

Scientific Report of the Conference

AutoMathA 2007

Automata: from Mathematics to Applications

June 18-22, 2007 - Palermo (Italy)

1. **Summary**

The conference AutoMathA 2007 (Automata: from Mathematics to Applications) was held in Mondello, near Palermo, Italy, from June 18 to June 22, 2007.

AutoMathA 2007 was the first general conference of the programme AutoMathA of the European Science Foundation.

The goal of the conference was to provide the opportunity of exchange of information and discussion about developments of the theory of automata and its application to scientific problems.

The topics of the conference covered the areas considered by the programme AutoMathA ranging from the mathematical foundations of automata theory to the more recent applications.

There were 88 participants from 19 different countries. In particular 2 participants from Austria, 1 from Belgium, 1 from Canada, 4 from Czech Republic, 1 from Denmark, 1 from England, 1 from Finland, 14 from France, 8 from Germany, 1 from Holland, 1 from Hungary, 2 from Israel, 35 from Italy, 5 from Poland, 5 from Portugal, 3 from Russia, 1 from Slovakia, 1 from Switzerland, 1 from USA. Among the participants there was a good mixture of Master- and PhD students, research and teaching assistants, and professors.

The scientific programme consisted of

- 10 invited lectures (60 minutes);
- 23 technical contributions (30 minutes).

A CD containing all the papers of the conference was distributed to all the participants.

In addition to the successful scientific programme there were opportunities for social events (free afternoon for excursions, conference dinner).

A welcome cocktail party, lunches, coffee breaks were offered to every participants. Travel and accommodation costs of invited speakers were reimbursed, while only accommodation expenses were reimbursed to other speakers.

All participants manifested their appreciation of the scientific program and the overall organization of the event.

A web page containing all information on the workshop is available at the URL: <http://www.math.unipa.it/~ama07/>. In the web site of the conference are also contained almost all the presentations of the talks given during the conference.

2. Scientific content of the event

The scientific programme of the conference included invited and contributed papers in order to cover the following areas:

(A) Automata models

- Automata on words, infinite words, traces, trees, etc.
- Extended automata
- Automata with output, transducers

(B) Fundamental aspects of the theory of automata

- Mathematical foundations
- Algorithms on automata and words
- Languages and formal grammars
- Symbolic dynamics and coding

(C) Applications

- System analysis and verification
- Natural language processing
- New challenges for automata theory.

The Programme Committee was composed by Jean Berstel, Mikolaj Bojanczyk, Stefano Crespi Reghizzi (co-chair), Javier Esparza, Zoltan Fülöp, Hendrik Jan Hoogeboom, Juraj Hromkovic, Jarkko J. Kari, Nils Klarlund, Michal Kunc, Markus Lohrey, Mark-Jan Nederhof, Jean-Eric Pin (co-chair), Alexander Rabinovich, Antonio Restivo (chair), Michel Rigo, Géraud Sénizergues Pedro Ventura Silva, Benjamin Steinberg, Mikhail Volkov, Thomas Wilke, Pierre Wolper.

The invited speakers, decided by the Programme Committee, gave the following presentations concerning the state of art in several different research areas related to the ESF Programme AutoMathA:

1. Aldo de Luca, "Pseudopalindromes and generalization of episturmian sequences"
2. Pascal Weil, "On recognizable trace languages"
3. Dominique Perrin, "Embeddings of automata"
4. Volker Diekert, "Word problems in some inverse monoids"
5. Georg Gottlob, "Monadic Queries over Tree Structured Data"
6. Maxime Crochemore, "Computing Local Periodicities in Strings"
7. Giorgio Satta, "Natural Language Parsing: New Trends and Open Problems"
8. Orna Kupferman, "From formulas to systems"
9. Daniel Kirsten, "Distance Desert Automata and the Star Height Problem"
10. Alexander Okhotin, "Seven families of Language Equations"

The Programme Committee also selected 23 contributed papers among 35 submissions (see Section 4 containing the final programme of the conference).

3. Assessment of the results and impact of the event

As it can be seen from the description of the scientific content, the conference covered several different aspects of automata theory.

The invited talks given during the conference surveyed some of those important research directions, while the contributed talks mostly showed some recent results on the topics. The speakers were all highly valued researchers in the field and the participants well motivated and interested in the area. The atmosphere resulted very friendly and active.

Due to the relatively wide scope of the presentations, the participants received as good introduction to the state of the art in different topics discussed during the conference. After each presentation there were always questions and comments. All those discussions have provided a better understanding of the main problems in the area and of the new directions of research in which to investigate.

In addition to the presented talks there was time for bilateral discussions and cooperative work. In particular, the participating young scientists took the opportunity to discuss with the senior researchers.

Finally, the conference improved the collaboration between different research groups participating to the ESF Programme and it gave to them the opportunity to propose a set of co-ordinated actions for advancing the theory of automata and for increasing its application to challenging scientific problems.

4. Final Programme

The final programme of the conference was the following:

Monday, June 18

15.00-16.00 Invited talk: **Aldo de Luca**, "Pseudopalindromes and generalization of episturmian sequences" (joint work with M. Bucci, A. De Luca, and L.Q. Zamboni)

16.00-16.30 Coffee break

16.30-17.30 Invited talk: **Pascal Weil**, "On recognizable trace languages" (joint work with M. Kufleitner)

17.30-18.00 "OmegaRegular Half-positional Winning Condition", **Eryk Kopczyński**

18.00-18.30 "Splitting Conditions for Classes of Meet Automata", **Ondřej Klíma, Libor Polák**

19:00 Welcome Cocktail

Tuesday, June 19

9.00-10.00 Invited talk: **Dominique Perrin**, "Embeddings of Automata"

10.00-10.30 Coffee Break

10.30-11.00 "Collapsing Words And A Sequence Reconstruction Problem", **Elena V. Pribavkina**

11.00-11.30 "A note on the complexity of the problem of finding shortest synchronizing words", **Wojciech Samotij**

11.30-12.00 "Recognizing synchronizing words", **Pawel Gawrychowski, Andrzej Kisielewicz**

LUNCH

15.00-16.00 Invited talk: **Maxime Crochemore**, "Computing Local Periodicities in Strings" (joint work with L. Ilie)

16.00-16.30 Coffee Break

16.30-17.00 "Approximating the mean speedup of trace monoids", **Alberto Bertoni, Roberto Radicioni**

17.00-17.30 "Reachability over Tagged Infix Rewriting Systems", **Jan-Henrik Altenbernd**

17.30-18.00 "Marked Systems and Circular Splicing", **Clelia De Felice, Gabriele Fici, Rosalba Zizza**

Wednesday, June 20

9.00-10.00 Invited talk: **Georg Gottlob**, "Monadic Queries over Tree Structured Data"

10.00-10.30 Coffee Break

10.30-11.00 "A Decidable Probability Logic for Timed Probabilistic System", **Ruggero Lanotte, Danièle Beauquier**

11.00-11.30 "A decidable property of regular languages related to periodicity", **Tomasz Kazana**

11.30-12.00 "Minimal Weight Expansions in some pisot bases", **Christiane Frougny, Wolfgang Steiner**

LUNCH

15.00-16.00 Invited talk: **Volker Diekert**, "Word problems in some inverse monoids"

16.00-16.30 Coffee Break

16.30-17.00 "Computing convex hulls by automata iteration", **François Cantin, Axel Legay, Pierre Wolper**

17.00-17.30 "The lexicographic covering", **Jacques Sakarovitch, Rodrigo de Souza**

17.30-18.00 "Internal Structure Computation of Finite State Automaton", **Lamia Tounsi, Béatrice Bouchou, Christophe Lenté, Denis Maurel**

18.00-18.30 "On Pattern Expression Languages", **Cezar Câmpeanu, Nicolae Santean**

Thursday, June 21

9.00-10.00 Invited talk: **Giorgio Satta**, "Natural Language Parsing: New trends and Open Problems"

10.00-10.30 Coffee Break

10.30-11.30 Invited talk: **Orna Kupferman**, "From formulas to systems"

11.30-12.00 "A Note on Subsequential Transducers and Coalgebra", **Helle Hvid Hansen**

12.00-12.30 "Almost Periodic Sequences under Finite Transductions", **Yuri Pritykin**

LUNCH

Free Afternoon

20.00 Conference Dinner in Palermo

Friday, June 22

9.00-10.00 Invited talk: **Daniel Kirsten**, "Distance Desert Automata and the Star Height Problem"

10.00-10.30 Coffee Break

10.30-11.00 "Transition Graphs of Rewriting Systems over Unranked Trees", **Christof Löding, Alex Spelten**

11.00-11.30 "On the topological complexity of weakly recognizable tree languages", **Jacques Duparc, Filip Murlak**

11.30-12.00 "Myhill-Nerode Theorem for Recognizable Tree Series Revisited", **Andreas Maletti**

LUNCH

15.00-16.00 Invited talk: **Alexander Okhotin**. "Seven families of Language equations"

16.00-16.30 Coffee Break

16.30-17.00 "On the separability of sparse context-free languages and of bounded rational relations", **Christian Choffrut, Flavio D'Alessandro, Stefano Varricchio**

17.00-17.30 "Suffix Automata and Standard Sturmian Words", **Marinella Sciortino, Luca Q. Zamboni**

17.30-18.00 "On the Suffix Automaton with mismatches", **Maxime Crochemore, Chiara Epifanio, Alessandra Gabriele, Filippo Mignosi**