cart. I took one of the cans and it was... Tomato Soup! Feeling a little less ashamed for my original choice, a smile appeared on my face too, while following him to the cash counter.

Since then I’ve heard several times, especially at dinner parties, Alberto telling the story of my dreadful choice of tomato sauce, as an explanation for why I was strictly forbidden to go close to the kitchen. I have to say he was so funny in telling the story that it was only recently that I revealed to him that, if he was really using what he put in my cart, he must have had “spaghetti with tomato soup”!

## Rich DeMillo

My memories of Alberto always involve kindness, family, laughter, food, and culture (real or imagined) in some combination.

### Culture

One of Alberto's letters of recommendation here at Georgia Tech said, "He is the most cultured person I know." Alberto was always able to dig up a literary allusion, philosophical argument or historical fact on a minute's notice. His lectures—even on the most abstract mathematical topics—were often laced with cultural digressions. His students loved this about him. Alberto and I taught competing sections of CS 4001, the required Computers and Society course at Georgia Tech. We traded experiences often, and I was constantly amazed that Alberto's students—Georgia Tech undergraduates who are not known for reveling in classical material—seemed to love it.

Alberto's love of culture extended to his musical tastes. He did not appear to follow popular culture at all. When Titti and Ronnie managed to convince him to attend a Paul McCartney concert in Piedmont Park, he smiled through the whole thing but claimed he did not know a single McCartney song.

I took this at face value until one summer evening in Padua when we were all invited to an Italian garden party. Our host had cued up dozens of popular songs from the 60's and 70's. Not only was this popular culture, it was popular music. I was sure that Alberto hated it until I noticed that he was smiling a lot. At about eleven o'clock, there was a run of four or five rock instrumentals. I knew most of them, but when Titti asked me the name of the Shadows' guitar solo from 1960, I drew a blank. At that point, Alberto leaned over and said with a completely straight face, "Apache."

## Alberto and Driving

Alberto loved to drive cars. It never seemed to matter what kind of car. He said it relaxed him, and it was not unusual for him to make a round trip between Rome and Padua in time to go to dinner. He always liked to drive fast.

When we lived in Padua I took advantage of a tax loophole and bought a new BMW. Ronnie, Cara, and I drove it back from Munich to find Alberto waiting for us. I knew he wanted to try it out, so we drove it to Venice. He was very complimentary, but did not give it an especially aggressive test drive. A couple of weeks later, Alberto suggested that we take a road trip to Trento. We would not all fit in my new car, so Alberto bundled Titti, Rosa, and Cara into their decrepit Ford Fiesta. Ronnie and I followed in the new car. As soon as we hit the mountain roads, Alberto left us in the dust. The Fiesta's muffler was loose and in the distance, we could see it bouncing up and down as the Apostolico family went tearing through the valleys at a hundred miles per hour. No matter what I did, I couldn't catch him. There would just be this old Ford Fiesta bouncing up and down barely visible ahead of us.

That was the trip where we all got lost. Alberto kept following increasingly less promising detours to a mountain pass, eventually crossing a small bridge over a deep gorge. The road ended in the driveway of a private house that sat atop an improbably small *mesa*. It must have been five hundred feet high and looked a little like a scene from a Road Runner and Wiley Coyote cartoon. There were no guard rails and only a few feet to spare on either side, so we spend the next quarter hour trying to turn our cars around without running off the edge of the cliff.

## Sgroppino

Alberto discovered the Venician dialect word "sgroppino" one winter and thereafter used it as a test of a restaurant's menu. Sgroppino is a kind of palate cleansing sorbet consisting of lemon *sorbetto* and vodka. Made properly it is a frothy, tangy *digestivo* that also makes a great dessert. The word itself signifies the untying of a knot, and Alberto correctly decided that it referred to untying the knot in the stomach that might be caused by rich food. After every meal, Alberto would inquire in a conspiratorial tone whether we should find out if the establishment served sgroppino. If you had to explain what it was, the authenticity of the entire meal was called into question. Sometimes a perplexed waiter would show up with a sad plate of lemon sorbet swimming in a pool of vodka, but Alberto never embarrassed him for not knowing how to prepare and serve sgroppino.

## The Race

Who pays for dinner was always an important decision. For the most part, it was Alberto who managed to convince waiters that there was nothing to discuss: Alberto would pay! Titti also learned some of these skills, but Alberto was the master at making sure *il conto* was taken care of before the rest of us could react. There were many evenings when Ronnie sat Titti down for a serious discussion on this matter. It was the only way to win.

Several years ago, we all went to dinner at *Al Piri*, one of our favorite summertime restaurants in the hills outside Padua. Cara, Rosa, and one of Cara's friends were there along with our old friend and colleague Guido Cortolazzo. By the end of the meal the bill was still unpaid. It was a rare lapse on Alberto's part. Guido and I realized it at the same time. We all exchanged looks for a moment and then, sensing a rare opportunity, we got up in unison to intercept the waiter, who by that time was behind the register at the far end of the restaurant. We were seated at least a hundred feet away on an outdoor plaza overlooking the hills. I imagine we looked like characters from a Totó movie, not quite running, elbowing each other as we raced to be first to present a credit card. Everyone else was doubled over laughing at the sight. Alberto won the race.

## De Crescenzo

Alberto was a great story teller, and he would borrow freely from whatever Neapolitan material suited the moment. The tales became more elaborate as the years went by, but since there were only a finite number of "seeds" many times we were hearing a new variation on a story that he had first told ten years before. One of Alberto's favorite authors was Luciano De Crescenzo, a former IBM executive who gave up technology to write comic essays and books about Naples and its people. De Crescenzo characters—in particular De Crescenzo's famous Professor Bellavista—found their way into many of Alberto's stories.

This was one that tickled him so much that he had a hard time finishing. Evidently De Crescenzo's mother was suspicious of her son's involvement with computers. "And what do these machines do?" she asked. Luciano thought it was because she did not believe it was a serious career and so he took great pains to describe the technology and impress her with its importance. During one ambitious explanation of how fast IBM computers could perform arithmetic operations, De Crescenzo described a tight loop of additions and multiplications—millions upon millions every second. Mother recoiled in horror at the thought of so many whirring calculations. What if something were to go wrong? "Careful, son," she blurted. "It sounds dangerous!" Long before he got to the punch line, Alberto had dissolved into giggles, inviting us to imagine De Crescenzo's mother pulling her son back from the brink of disaster.

## Sailing

Anyone who knew Alberto, knew of his love of sailing and his devotion to *Obliqua*. He managed to convince Ronnie of the charms of a nautical life, and she was a devoted crew member from that point on. Alberto also knew that I was less enthusiastic, preferring a soft bed and warm shower. In that regard, I had in Alberto's eyes much in common with his brother Lucio who believed—Alberto would loudly pronounce every summer—“Sailing is an expensive way to be uncomfortable!”

One March when I was with HP, I found myself in Europe for the weekend with nothing much to do so I arranged to meet Alberto and Titti in Lignano, where *Obliqua* was moored for the winter. By coincidence, Alberto needed a hand moving *Obliqua* to a new slip at the Marina. The weather was windy and raw and the tide was low which made the use of a motor a little tricky in the shallow harbor. My role was to wrap wet lines around myself to prevent the boat from being pulled out into the harbor while currents and high winds tried to do just the opposite. There were sailors on both sides of us but they were indifferent to our problems, so it fell to us to coax and nudge the boat against the current into place. I had no idea what I was doing, but Alberto seemed to be in control of the situation. I think it was the only time I was ever really helpful to him on the boat, but he went out of his way to say it was evidence of my lifelong interest in sailing.

In truth, there was no more relaxing way for me—the non-sailor—to sit quietly in the open air, reading books on my Kindle. Ronnie and Titti would scamper across the deck taking care of the multi-colored lines, and Alberto would sit perched in the Captain's chair, one eye on the weather and the other on the GPS navigation system. This summer we toured the Aeolian Islands, usually dropping anchor in a protected harbor. We had one day of good wind and the rest of the time moved by engine from cove to cove. The sun was hot so Alberto agreed that Titti and Ronnie should put up the large sun shade, a device that, once installed, made it impossible to use the sail. There was a zipper to fasten the shade to another section of canvas, but that zipper often pulled apart, which led to a pup-tent configuration that was not very effective. One afternoon, Ronnie, Titti and I took a water taxi to fetch some fresh fruits and vegetables. When we came back, Alberto had fixed the rigging and the resulting apparatus now worked perfectly. We were impressed but after a little while the zipper arrangement once again began to fail, which threatened the whole enterprise. I noticed that a simple shifting of a support line would rescue things. Alberto seemed fine with my solution, until he got a look at the knot I had used to secure the line. I think I mumbled something about a “good engineering solution,” but I had used every inch of line to build a kind of rope ball that I was sure would never unravel. Alberto thought this was the funniest thing he had ever seen and proclaimed it evidence that I had never been a Boy Scout.

Later in the day we took shelter in the harbor at Lipari where we were joined by a yacht called *White Lady*. The name of the boat was outlined in neon and it took a crew of five or so to operate the vessel. Alberto was intrigued by the whole setup and we spent the early evening watching *White Lady*'s inhabitants disembark one by one (never together) on a red carpet that their Captain had deployed especially for the occasion.

## Prosecco Ritual

Most evenings when we were in Padua, we would gather at Alberto and Titti's apartment for the prosecco ritual. Their apartment was near a central square where you could find little savory treats, so Titti often had a tray of these and glasses of prosecco waiting for us. It did not matter who was in town. Every one was invited to partake (including Cara, who even when she was a little girl could count on a splash of sparkling wine in a grown-up glass). As visitors to the Masters in Software Engineering showed up in Padua, the number of people at the prosecco ritual grew. Al Aho, Dick Lipton, Mike McCracken, Walter Tichy, Walter Gautschi, and Vic Basili were among the more famous attendees.

The only problem was that the ritual inevitably interfered with dinner. Alberto's car was kept in a garage about a half mile from their apartment, so after draining a bottle of prosecco, the group had to figure out how we were going to get everyone to the restaurant. We seldom got there on time.

## Cacio e Pepe

Last year Alberto introduced Ronnie to *cacio e pepe*. I had left Ronnie, Titti, and Alberto on the boat to catch an earlier flight. Meanwhile, Alberto took Ronnie to Enrico's, a restaurant near his Rome apartment, to get *spaghetti cacio e pepe*. The idea behind it is simple: a lot of Parmesan and Romano cheese mixed with a little pasta water and whipped into a frothy sauce that coats the spaghetti. It's extremely hard to get it right, but when it works it's wondrous. It is also rich and heavy. Alberto went on a cacio e pepe diet. He tried it out at half a dozen places around the city. He said he felt out of sorts for the next week or so, but that it was worth it.

Meanwhile, Ronnie started perfecting her technique here in Atlanta. She was making real progress when we discovered that Modena's famed chef Massimo Batura had invented *risotto cacia e pepe* which is even more difficult to make. We told Alberto the story of how Batura developed the dish as a way of making use of the 1,000 wheels of Parmesan cheese that were damaged in the 2012 earthquake in Emilia-Romagna (The dish was so wildly popular that all of the damaged cheese was sold out world-wide within a few weeks.) Alberto liked the story, and gave us the green light to make as much cacio e pepe as we wanted, but we never perfected the method. When we do, we will have a celebration in Alberto's name.

## Alberto the Practical

One of the things Alberto and I did in Padua was to start the Masters in Software Engineering. You have to understand that Alberto's approach to academic matters was classical and theoretical. There was never a hint of the practical, but for some reason he became enthralled with the idea of creating in parallel to the university an industrially supported "masters" degree in software engineering (MSE). He rounded up support from the local chamber of commerce in Padua and from a number of surrounding industries. He was not himself an expert in the field, but he was a great supporter of the idea that academic experts could contribute much to economic development in the region.

Alberto made the rounds of executive suites of companies that he believed would benefit from stronger software technology, and I watched with amazement as he sharpened his pitch. One day he was explaining the MSE to the CEO of a financial services company. The CEO was skeptical, and said "What can a university professor tell me about my business that I would be interested in hearing?" Alberto launched into a half-hour dissertation on how Italian companies were passing up a great source of innovation and how this company in particular would find itself better positioned if its senior software developers were exposed to the ideas of the MSE. The CEO eventually relented and supported a number of students as a result.

"Alberto the Practical" made many guest appearances after that. Once word circulated among Italian consulates that Alberto was stationed for half the year near Chicago, there were many invitations to Italian-American industrial symposia where Alberto would make the rounds of visiting businessmen, passing out his MSE business card and cementing his reputation as a practical engineer.

## They are with Me

There is an American military base in Vicenza, just a few miles from Padua, that hosts a street fair and fireworks display for the locals every July 4th. The Americans served hot dogs to their Italian neighbors and the Italians set up street food stands to sell grilled meats and other goodies to the Americans. Vicenza townspeople and American base personnel mingled, ate, drank, and everyone had a great time. The Apostolico and DeMillo families went whenever we could. The US Army has a lot of experience with explosives, so the fireworks were always spectacular. The rules for driving on or near the base were never entirely clear to us, so one year we accidentally turned into the main entrance to the base. As usual the Ford Fiesta was in front while Ronnie, Cara, Rosa, and I followed closely behind. It's important to understand that none of us had permission to enter the base. We were stopped by guards with drawn weapons. They were not menacing but it was clear – with so many civilians nearby – their role was to keep unauthorized personnel out. Normally, the guards would have asked for ID's and when we could not produce them they would have directed us to turn around. Instead, I could see Alberto engaged in a very earnest discussion with the guards. Occasionally he would point toward our car and the guards would look in our direction. None of us could hear what was being said, but after a few minutes, the gate rose and Alberto drove through it. After he was safely inside the base –but before the gate was lowered to block our entrance – Alberto opened his car door and announced

loudly: “It’s OK, they are with me!” At that point the guards stood at attention, saluted, and motioned for us enter the base.

We spent the evening, roaming the base, buying burgers from Burger King and ice cream from Ben & Jerry’s. However, most of the action (including the fireworks) was outside the gates. When it came time to leave to rejoin the street fair outside, we were once again stopped by guards, who demanded to know who we were and how we had managed to be on the base. Once again we let Alberto negotiate for us, although it was less clear how he intended to win our release. We could see the guards shaking their heads. After a few minutes they must have given up trying to understand what was going on because we were all ushered out.

## Totó

Alberto loved Totó, the legenday Italian comic actor, whose real name was Prince Antonio Griffio Focas Flavio Angelo Ducas Porphyrogenitus Comnenus of Byzantium Gagliardi De Curtis. Alberto did not have a large personal collection of videos, but he did have many of Toto’s most famous films and had memorized large portions of each of them. It did not take much to get Alberto wound up on the subject. His favorite Totó films were based on plays or short stories by the Nobel prize winner Luigi Pirandello. It was not enough to talk about the film itself; inevitably, Alberto was required to explain the Pirandello roots of the underlying story and—since Pirandello was one of the inventors of Absurdist literature—that conversation often took a long detour into other matters which required further explanation of classical references and philosophy. In short, there was no easy way around Alberto’s love of Totó. Like Luciano De Crescenzo, there was something about the story-telling in these movies that fascinated him.

We were reminded of this recently because Varuni’s Neapolitan Pizza (See “Friday Night Pizza”) showed Totó movies every night. In the middle of a sentence, Alberto would notice a long-forgotten scene and we would be off to the races. We were all treated to a complete re-telling (complete with footnotes) of the entire movie.

There were a few movies that tugged reliably on Alberto’s emotions. One was Tornatore’s sentimental *Cinema Paradiso*, although that may have had more to do with the Totó clips interspersed throughout the movie. Another was *Il Postino*. It was filmed on the Sicilian island of Salina, where we docked just before proceeding to Lipari this summer. There is a little monument to the postman’s bicycle near the marina. Titti and Ronnie took a tour of the island by bus to find the house where Naruda was supposed to have lived. Alberto always thought that Massimo Troisi (who played the postman and died just as the filming was completed) was a great tragic figure. On the other hand, Troisi’s very funny monologue on the problem with math problems was one of Alberto’s favorite.

## Rich's Passport

The only thing Cara and I needed to complete our Italian passport applications were documents from my grand parents' home town of Rocca Morrice, a dusty little village at the top of a mountain just inland from the port city of Pescara. Alberto was kind of fascinated by the town (which the locals called *La Rocca*) at least in part because my mother had been convinced that there was an interesting history to be uncovered there, an idea that Alberto thought was hilariously funny. He was convinced of just the opposite: there was nothing interesting that had ever happened in La Rocca.

I had written to my distant cousin Luigi, who happened to be the keeper of official records, but had heard nothing back from him. There were only a couple of family names in La Rocca, including DeMillo (or di Millo), so the sudden appearance of a new cousin from the United States just added more DeMillo's to keep track of and clearly did not interest Luigi.

When Alberto heard of this, he said that he would personally go to La Rocca to find out why Luigi was ignoring us. If you've read "Alberto and Driving" you already know that a six hour jaunt to Abruzzo was appealing to him. A few days later, the required documents showed up in Atlanta. I thought that Alberto had used his skill in navigating Italian bureaucracies to pry them out of Luigi's hands.

The next summer, Ronnie, Cara, and I made a trip to La Rocca to thank Luigi for his help. When I showed up at the town hall and announced myself, there was a noticeable hubub as calls went out to various city officials. Before I knew it we were being ushered into the Mayor's "office", which turned out to be a certain table in the bar next door to Town Hall, where we were formally greeted by the mayor himself, along with the publisher of the local newspaper, and other VIP's.

It turns out that Alberto, in order to get Luigi to release the papers, had let everyone know that they were dealing with THE Professor DeMillo, who shared certain characteristics with a certain Professor Bellavista and who would not be happy to hear of delays and foot-dragging. Alberto had instructed Luigi about how to treat a person of my importance and assured everyone that their prompt cooperation would not go unrewarded. Despite the fact that I had arrived unannounced the mayor began insisting that I stick around for the day. I had to invent a more pressing engagement in Rome to extract myself.

## Noventa Padovana

When we lived in Italy Alberto was perplexed that, rather than choosing an apartment in the center of Padua, we chose to live in a suburb called Noventa Padovana, a place where he was certain nothing ever happened. He tried hard to get us to see the folly of living so far from everything.

Then he made three discoveries. The first was a restaurant called Bocca D'Oro which had a basement taverna where Rosa and Cara could go off by themselves to play without disturbing the adults. He liked Bocca D'Oro so much that for awhile it was the first place he wanted to go. The second discovery was a local pizzeria called Europa Unita, run by a great Venetian named Mario. Mario's son Marco, who was about the same age as Cara and Rosa, was always in the front window with coloring books and crayons that he was willing to share with his new friends. The dining room was on the first floor of a run down hotel that almost certainly doubled as a brothel. It turned out that the guy who manned Mario's pizza ovens was from Salerno. This gave the whole place more credibility in Alberto's eyes and he quickly announced that from now on Mario's was to be the pizzeria of choice, "*even if it is so far out of town.*" When his father visited, Alberto insisted that we all go to dinner at Mario's. Once we moved back to Purdue, our colleague Ahmed Elmagarmid took up residence in Noventa Padovana and continued the suburban dining traditions.

At some point, the town decided to raze a group of buildings and build a new plaza, complete with a marble-tiled square surrounded by retail and office buildings richly finished in pink Venetian plaster. We always went for a walk to the plaza after pizza at Mario's to check on progress, which had come to a halt after the initial construction. Alberto was convinced it was just a pause in the otherwise steady upward climb of Noventa Padovana. Bocca D'Oro, Europa Unita, and the perennially deserted pink plaza did more to raise the profile of Noventa Padovana than an expensive public relations campaign.

## Friday Pizza

In the 1980–1990’s, there was at Purdue a group led by John Rice and Elias Houstis that assembled at a Greek diner called the Akropolis for informal Friday dinners. The group grew over the years to include spouses, kids, visitors and anyone else who wanted to join. The whole affair was like an extended family for those of us who wondered how we had managed to end up in central Indiana. There was also a fair amount of departmental politics that went into deciding whether you wanted to join the Akropolis crowd on Friday, but in Alberto’s eyes that never clouded the sense of camaraderie. On more than one occasion, Alberto, Titti, and Rosa would show up at the Akropolis, bleary-eyed from their flight from Rome, and stay on until nine or ten o’clock.

About a year ago, Alberto discovered a Neapolitan pizza place called Varuni, near the corner of Monroe and Piedmont. We decided it was Atlanta’s Akropolis and a group of Italians and their friends, students, and spouses started showing up on Friday nights to eat pizza and socialize. The group included—in addition to Alberto and Titti—Alex, Paola (and eventually Mathilde), Ned, Chiara, and Roberto, Dick and Kathryn, Zvi, Cara and her boyfriend Joe and others who would randomly drop by. There were spin-offs of Varuni. Some of us would host informal dinners at which various friends would supply one or more courses. It was an Apostolic innovation based on the Akropolis theme. The only politics allowed had to do with the sad state of affairs in Italy, never the politics of Georgia Tech or Emory. Alberto and Titti were the mainstays.

When Ronnie and I left Alberto in Lipari at the end of July, he apologized for not being as mobile as usual but assured us that next year he would be in better shape. He had started making plans for their return to Atlanta in August. Alberto was especially interested in Varuni. “Are we still going to Friday night pizza at Varuni?” he asked.

## Moshe Lewenstein

### The Levenshtein-distance

In 2003 Prof. Rudi Ahlswede from Bielefeld University was funded by ZIF (in Bielefeld) to organize a yearlong string of workshops on "Information Transfer and Combinatorics". Vladimir Levenshtein, who defined the Levenshtein-distance, was there for several months with a group of fellow researchers from Moscow. Alberto was also a long-term guest and was asked to form his own part-time group. I was a young, new faculty member in Bar-Ilan University and was more than happy to join when Alberto graciously invited me. My three visits lasted for about a month in total. For those of you who know Bielefeld – that is a lot of time.

Fortunately, Alberto took his "group responsibility" very seriously and after research during the day he entertained us in the evenings with stories, discussions and wine. Towards the end of one of these visits pictures were being taken of the group. Suddenly Alberto's eyes lit up and he asked Vladimir to stand next to him and for me to stand on his other side. With a big smile to the camera he said "*I am the Levenshtein-distance*".

### The Ride to Georgia-Tech Lorraine

I was sitting one afternoon in the mess room of Dagstuhl with Alberto when he turned to me and asked "Did you know that Georgia Tech has a campus not far from here?" Obviously, I did not. "You know it is near Metz" he told me. "Have you ever been to Metz?" he asked. I had not. "*Moshe, Metz is a wonderful city. It has an amazing church and a wonderful old city. You must come and see it.*" This is how I was (unknowingly) convinced to join him on the 200 KM trip (100 in each direction) to check out a potential sabbatical for Alberto in Georgia-Tech Lorraine.

I do not regret making that trip.

## Laurent Mouchard

### Bielefeld

I met Alberto (and Stefano) once in Bielefeld in the mid 90's. Robert Giegerich and Andreas Dress invited us to set up a possible European Programme for Computational Biology, to think of students/staff mobility etc.

After an intense brain storming session we had some time for general discussion. Alberto was staring into space, I politely asked him if he was tired, since he told me before that they drove from Italy.

He answered: "*Laurent, imagine how lucky we are to be in Bielefeld, everyone should be able to visit Bielefeld once in his lifetime*".

I was a bit confused and asked him why.

He pondered the answer for a few seconds and explained:

*"For those who don't believe that Hell exists, they have now some evidence that it possibly does.*

*For those who are afraid to go to Hell, they know that there is still hope as they will find pleasant people to welcome them and to share eternity with."*

## Roberto Grossi

I met Alberto 25 years ago at an advanced research school organized by him and Franco Preparata for the no-longer-existing Fibonacci Institute in Trento, Italy. There some stringologists and biologists from all over the world spent two weeks in a research retreat to discuss together combinatorial problems. I think it was one of the first experiments of this kind, as bioinformatics was still to emerge as an independent field. I was starting my PhD at the time and it was my first international experience. Dinner time was great for the food and Alberto's stories at the table. His voice sounded peculiar to me, so my tale is about that.

### Alberto's voice

If you understand Italian spoken language, you can recognize that Alberto spoke with a rich vocabulary and a slight aristocratic Neapolitan accent that was pleasant to hear. This was a sort of trademark for Alberto, even when he was fluently speaking English.

I saw Alberto for the last time at SPIRE 2013 in Jerusalem. I soon noticed his weak voice, it changed much more than his physical appearance. (Someone told me that this is a side effect of the therapy.) One of the days of the conference we were invited by Ami to his home for dinner, together with other friends, and he organized a taxi pickup for us at the hotel. We were all waiting at a table in the hotel lobby for the taxi, relaxing and talking together.

That day, unfortunately, a famous Rabbi died in Jerusalem. Around a million people were heading to Jerusalem from the rest of Israel. All the cars were stuck in the roads, including our taxi, and we had no idea when it could reach us. So we spent our waiting time chatting at the table in the hotel. Meanwhile Alberto had still his weak voice when speaking.

Waiting time was quite long due to the traffic jam.

At a certain point, as is inevitable in our community, we switched to technical matters on strings and algorithms. Alberto wanted to discuss a topic and started talking enthusiastically. Not only did I see a gleam in his eyes but, magically, I heard that his voice was back. That weak voice was gone. It was finally the familiar voice of Alberto. And I soon realized that the best therapy for him was research.

# Gadi Landau and Amihod Amir

## Proof of Research

Alberto and we collaborated extensively. We were funded by a BSF grant the last five years and, in fact, were just awarded a new BSF grant for the next four years. Alas, we will not be able to continue our joint research.

The BSF, as all funding agencies, requires annual progress reports as well as a project summary at the conclusion of the grant period. These reports included, naturally, the list of joint publications resulting from the grant.

Last year we started using new technology. Whenever we would finish proving something on the board, Gadi would take a picture of the whiteboard, in order to make it easier to reproduce the proof later.

At some point, as Gadi finished photographing the board, a graduate student of Alberto's passed down the hall by the open office door. Alberto pounced upon him, corralled him and had him take the photo below. His explanation:

*"It is our responsibility to the grant officers, who so generously fund our research, to prove to them incontrovertibly that their money is well spent! We need to show them irrefutable evidence of our hard joint work. We will be remiss in our duty if we don't provide them with proof of our industriousness!"*



# Franco Preparata

## Brother

Alberto is no longer with us. The news of his passing away leaves us disoriented: it is hard to immediately fathom the impact of this fundamentally irreversible event, when the deceased one is a person with whom we have shared so much of our experience. It is painful to consider that so many warm encounters will not repeat; it is painful to consider that so much knowledge and culture is instantly disappearing. But ... after the initial shock, it is somehow reassuring to realize that the memories still alive with his friends and the written record of Alberto's accomplishments are the surest form of immortality.

Our close relationship started about forty years ago. I had recently resigned my professorship at the University of Pisa, to return to the University of Illinois; Alberto, a very young faculty member at the University of Salerno, contacted me with a very "deferential" letter, that I found very moving. Soon thereafter I invited him to visit, and his short stay was the beginning of a lasting brotherly friendship.

Alberto and I intimately shared a common professional outlook: the desire to model a computational issue as a discrete-mathematical problem and to develop an algorithm that was, not only efficient in the parlance of our community, but also "aesthetically" pleasing. Others of his friends will comment on the details of his remarkable accomplishments in the fields of "stringology" (I just refrained from writing "string theory"), pattern matching, etc. which led him to his solid contributions to computational biology. Let me just recall an episode of our scientific interaction that stands out in my memory.

One afternoon we were relaxing on the beach at Akko, Israel (where ICALP 1981 was held), contemplating the sea and trying to solve an issue on repetitions in strings: after some struggling and long silences, all of a sudden a pleasant solution was formulated, and we shared that ineffable sense of elation that is typical of such events.

But Alberto and I shared more than common scientific interests. We were both the products of the same heritage, deeply rooted in the classical culture that nurtured our formative years. The reference to a Latin citation, a poem of Horace, or a sentence of Caesar, evoked an intellectual affinity that is not easy to verbalize. In our exchanges (the most recent one through Skype of two months ago, with the participation of our respective spouses), we would analyze the present using the lexicon of our common past.

After this somber testimony, let me recall a couple of light-hearted chuckles, that have sprinkled our interaction.

Alberto, while visiting the UofI, asked my secretary to kindly type for him a hand-written letter: the only words in Italian were Alberto's academic title (Professore Incaricato). Italian school hand-writing is well known for its vagaries: Incaricato became "Lucalicerto", and Lucalicerto has been the affectionate name with which for

many years my family addressed Alberto.

The next anecdote typifies the dialectics of the relation of many Italians with the country (and may not be received kindly by some of them). Alberto one day said:

*”When you arrive in Italy, you feel elated by its beauty, its art, its cuisine, etc; the day you leave, you are happy.*

*Therefore, if you want to remain happy, you should stay in Italy two days”.*

## Mary Ellen Bock

### Alberto Policies for Visits

I met Alberto at Purdue University in West Lafayette, Indiana, My statistics Ph.D. student there reported taking an inspiring course from Professor Apostolico and that led to our joint research. ( At that time, research collaborations between faculty members in the two departments, Statistics and Computer Science, were rare.) It was then my good luck to pursue research with his wife Titti as well and to see their young daughter Rosa grow to the extraordinary person she is today.

My initial visit to Alberto and Titti in Italy was a chance to work without the distraction of Purdue committee meetings. (This was in the days before the committee chairs in my department had discovered Skype.) But visiting Italy for the first time (outside the embrace of a conference) was daunting since I did not speak a word of Italian. No matter, their hospitality overcame all obstacles and in the process I discovered a few Alberto policies:

1. When in Italy, his sailboat Obliqua should be boarded if at all possible. (it was important to spend some period of time on the boat even if it never left the dock in Lignano!)
2. An occasion calls for prosecco and there is always an occasion. (But after dinner, there is grappa.)
3. Culinary excellence must be continuously refined. (Alberto's example: His brother Lucio, after consuming a cooking masterpiece, wondered aloud whether or not it might have been improved if the basil leaf in the dish had been more properly turned toward the sun.)
4. Alberto must pay for all meals. (I pretended a visit to the ladies room in a restaurant in order to catch the waiter for the check. This only worked once.)

Over the years, I learned what a wonderful man Alberto was...caring, cultured, humorous. But there was another Alberto policy that made him exceptional as well as wonderful: the relentless pursuit of great research. His legacy of published work allows us to "visit" with him through his extraordinary ideas even though he is gone.

## Pavel Pevzner

### Elegance

The very first computer science conference I attended in the US after arrival from Russia was CPM in Tucson that started on April 29, 1992. I remember it well since this is the day when the LA riot broke up right after I left my home in Los Angeles. It was a hot day – the temperature archive shows over 100 degrees in Tucson.

That is where I met Alberto for the first time and we made a few rounds around the hotel talking about algorithms. The thing that immediately distinguished him from *schmos* like me (and most other CPM attendees and hotel guests) is that he was wearing such an elegant jacket even on a hot day.

I had many good meetings and interactions with Alberto in both Italy and the US in the next two decades but when I invited him to give a keynote at the 25<sup>th</sup> CPM in Moscow last year I thought I am having a *déjà vu*. It was again a hot day (albeit not as hot as in Tucson) but he was wearing an elegant jacket of the shade of blue that nobody in Moscow had seen before. And I was so happy that he finally had a chance to give a keynote at the conference that was his baby (co-parented with Maxime and Zvi).

Alberto and CPM played the key role in forming the bioinformatics community and the eventual launch of RECOMB and other bioinformatics conferences - CPM was the main gathering place for computational biologists before we launched RECOMB in 1997. In fact, many sub-fields in modern bioinformatics started at CPM, e.g., algorithms for genome rearrangements were first discussed in CPM paper by John Kececioglu and David Sankoff. And now it is the key topic of the RECOMB satellite on Comparative Genomics. So it is no accident that the 10<sup>th</sup> RECOMB in 2006 was organized by Alberto and Titti at the palace that is the site of the Venice Film Festival!

And that is how I will remember Alberto – he would be equally at home talking to his colleagues at CPM and mingling with the stars at the *Bienalle di Venezia*.

## Sorin Istrail

While attending CPM 2015 at Ischia, I telephoned my son Larry, a physician resident at a hospital in Northern Virginia, to share with him the awful medical news about Alberto. I asked him what he remembers about Alberto. He recalled a dinner in Padova, when Alberto, Titti and Rosa took my wife, Larry, his brother Lee, and me to a nice *ristorante* for dinner; Larry was 12 then. Without hesitation Larry started retelling a story that Alberto, with his charming accent, told us 17 years ago.

### Trascina faccende, Alberto!

*Padova, 1998.*

The story was about cell phones – a new thing then. How people on the train would call home every ten minutes to report: “the train is just leaving,” “we can still see the train station,” “already 10 minutes past and the ride is OK,” and so on, more of the same. Quite a plain story made far from plain when told by Alberto with his unforgettable gentle humor and wit. And of course his stories had always a deeper meaning. That repetitive, dragging story line made us eager to hear the ending. Alberto concluded his tale with a bit of a dramatic intonation: “*trascina faccende.*” With my Latin language background, I really liked the sound of it. I liked saying it, although my pronunciation was a Romanianized, Italian-approximate pattern matching rearrangement, “*stracina faciende.*” Over the years, as a remembrance of our families’ fun times together I would greet Alberto with “*Stracina faciende, Alberto,*” and we’d both smile instantly. A story, with its funny detail, remembered long after its first telling: yes, that was Alberto’s storytelling gift.

In writing down these thoughts, I turned to a good friend of Alberto and mine, Franco Preparata, for the correct spelling of the greeting Alberto and I shared.

“*Trascina-faccende* (hyphen optional), translated as ‘one who drags the issues’ (*trascinare*=to drag, *faccenda*=issue, thing),” he said. “It is expressive, but has some flavor of southern vernacular (no one in Milan or Padova would naturally use it).” Expressive, indeed!

*Venice, 2006.* Alberto was one of the founders of the field of Combinatorial Pattern Matching (CPM) one of the preeminent areas of computer science. It focuses on fundamental algorithmic problems on sequences (aka strings or words) and on the mathematically rigorous discrete mathematics algorithms that solve them efficiently. The algorithmic strategies are obtained with the methods of computer science, based on sophisticated data structures on which mathematically provable global optimal, and near optimal, algorithms are developed. When computer science together with statistics, are acknowledged to have enabled the analytical Genome Era, what is meant by that is Combinatorial Pattern Matching algorithms.

In 1989 Alberto co-founded the field’s premiere conference, named appropriately “Combinatorial Pattern Matching.” The RECOMB Conference (International Conference on Research in Computational Molecular Biology) was started 8 years

later. When RECOMB was in its planning stage, I remember discussing with Pavel Pevzner whether a new conference was necessary or would CPM suffice. In celebration of the 10<sup>th</sup> RECOMB in 2006, only Venice would do, and only with Alberto as the PC Chair and Titti as Conference Chair. It was indeed a memorable conference for many reasons, including gender balance: Drawn by the romance that only Venice can offer, many of the regular RECOMB attendees were this time accompanied by their spouses. Alberto and Titti did a terrific job

*Ischia Island, 2015.* The 26<sup>th</sup> CPM conference was held at the end of June 2015 on Ischia Island, close to Capri and Napoli. I was honored to be invited to give a talk there, and I was delighted to discover that both Alberto and Titti would be attending. I enjoyed the conference. The content of the papers presented bore a sense of intellectual honesty and technical achievement, with no hint of sales pitch or so-called biological “impact” that clutters the alarming growth of softcore bioinformatics today.

There, on the beautiful Ischia Island, at his beloved CPM conference, Alberto sat in the front row for almost all the talks. He asked questions and was generous with his comments about the contributions of speakers he liked. We had a few discussions during the meeting; together we attended a concert of Neapolitan music prepared as part of the conference banquet.

On the last day of the conference, we sat together at lunch and we talked. He told me about Rosa, I told him about Larry. In fact, I told him that the weekend of the conference was Larry’s first week as an MD, starting his residency in internal medicine. On the topic, Alberto said he soon would need surgery to address a problem with his blood circulation, but it was nothing major. We talked then a bit about his plans to sail aboard his beloved boat. After lunch, as I was leaving for Napoli, I looked for Alberto. When he saw me, he came out of the conference room, and we both looked for Titti. Then the three of us said goodbye.

*Alberto’s Axioms.* What have I learned from my dear friend Alberto? What are his axioms? It is enticing to speculate on Alberto’s meaning of the “Trascina faccende” story. Like every work of art, it has a number of interpretations. You have to have heard Alberto give a technical talk to understand how much fun his lectures were, how he used humor as a key ingredient for communication, and a preferred medium for critical commentary. His passion for teaching was contagious, a breath of fresh air. In love with algorithms and the rigor of computer science, intertwining combinatorics with probability and statistics, he was interested in developing the next body of algorithmic method unified mathematically and discovering tractability islands in the ocean of intractability. Serious people do things seriously. Time is short – there is no time for trascina faccende. We have to keep rowing. We have to focus on solving the next algorithmic challenges.

I loved listening to this passionate storyteller who always took the high ground. A sailor who enticed us to enjoy life with a good glass of wine, he was a true gentleman of the classic, cultural type, a mensch.

## Alberto's Axioms

**Axiom 0.** Be in love with algorithms

**Axiom 1.** Champion computer science rigor

**Axiom 2.** Time is short – intellectual honesty leaves no time for *trascina faccende*

**Axiom 3.** Use humor as critical commentary

**Axiom 4.** Only the guy who isn't rowing has time to rock the boat (Jean-Paul Sartre)

**Axiom 5.** Be a storyteller

**Axiom 6.** And in the end, the love you take is equal to the love you make



## **Giuseppe Longo, Linda Pagli, Raffaele Giancarlo**

This Apostolic tale became a novella by Giuseppe Longo in "vulgar", e.g. Boccaccio style. Linda Pagli was able to retrieve the novella in her files and offered the electronic version of it. Raffaele translated the summary of the story, with some notes. In due time, the entire novella will be translated.

### **The Story of Feltino**

In January 1978, a school on Complexity took place in Erice (Sicily). Among the attendees, there were Alberto (in the story referred to as Alberto Salernitano), some young, intelligent and beautiful ladies and a man, apparently named Feltino. The later had a largely unmotivated excellent opinion of himself and was also somewhat arrogant. On top of that, he thought that his charm was irresistible to women. So, although he was a married man, he started courting the young ladies at the gathering. The ladies made some fun of the guy and talked to Alberto about the courting. Alberto decided that something had to be done about that. So, he plotted the following.

Alberto made Feltino believe that some Sicilian women had madly fallen in love with Alberto, Feltino and Ottavio, another member of the company. He said that these women urged a romantic meeting, since their hearts were burning for those young men. Now, you see, it is very well known that Sicilian men are quite jealous for their women. So, when Feltino learned this news by Alberto he was indeed flattered, surely tempted, but reluctant because of the possible consequences if family members of the women would find out. Sure enough, Alberto convinced Feltino that the women would make arrangements so that no one would find out. Marital bonds? - Apparently they were dismissed by saying that he (Feltino) would do anything not to acquire the reputation of man who makes ladies wait for him.

Indeed, the place for the romantic meeting was set at night in a garden in Erice. The women would be hiding and show up only once that Feltino had sung a particular song,. This he did, with romantic expectation. But then, from the bushes, several very mad Sicilian men charged out yelling. Alberto and Ottavio disappeared very quickly and Feltino was left to deal with the men, who claimed to be the relatives of the women whom Feltino had dishonored. Such behavior demanded a solid beating of Feltino and then marriage!

Feltino was speechless and scared, He was taken by the angry men to another location, where the entire student gathering was waiting for him. It was explained to him by Alberto that there were no women waiting for him and that everything was pre-arranged. He also told him that all is well that ends well and recommended Feltino to think about what had just happened in the future.

Then, the company left Feltino to his embarrassment and went on to have fun for the rest of the night.

## Giuseppe O. Longo

Erice, 10 gennaio 1978

### La novella di Feltino

Feltino, uomo di pasta grossa e credulo di ogni fola, è uccellato da Alberto Salernitano che, fattogli credere d'essere aspettati da femine trapanesi, gli fa invece incontrare alcuni cavalieri, che con molta ingiuria, affermando essere i parenti delle femine, il vituperano e minacciano di percosse. Scoperta la verità ciascheduno si ride di Feltino e della sua confusione e la compagnia in piacevoli conversari e altri trastulli trascorre la sera fino a tarda notte.

Nella nobile città di Erice, che surge su un'altura sopra Trapani e fra tutte le città è commendevole per bellezza di panorama e quiete e purezza dell'aria, erano convenuti alcuni cavalieri e alcune dame, desiderosi di apprendere le magiche arti della complessità da alcuni grandi maestri occidentali e orientali che si erano dichiarati disposti a istruirli. Tra i giovani convenuti eravi Feltino padovano, che, compiuti i suoi studi a Pisa, per essere stato nei migliori collegi e aver avuto i migliori maestri della città toscana, di sè avea grandissimo concetto e tenevasi per uomo superiore a ogni altro ed eziandio credeva che ciascuno dovesse naturalmente tributargli rispetto e omaggio.

Eravi pure nella compagnia di giovani certo Alberto Salernitano, uomo lepidissimo e faceto che, vista la pasta di cui era fatto Feltino e il gran concetto che senza alcuna ragione egli di sè avea, concepì di uccellarlo e di confonderlo di fronte a tutta la compagnia.

Fin dai primi tempi del convegno erasi Feltino avvicinato a due delle dame e, pavoneggiandosi e dandosi a vedere uomo di mondo, cercava in tutti i modi di abbagliarle per piegarle ai suoi voleri, e le due dame di lui pianamente ridendosi, tutto raccontavano ad Alberto e ad altri giovani di buono spirito, finché fu deciso che a Feltino dimostrar si dovesse quanto la pasta sua fosse grossa, sicché non ardisse più di pavoneggiarsi e tenersi uomo a tutti superiore.

Un giorno fra gli altri che la brigata piacevolmente desinava in una taverna di Erice, entrato Alberto con viso pensieroso, contro il suo solito si taceva e, più che mangiare spilluzzicava, sicché uno dei giovani, di nome Ottavio, da un capo della tavola l'apostrofò, chiedendogli della sua mestizia. Al che Alberto, che per arte tale animo fingeva, risposegli che sortogli era un grave contratempo che non sapea come risolvere, poichè, essendo vicino alla felicità che ogni cavaliere agogna, se ne vedea allontanato e quasi respinto dalla proterva pretesa di alcune Ciciliane. Incuriositi tutti, et in ispecie Feltino, da questo discorso che dicea e dir non volea, cominciarono a porre domande e quistioni ad Alberto, che pur si schermì e dopo poco uscì. Dopo il desinare, incontrato Feltino, cominciò Alberto per ambagi a aprirgli quanto lo turbava e dissegli che non essendo avvezzo a riportare imbasciate la condizione impostagli eragli assai gravosa e Feltino da lui pendeva come un beccaccione e tutto si beveva e Alberto a dirgli che alcune femine ciciliane eransi per qualche ragione a lui sconosciuta invogliatesi di lui, Alberto, e di Feltino e di Ottavio e che in tutti i modi incontrarli dovevano perchè il loro cuore ardea troppo.

Feltino, che a tali parole erasi tutto commosso e per nulla in sospetto si stava, pure per parere serio cavaliere e dabbene verso la sua moglie che in Padova si dimorava, dicea che non pareagli possibile che d'un tale subitaneo amore quelle dame ciciliane

di lui potessero ardere, e che se anche, poiché Alberto così l'assicurava, ciò vero fosse, non vedea come la cosa condursi potesse, essendogli noto essere le Ciciliane molto ritrose, ancorché ardenti, ed i mariti e i parenti loro tutti gelosissimi e cupidissimi e ferocissimi contro coloro che le femine imbolar si volessero. A questi ragionamenti rispondea Alberto che tutto ciò si sapea, ma che l'ardore delle Ciciliane era tale che certo saprebbe loro suggerire il modo e il tempo adatto a non farsi sorprendere da quelle belve dei lor mariti e che tutto con un po' di discrezione si sarebbe in modo potuto condurre, che tutti ne avrebbero avuto consolazione e piacere e che niuno avrebbe di tale impresa alcunché saputo. E Feltino, che dentro di sè si sciogliea e insaporiva tutto pensando all'ardore delle Ciciliane, pure per non parere persona di capo leggiero che di subito dimenticasse la moglie sua e i doveri coniugali, continuava a opporre ragioni, ma tanta fu l'eloquenza del Salernitano che in buon punto Feltino disse: "Sia dunque come queste Ciciliane si vogliono, che non si debba dire che un cavaliere par mio ha fatto troppo a lungo una dama sospirare per non volerla contentare. Ma pure, Alberto, c'è un'altra difficoltà, cioè che io debbo pur far quel lavoro che sai e che, se non lo faccio, grande vituperio i maestri me ne daranno e entro questa sera io lo debbo fare." E Alberto: "Or va dunque e fa il tuo lavoro, che l'imbasciata che poco fa ebbi dalle femine fissa il luogo e l'ora dell'incontro, che è cinque ore dopo il tramonto ai giardini del Balio", che è un luogo in Erice come nessun'altro propizio a questi amorosi incontri.

E partitosi Feltino, tutto commosso dalla vagheggiata immagine di una battaglia d'amore, e poco ormai calendogli di sua moglie e di altre cotali bazzecole, fece bravamente la bisogna che far dovea e puntuale alla cena si trovò con la brigata, e Alberto con parole e con cenni e sguardi d'intelligenza con Feltino e Ottavio, che pure della burla sapea, fece intendere che essi, partendo dalla taverna, arebbono avuto piacevoli ore, da trascorrere con certe femine trapanesi che per essi loro struggevasi nel giardino del Balio. E subito qualcuno, forse per spaventare Feltino o per ridire cosa già udita, prese a narrare alcuni fatti che molto la gelosia e la ferocia dei Ciciliani inverso chi insidia le lore femine dimostravano.

Ma Feltino, per il continuo pensare alla dolcezza dell'incontro ormai incontenibilmente insaporito e reso vieppiù coraggioso dal vino bevuto e dalle occhiate d'intesa di Alberto, era a tal punto deciso a sfidare tutte le ire di cento Ciciliani, che levate le mense e andando tutti a lento passo verso un luogo dove la brigata usava trascorrere piacevolmente le sue serate, egli con Alberto e Ottavio, alla breve, con un cenno di salute dagli altri presero commiato e a grandi passi s'avviarono per le oscure stradette di Erice verso il Balio. Dove giunti e non vedendo nessuno Feltino cominciò a chiedere dove le femine si appostassero e Alberto dissegli che attendevano un loro segnale per palesarsi, e questo segnale era una canzone che Feltino cantar dovea. Intonata la canzone, dopo poche parole, rispose un urlo bestiale da dietro i cespugli nell'oscurità e quest'urlo era al modo dei Ciciliani "T'ancido, t'ancido", e subito dai cespugli balzarono fuori tre Ciciliani che gridando e minacciando s'avventarono su Feltino che, preso alla sprovvista, mentre gli altri si davano alla fuga, altro di meglio non potè dire che lui in buona fede agli amici creduto s'avea che si dovesse fare una passeggiata nel Balio con alcune femine trapanesi che mostrar loro Erice doveano al chiaro di luna. E i Ciciliani a gridare che la luna appunto non c'era e che lui, Feltino, erasi uno di quegli uomini spregevoli che insidiano le altrui femine per non averne una propria e che tuttavia se a tal punto erasi condotto convenivagli ormai porre rimedio alla sua azione vergognosa con un matrimonio riparatore.

Feltino, che si sentiva morire, nella notte, preso da questi Ciciliani, minacciato da più parti e da nessuna aiutato, raccomandandosi l'anima a Dio si stava senza dir motto e leggermente tremava. I Ciciliani, che ammaestrati a far tutto ciò da Alberto stati erano, cominciarono a muovere piano piano i passi verso il luogo dove la brigata erasi riunita e li attendeva, trascinando Feltino più morto che vivo, il quale non sapevasi dove portar lo volessero.

Finalmente, giunti nel luogo, e riconosciutolo Feltino, il terrore gli si cangiò in vergogna e giunto davanti alla compagnia dove ognuno piacevolmente ridendo di lui l'accolse, Alberto gli disse: "Feltino, questo ti serva per il futuro a meno di te presumere, a più serbare onestà alla moglie tua e a non correre dietro le parole di altrui".

Feltino, vergognoso e uccellato, in disparte se ne stava a capo chino, finché portogli un calice di vino detto Marsala, Alberto gli disse: "Sta' di buon animo, e rallegrati, che tutto è bene ciò che finisce bene". Così, piacevolmente cantando e novellando, la brigata, coi tre Ciciliani, trascorse il resto della notte fino all'alba, quando tutti si ritirarono, secondo il loro piacere per il sonno o per altro.

# Raffaele Giancarlo

## The Annotated Translation of the Summary

### The Novella of Feltino<sup>1</sup>

#### Summary

Feltino<sup>2</sup>, a man of *pasta grossa*<sup>3</sup> and believer of any *folia*<sup>4</sup>, is *uccellato*<sup>5</sup> by Alberto Salernitano<sup>6</sup> who, once, convinces him that they were expected by *trapanesi females*<sup>7</sup>, arranges for him to be found by a few chevaliers that, manifesting great offence, declare themselves to be the relatives of the females, *il vituperano*<sup>8</sup> and threaten of pummelling him. Once the truth revealed, everyone laughs at Feltino and at his *confusione*<sup>9</sup> and the company proceeds to enjoy the evening until late at night in pleasant conversations and other amusements.

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<sup>1</sup> This is the translation of the "Sommario" of the tale by Giuseppe O. Longo. In order to offer to the reader a taste of the style and of the many shadows that the chosen words offer, some terms are left untranslated, although an explanation is offered.

<sup>2</sup> Here is the first main character of the story. To be noted: The Writer uses his last name. The first letter is kept in capital for stylistic purposes.

<sup>3</sup> Here pasta is used possibly in a double sense. It may refer to the figure of a person as well as to his moral constitution. Grossa, here should be translated as thick. The description is very effective and only politely offensive.

<sup>4</sup> The root is the latin fable. However, in Italian, it has two meanings: fable and lie.

<sup>5</sup> He is the object of uccellare, literally to bird. In Italian, there are two versions of the verb. The intransitive, that refers to bird catching, possibly with traps. The transitive means to fool someone, most of the times via flattery. A different kind of trap.

<sup>6</sup> This is the main character. Obeying the style, he is addressed by his first name and his city of provenance, Salerno, deserves the capital letter. There is a historic analogy with Masuccio Salernitano, a nobleman and writer, follower of Boccaccio. This should be contrasted with the Feltino at the beginning: only the last name is used and we do not know yet where he comes from.

<sup>7</sup> The Ladies are from Trapani. The use of the word female to refer to women is still in use in many Italian dialects.

<sup>8</sup> They insult him, but vituperare is a highest activity of insult.

<sup>9</sup> The literal translation is confusion. However, confusione also means embarrassment, to the point of being lost. Here an analogy with cooking is appropriate. The choice of the ingredients and the following of the various recipe stages gives no guarantee of the end results being right. There is some art in obtaining a successful dish. This point is well illustrated (at least to me) by the Neapolitan poetry "O Raù" by Edoardo De Filippo, in which the difference between meat with tomatoes and Neapolitan ragù is described. Here an "uccellare" must result in confusione. That is, the object must be totally lost, not simply embarrassed, otherwise it would have simply been the object of a joke.

## Stefano Lonardi

### How do I Thank you?

I met Alberto twenty years ago. I was admitted to the computer engineering PhD program in Padova and when it was time to choose an advisor, I realized that I did not know anyone in the Department. The web barely existed at that time, so I asked a friend who was familiar with the faculty in Padova and he suggested to talk to "Apostolico o Bilardi". I decided for the alphabetical order, and one day in the summer of 1995, I stopped by Alberto's office in Via Gradenigo. The office was small, and full of cigar smoke. I introduced myself while Alberto was emerging from the smoke, and after a few minutes of conversation I was impressed enough by his personality and professionalism that I never spoke to Gianfranco. That day was the first day of a long journey that took me through my professional career and to where I am now. Alberto influenced me in so many way that I cannot begin to describe. He was not only an inspiring advisor, but a role model of generosity, humor, and gentlemanship. I have one story that I want to share that captures his personality. I will miss him.

In 2001, at the end of my PhD at Purdue I was about about to join University of California as an Assistant Professor. I was excited but also a little scared about having to advise my own students, get my own grants, publish my own papers. I felt very grateful for Alberto's guidance and generosity over the years, so I asked "Alberto, how could I thank you for what you did for me? Alberto answered "*By doing what you are about to do*". A few of my PhD students that are assistant professors have asked me the same question. I have given them the same answer.

Alberto's legacy is alive.

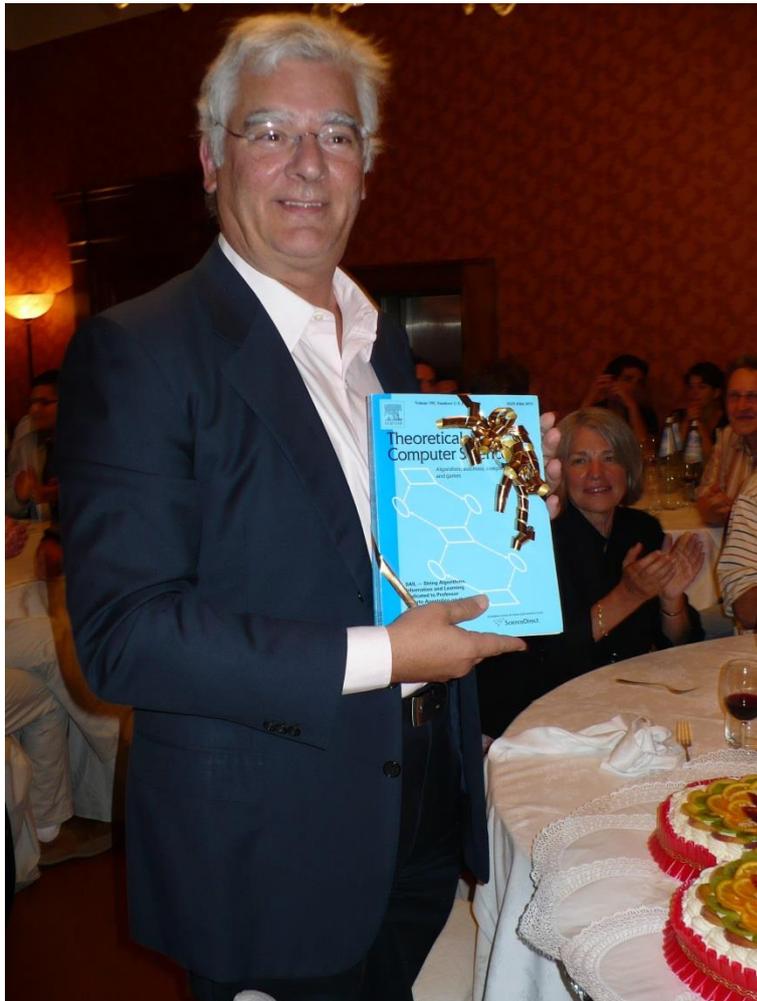
## Alberto's 60<sup>th</sup> Birthday

**Good  
Friends**



**Good food**

**Good  
drinks**



**and  
intellectual pursuits**

## Condolences

My last memory of Alberto is very vivid. It was at 1 PM and I was with Titti and Alberto at Atlanta airport on Tuesday, 25 November, after two very intense days as their guests in Zvi Galil's College of Computing at Georgia Tech. I was on my way to four even more intense days backpacking into the Grand Canyon over Thanksgiving. The three of us had been sitting at a small airport bar drinking beer and talking about matching genomes using a bag of words approach. I had not realized how much Alberto had done on this topic and I was so excited to be able to learn from him. The next thing we knew it was late and I had to run to get through security with my strange combination of hand luggage - a hiking backpack as well as suit and laptop. This last memory is now even stronger and will be with me forever.

*Michael Levitt*

שלום צבי,  
תודה ששיתפת אותנו, את מייק ואותי. עצוב כל כך.  
אנחנו חברים טובים וקרובים של טיטי ואלברטו. גם היינו איתם הרבה פעמים בליפארי.  
אהבתי את שניהם ובמיוחד התחברתי לאלברטו, איש פתוח, ריגשי וחכם.  
כמה עצוב וכבד לי על הלב.  
גם את רפאלו אנחנו מכירים טוב ומרגישים קרובים אליו.  
*רינה ומייק לוויט*

Shalom Zvi.

Thank you very much for including us (Mike & me). It is so deeply sad. We are close friends of Titti & Alberto. We shared lots of times & experiences with them for quite few years, especially in Lipari Summer Schools. I love them both. There was a special personality connection between Alberto & me. Alberto was very sensitive, opened to life & wise. It was a great pleasure for me to share views & opinions with him. My heart feels so heavy & sad. We know Raffaele as well & feel close to him.

*Rina and Mike Levitt*

The passing of Alberto is a great loss to pattern matching community, and more generally to computer science. Alberto was a deep thinker and a dedicated teacher. I had the good fortune of being his colleague at Purdue for one year. He was always full of energy and humor. When I contacted him last year to wish him good luck with his health, he sounded very cheerful - the old Alberto I knew.

I hope he rests in peace,  
*Rao Kosaraju*

Very very sad news. Alberto was always a fountain of enthusiasm and interest. My thoughts are with his family.

*Jeff Vitter*

That is indeed terrible news. Such a wonderful human being as well as a great researcher.

*Dennis Shasha*

Sad news indeed as I thought he had done well against his illness last year. I had good fortune to hear some of his anecdotes in weekly "curious minds" seminar at Purdue. Rest in Peace Alberto !

*Rahul Shah*

These are very sad news indeed. May Alberto rest in peace. All my thoughts are with his family.

*Gabriel Valiente*

This is extremely sad to hear. Alberto was an inspiration to us all. Condolences to Titti and Rosa and all the pattern matching community.

*Cenk Sahinalp*

This is so sad; I have known Alberto for over 25 years. I will miss him, and he will be missed by so many, including the DCC community, where he has been a DCC committee member for many years.

*Jim Storer*

This is really sad, my condolences to Titti and Rosa. Alberto was the external examiner of my PhD thesis and he always was full of life. It is hard to imagine not seeing him again.

*Ricardo Baeza-Yates*

It's very sad to hear of Alberto's passing. My thoughts are with his family and on knowing him over almost 40 years.

*Ian Munro*

This is very sad and shocking news. I always feel that Alberto is a mentor to me. My condolences to his family.

*Kaizhong Zhang*

Alberto was a man of many talents, very sad news indeed.

<https://www.youtube.com/watch?v=4jXTdvH3PFQ>

Let him rest in peace,

*Leszek Gasieniec*

A very talented guy, a very fine man, He'll be much missed by all of us.

*Bill Smythe*

This is very sad news indeed. I saw Alberto just weeks ago, in CPM in Ischia, with all his joy of life. Rest in peace, Alberto. My condolences to his family.

*Gonzalo Navarro*

Very sad news indeed. Alberto was a great community builder, leader and booster. He was also the only person I knew who could truly be called a Raconteur, with a capital R. I remember when he turned 50 he said that he would now focus more on the "life of the mind", making every minute count. I know he did.

*Dan Gusfield*

Terrible news. We lost a valued colleague and friend, a great researcher, a perfect gentleman, and (to echo Dan Gusfield) the ultimate Raconteur: Alberto could convey even the most mundane story in a wonderfully humorous and inspiring manner.

Rest in Peace Alberto

*Mike Atallah*

This is indeed very sad and shocking news. I have known him closely for a shorter time (last two years since I joined, though we were acquaintances for long before), but feel compelled to share some observations to celebrate his life, passion for work, and courage.

My group worked with Alberto (primarily through my postdoc Sharma) on approximate sequence matching algorithms. The news is all the more shocking to us because we submitted two journal papers from this joint work this month, one on last Thursday night. Alberto is the first colleague here I published with after joining GT, and may be we have the honor of being his co-author on what may be his last publication to come out.

I have found Alberto to be a scientist with a keen sense of quality, and a generous and kind personality. Knowing his condition and periodic need for treatments, I used to offer to substitute for him in classes if needed. Not only did he never take up on my offer, he used to offer me unconditional help when writing large grant proposals or preparing groundwork for the data IRI. He gladly offered any kind of help from brainstorming to more mundane matters such as typing of references. When I empathized with his situation, he would remind me that all of our lives are temporary and his situation is no different. Despite his condition, he used to work because he found meaning and purpose in what he did for us and the institution. In doing so, he exhibited remarkable courage till the very end. I can only hope I can grasp some of it.

*Srinivas Aluru*

I found Alberto to be a kind and thoughtful soul who was gracious and energetic in his striving to improve the institution.

*Aaron Bobick*

I am so sorry to hear this sad news. Alberto was always full of energy. May Alberto rest in peace.

*Ming Li*

Very shocking and sad news indeed. I first met Alberto in 2005 at COCOON, when I first seriously switched to computational biology. Every meeting with him after that was helpful to me. Our thoughts are with his family.

*Binhai Zhu*

*Very sad to hear the news.*  
Alberto was such a talented man and leader of our community.  
I was fortunate to know him and work with him.  
My condolences to Titti and Rosa.

*Kunsoo Park*

It is really a bad news.  
Alberto was a keynote speaker at Cocoon 2005 in Kuming.  
I still have some photos at that conference. It is like yesterday.  
My condolences to his family.

*Lusheng Wang*

I had the honour of working with Alberto here in Padova for some years. What learned with him and how it can be learned has been unique and full of his inimitable brand of humour. His rigour, vision and culture make his passing a great loss to Computer Science.

Condolences to Titti and Rosa.

*Massimo Melucci*

I very sorry to hear this, the community owes so much to Alberto.  
Condolence to Titti and Rosa.

*Rolf Backofen*

I first met Alberto 25 years ago. At that time I was still working in Numerical Analysis. I was immediately fascinated by his personality and by how he made you see the deep theory behind his results.  
A few years later I was working full time on string algorithms.

We will miss the friend and the mentor alike.

*Giovanni Manzini*

In memory of the charismatic Alberto:  
Attached is a beautiful gift from Titti & Alberto when they visited London, circa 1988.



The plate encapsulates their style, generosity & warm-heartedness - in a word Italianes!

Cin cin to the good times & friendship!

*Jackie Daykin & Costas Iliopoulos*

Very sad news indeed.  
We've lost a scientific mentor and exquisite person.  
All my thoughts go to his family.

*Eric Rivals*

Alberto was a one-of-a-kind researcher with a keen eye for important open problems. As we all know, it takes a village to raise a child. Alberto's generosity, willingness to help colleagues and encouragement of junior researchers was key to making our community into that village. My heart is with his family. Alberto will be sorely missed.

*Michal Ziv-Ukelson*

These two photos were taken on an excursion from Dagstuhl (a conference organized by Andreas Dress) on 2010.06.07.

*Peter Erdos*



What I will miss most about Alberto is his enthusiastic love for teaching. He spoke with me often about his students and their future, and he truly lived each day for the gift of sharing his knowledge in the classroom.

*David Bader*

Alberto was a true scholar. He was a good citizen, always kind, and he always said yes when asked for assistance.

*Annie Antón*

Just few, intense words to remember Alberto.

As soon as I've got the sad news from Raffaele, my thought immediately went to CPM 2008 in Pisa where Alberto participated actively, establishing connections and talking widely to young researchers and friends.

*Paolo Ferragina*

Very sorry to hear! My condolences and deepest sympathy to all.  
I have met him a few times and always seemed like a sweet man.  
How shocking and sad...  
Best wishes,

*Prasad Tetali*

I heard the news this morning and couldn't believe it. So terribly sad...  
My condolences to Titti.

*Alex Orso*

That is terrible! We had dinner with them earlier this Summer. I hope his wife is OK, we like her very much.

*Santosh Vempala*

I'm so sorry. I'm so sad to hear the news. My best,

*Merrick Furst*

Very sad :-)

*Moshe Vardi*

This is incredibly sad news.

In my short time here in Georgia Tech, I had really grown to appreciate Alberto. He was so passionate about algorithms research and about education, and we had long discussions about both over lunches. It was an incredible pleasure to talk to him - he knew so much, about mathematics, about computer science, about philosophy, and so many other topics. He was a thoughtful mentor, and a friendly and approachable office neighbor. I will miss him, as I am sure so many others will.

*Bistra Dilkina*

How sad. I still remember when he sat in my office and we called you about the Dean of CoC job.

*Ellen Zegura*

A terrible news indeed.

My deep sympathy on your personal great loss of Alberto, a very dear friend

*Mark Borodovsky*

Indeed, extremely sad news, my thoughts are with his wife and family, and also with his many friends! This is a grave loss also to the string algorithms community, Italian Computer Science, and the various schools he was associated with. Computer Science has lost a leading scientist and a really exceptional man!

*Moti Yung*

My heartfelt condolences to you. It is hard to see friends and colleagues pass. I know this is a part of life, and that I will be facing these soon. I have watched you handle these in stride. Still very, very sad.

I just held a moment of silence for Alberto at Pam's Qtrly Staff meeting. I also mentioned Titti in IC being his spouse.

*Alan Katz*

This is a terrible loss, my deepest sympathies to the family members!!

*Muthu*

I do not even have the words to express how sorry I am that you have lost such a good friend and the College has lost such a great man.

I am not surprised that this gentle man passed with great peace.

I am thinking of you all.

*Alicia Richhart*

A very sad news, my thoughts are for Titti and his daughter. May he rest in peace.

The Scientific Community has lost a great talent.

*Cosimo Spera*

Very sad news.

Alberto was a very dear friend and colleague.

My condolences to Titti, Rosa and his family.

*Danny Breslauer*

What a great loss! Above all his other merits Alberto was a great and warm man!!

My deep condolences to his family members

*Jacob Ziv*

It was really shocking news.

*Pino Italiano*

It is very sad to hear this news. Just two months back I had lunch with him and Amihod Amir. He was so full of life, as always, so it is difficult to digest this news. We have lost a noble soul from our midst...

*Kishore Ramachandran*

I had the honour of working with Alberto here in Padova for some years. What learned with him and how it can be learned has been unique and full of his inimitable brand of humour. His rigour, vision and culture make his passing a great loss to Computer Science.

Condolences to Titti and Rosa.

*Massimo Melucci*

I was very saddened to hear this terrible news.  
Thanks for sharing the lecture -- it is indeed remarkable.

*Vijay.Vazirani*

Such sad news. Alberto was such a wonderful person and will be greatly missed. My condolences to you as well in the loss of your friend.

*Pam Ruffin*

That's so sad. Thanks for filling me in.

*Mike Fischer*

It was a sad day for me when I heard that Alberto, the Alberto we all respected, enjoyed and looked forward to spending time with, is not with us anymore. Alberto enjoyed people and was fun to be with. However, for me it was his deep respect and care for the many people he encountered that impressed me most.

My academic career began with a joint paper with Alberto and I was still discussing joint research with him not long ago. Of course, with Alberto life went well beyond research. I have so many fond memories from our many encounters and discussions in so many different places. So, I was grateful that one time I had the chance to give back a bit and this is the story.

In one of the Israel Stringology workshops that I co-organized with Ami, Gadi and Ely I found myself in charge of the day trip. Ami and Gadi were both checking out the possibility of rector positions in their respective universities and could not join the trip. Ely, likewise, was busy. So, I decided that the desert/dead sea would be a great trip. Alberto joined but he was already not feeling well. So, when we all descended from the bus to hike in the desert (which included some climbing) he decided not to join. I felt bad. However, the next two stops were exactly to his taste. He was very taken with the historic guide on top of Masada and he fully used the time floating in the dead-sea water pool in the hotel on the dead-sea beach. Finally, at dinner he was glowing again and graciously thanking me for "this most wonderful day". He explained that "unlike sailing, the virtue of the dead-sea water is that you do not need to make an effort to enjoy."

In fact, I regret not taking him up on his offer to sail around the whole Italy in his yacht. I would surely NOT have enjoyed the sailing. However, I missed out on two weeks with Alberto - a big mistake.

*Moshe Lewenstein*

My condolences

*Fabrizio Luccio*

Good Bye Alberto, hope to see you again.

*Linda Pagli*

Very moving - indeed buon vento.

I'm glad Alberto's last weeks were taken with the activities he liked best - science and sailing.

He left behind many who mourn his passing.

*Bella Galil*

I attach two of Alberto's last pictures. The first in a conference in Ischia (an island off Naples) June 28-July 1.

The second is from a workshop in Lipari (an island off Sicily). It was his last day.

I am heartbroken.

*Zvi Galil*



## Dick Lipton and Kenneth Regan

Taken with permission from

<https://rjlipton.wordpress.com/2015/07/22/alberto-apostolico-1948-2015/>

### Alberto Apostolico, 1948–2015

July 22, 2015

*Our condolences on the loss of a colleague*

Alberto Apostolico was a Professor in the Georgia Tech College of Computing. He passed away on Monday after a long battle with cancer.



Today Ken and I offer our condolences to his family and friends, and our appreciation for his beautiful work.

Alberto was still active. He had a joint [paper](#) in the recent 2015 RECOMB [conference](#), that is Research in Computational Molecular Biology. It was written with Srinivas Aluru and Sharma Thankachan and titled, “Efficient Alignment Free Sequence Comparison with Bounded Mismatches.” Srinivas is also here at Tech and wrote some words of appreciation:

[We] submitted two journal papers from this joint work this month, one on last Thursday night. ... When I empathized with his situation, he would remind me that all of our lives are temporary and his situation is no different.

A full session of that conference was devoted to fighting cancer. One can only hope that some of the results of this and other theory conferences contribute to finally *solving* that problem.

### Words and Work

Alberto’s work was on how much work one needs to do to identify notable properties of *words*. We mean very long words such as the textual representation of the human genome. Many “obvious” methods for processing strings do too much work. In a Georgia Tech [feature](#) several years ago, Alberto put it this way:

How do you compare things that are essentially too big to compare, meaning that the old ways of computing are no longer feasible, meaningful, or both? It's one thing to compare and classify 30 proteins that are a thousand characters long; it's another to compare a million species by their entire genomes, and then come up with a classification system for those species.

The theme of a special issue of the journal *Theoretical Computer Science* for Alberto's 60th birthday in 2008 was:

Work is for people who do not know how to SAIL — String Algorithms, Information and Learning.

The [foreword](#) by Raffaele Giancarlo and Stefano Lonardi lists Alberto's many contributions.

Giancarlo, who did a Master's with Alberto in Salerno and then a PhD with Zvi Galil—our Dean at Georgia Tech—told some stories yesterday to a mailing list of their field. As an undergraduate feeling jitters attending a summer school taught by Apostolico on the island of Lipari off the north coast of Sicily, he was greatly heartened to see the leader arriving in his *sailboat*, named *Obliqua* (“Oblique”). A month ago Ken was in Sardinia—further north in the same waters—for a meeting of the World Chess Federation's Anti-Cheating Committee, and offers this peaceful picture of the 41-foot yacht in which they took an excursion.

## Stringology and Zvi

Ken and I have already talked about stringology—see [here](#). Stringology is the study of the most basic objects in computing, linear finite sequences of letters, and is filled with deep and often surprising results. In the post we mentioned the surprise that an ordinary multitape Turing machine working in real time can print a 1 each time the first  $n$  letters it has read form a palindrome. One can also trace roots to the discovery that string matching—telling whether a string  $y$  occurs as a subword of  $x$  and finding it if so—can be done in linear time.



Alberto and Raffaele wrote a [paper](#) about Zvi before either wrote a paper with Zvi: “The Boyer-Moore-Galil String Searching Strategies Revisited.” This paper has a Wikipedia [page](#) under the name, “Apostolico-Giancarlo algorithm.” By employing a compact database of certain substrings of the pattern string  $y$  with room to record their matches and non-matches to parts of  $x$ , they showed how to reduce the overall number of character comparisons to  $2|x| - |y| + 1$ . The “2” had previously been 4, 6,

and 14 in this and related measures, and matched a conjectured lower bound by Leo Guibas.

Before the paper, however, Alberto and Zvi edited and contributed to a highly influential collection of papers from a workshop in Italy sponsored by NATO's Advanced Sciences Institute in 1984, [titled](#) *Combinatorial Algorithms on Words*. Many great people we know took part and wrote for the volume: Michael Rabin, Andy Yao, Andrew Odlyzko, Bob Sedgewick with Philippe Flajolet and Mireille Régnier, Andrei Broder, Joel Seiferas—and others such as Maxime Crochemore, Shimon Even, the aforementioned Guibas, Michael Main, Dominique Perrin, Wojciech Rytter, and James Storer. A contribution from Victor Miller and Mark Wegman (of universal hashing fame) titled “Variations on a Theme by Ziv and Lempel” is followed by one from **the** Lempel and Ziv.

Alberto and Zvi teamed on another [volume](#) in 1997, viz. the book *Pattern Matching Algorithms*. And yes they did co-write papers, including several on parallel algorithms for string problems—even the basic palindrome-finding problem. Their latest collaboration was a multi-author [survey](#) titled “Forty Years of Text Indexing,” which was a keynote presentation at the 2013 Combinatorial Pattern Matching symposium.

## Discovery ...

Alberto proved many surprising theorems during his long career. A recent example of his “out-of-the-box” approach is his 2008 [paper](#) with Olgert Denas titled, “Fast algorithms for computing sequence distances by exhaustive substring composition.” The abstract notes that the standard edit-distance measure

...hardly fulfills the growing needs for methods of sequence analysis and comparison on a genomic scale [...] due to a mixture of epistemological and computational problems.

Well we have compressed the abstract with a little stringology ourselves. Recall our recent [post](#) on new evidence that the time to compute edit distance really is quadratic. Edit distance is so basic, it takes chutzpah to imagine that “alternative measures, based on the subword composition of sequences” could be both quicker and useful. The main theorem is a *linear*-time algorithm for a distance measure that seems to depend on *quadratically*-many pairs of substrings. This is a real feat of leveraging the ways words can combine. The paper goes on to show how this is programmed and applied—note also that the link to the paper is on the NIH website.

In the Georgia Tech feature we quoted above, Alberto said this about the genome:

It's the closest thing we have to a message from outer space. We do not know where it comes from, understand very little of what it means, and have no clue about where it is going.

He went on to note the shift from pattern matching to pattern *discovery*—without saying how far he was in the vanguard on this.

## ...and Surprise

Alberto captured discovery by the element of *surprise*, which can be quantified statistically. One of my favorite papers of his is [titled](#), “Monotony of Surprise and Large-Scale Quest for Unusual Words,” with Mary Ellen Bock and the above-mentioned Lonardi. It is another victory in Alberto’s perpetual battle of linear over quadratic.

Here is the idea. Given a long string  $x$  and substring  $y$ , let  $f_x(y)$  be the number of occurrences of  $y$  in  $x$ . Now suppose  $x$  is in the support of a random distribution in which each character  $x_k$  depend only on a fixed finite number of previous characters  $x_{k-r} \dots x_{k-1}$  in a manner that is also independent of  $k$ . Let  $Z_y$  be the random variable of  $f_{x'}(y)$  over  $x'$  drawn from this distribution. Then

$$z_x(y) = \frac{f_x(y) - E[Z_y]}{\sigma(Z_y)}$$

is a normal statistical [z-score](#), where  $E[\cdot]$  stands for expectation and  $\sigma$  for standard deviation. If  $z_x(y) \geq T$  for some high positive threshold  $T$ , then  $y$  occurs unusually frequently in  $x$  and so is a *surprising* substring. Substrings  $y$  with  $z_x(y) \leq -T$  are surprising by their lack of expected frequency in the given long text  $x$ .

Telling which substrings are surprising still seems to face the wall that there are quadratically many substrings overall. But now the authors work a little structural magic. Suppose we have a partition  $[C_1, C_2, \dots, C_\ell]$  of the substrings into  $\ell$ -many classes such that each  $C_i$  has a unique longest and shortest member. Given  $y \in C_i$ , put  $y$  into  $\mathcal{O}_z^T$  if  $z_x(y) \geq T$  and no other string in  $C_i$  has a higher  $z$ -score, and  $y \in \mathcal{U}_z^T$  if  $z_x(y) \leq -T$  and no other member is more negative. They prove:

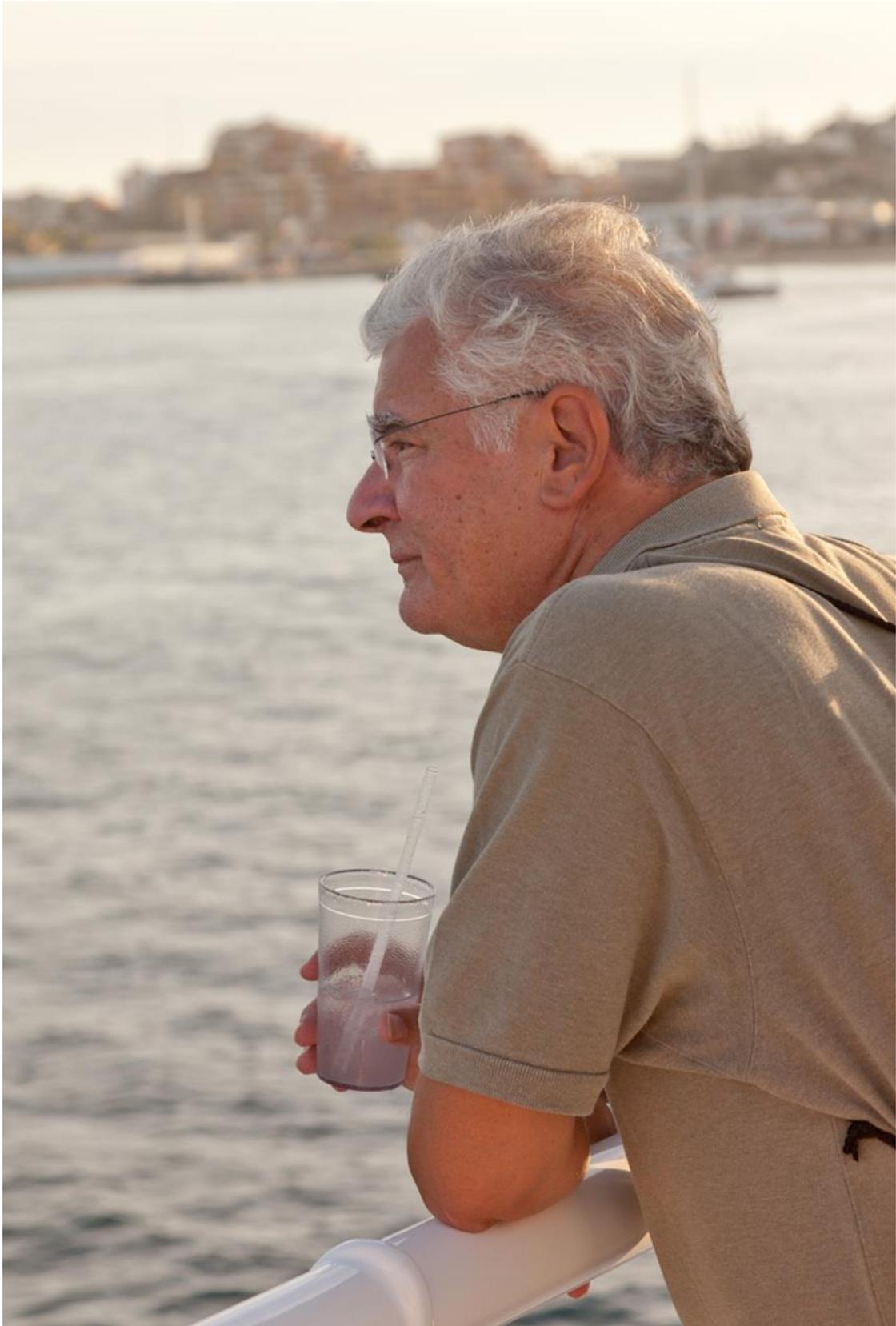
**Theorem 1** Given any  $x$  of length  $n$  and an  $\ell$ -partition of its substrings as above, and any fixed displacement  $T > 0$ , the sets  $\mathcal{O}_z^T$  and  $\mathcal{U}_z^T$  can be computed in  $O(n + \ell)$  time.

We have skimmed some fine print about complexity of the distribution and access to the longest and shortest strings in the  $C_i$ , plus how they make everything work also for other score functions  $z = z_x(\cdot)$ . The way they combine the monotonicity of  $f(y)$  with regard to sub- and super-strings of  $y$ , properties of convexity and concavity, numerical analysis, and graph-theoretic diagrams of the substring structures is a *tour de force*—the paper rewards attention to its details.

## Open Problems

We could go on... But let’s stop now and just again repeat our condolences again to his family and friends. Georgia Tech will be putting together a memorial in his honor—perhaps you will be able to attend.

Alberto is missed already.



**Good Bye Alberto ...**