Report on DLT 2010

14th Developments in Language Theory Conference

6–9 April 2010, London (Ontario)

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DLT 2010, the 14th in this series of conferences on Theoretical Computer Science, took place in **London (Ontario)**. Conference site was **University of Western Ontario (UWO)**, **Northern Campus Building**, room **N117**. It is situated on a beautiful campus of the university, not very crowded because of vacations, in the nortwestern part of London, with many wild animals as birds and squirrels living there.

The conference was organized by **Department of Computer Science, University of Western Ontario**. The organizing committe consisted of **Jamil Ahmed, Yuan Gao, Hanlin Lu, Peter Goodman, Cheryl McGrath, Angia Muir, Shinnosuke Seki**, and **Sheng Yu** (chair). **DLT 2010** was sponsored by **University of Western Ontario, Fields Institute, EATCS**, and **Academia Europaea**.

The conference was attended by 93 participants from 21 countries, details given in the following table (C country, P number of participants):

C	P	C	P	C	P	C	P	C	P	C	P	C	P
BE	4	DE	18	FR	2	IT	7	NL	1	SE	2	UK	2
CA	28	ES	1	HU	3	JP	3	PT	5	SK	2	US	2
CZ	3	FI	4	IN	1	LV	1	RU	2	TN	1	ZA	1

The scientific program consisted of 6 invited lectures, 32 contributions and 6 posters, selected from 60 submissions. Their distribution by countries and number of authors is given in the tables below (C for country, I invited, S submitted, A accepted, P poster, N number of authors). All contributions were presented.

C	I	S	A	P
AT		1	$\frac{1}{2}$	
AU		$\frac{5}{6}$	$\frac{1}{3}$	
BE	2	$\frac{1}{4}$	$\frac{1}{4}$	
CA	1	$5\frac{3}{4}$	2	1
CZ		$4\frac{2}{3}$	$2\frac{1}{6}$	$\frac{1}{2}$
DE	1	$11\frac{1}{6}$	$6\frac{1}{6}$	$2\frac{1}{2}$
DK		1		1
ES		1	1	
FI		$3\frac{3}{4}$	$2\frac{3}{4}$	

C	I	S	A	P
FR		$2\frac{7}{12}$	$2\frac{1}{3}$	
HU		$3\frac{1}{2}$	1	
IN		3	1	
IS		1		$\frac{2}{3}$
IT	1	$5\frac{1}{4}$	4	
JP		$\frac{1}{2}$	$\frac{1}{2}$	
KR		$\frac{1}{2}$		
LV		2		
MD		$\frac{1}{4}$		

C	I	S	A	P
NL		1		
PL		1		
PT		1	1	
RU		$3\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{3}$
SE		1	1	
SK		1	1	
TN		1	1	
UK		$1\frac{1}{2}$	$\frac{1}{2}$	
US	1	2	1	

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N	S	A	P
1	16	6	3
2	23	16	1
3	16	8	2
4	5	2	
	60	32	6

The program can be found at `http://www.csd.uwo.ca/DLT2010/`. **DLT 2010** started on Tuesday morning when **Sheng Yu**, welcoming all participants to London. It was followed by a welcome speech by **Amit Shakma**, president of UWO, an engineer, in which he also welcomed the participants, thanked the organizers, talked about changing ideas, bringing people together, the model of UWO (*teaching, research, service*), the motto *Veritas et Utilitas* in UWO's coat of arms, the facilities of the campus, finishing with *'Feel at home, enjoy our (now) empty campus'*. From **Sheng Yu** he got a present.

Juhani Karhumäki then talked about the history of **DLT**, its high level as the main conference in automata theory and formal languages, the expansion of the field in connection to others as biology, mathematics, etc., that the proceedings are published for the 10^{th} time at Springer, and the plan for a new handbook, supported by **ESF** (European Science Foundation). Then he officially opened the conference.

Then **Sheng Yu** thanked the program committee, all authors, participants, the organizers, and **Grzegorz Rozenberg**. Finally he gave special birthday congratulations to **Janusz Brzozowski** (75 in 2010), **Derek Wood** (70) who unfortunately could not be present, and **Tom Head** (75 in 2009).

Sheng Yu introduced the first invited speaker **Grzegorz Rozenberg**, mentioning his scientific CV (EATCS, Bulletin, more than 500 publications, 50 LNCS volumes), who then gave an excellent presentation *'Reaction Systems: A Model of Compuation Inspired by Biochemistry'* (co-author **Andrzej Ehrenfeucht**). In it he spoke on natural computing (computation in nature, computers inspired by nature, biochemical reactions), formalizing biochemical reactions (cell function as basic function, facilitating/inhibiting, threshold, environment, dynamics), modularity in reaction systems (formation of modules, mathematical vs. physical/material sets, separability, stability, self-organization), and research topics (how to count if needed - measurement functions, time in reaction systems (RS), RS with duration, RS as finite (set) functions, evolution in the framework of RS, modelling of specific biochemical systems). He finished with a drawing of by his son Daniel (bird - hand) and with, referring to a comment by CNN on the BP oil catastrophe *'Bad thing about the slick is that is is not finite - it is growing every day'*. Unfortunately there is only a short abstract in the proceedings.

The second excellent and clear invited talk (co-author **Martin Kutrib**), *'The*

Complexity of Regular(-like) Expressions', was given by **Markus Holzer**, who had a contribution at every **DLT** so far, with an addition in the title *'How costly is a Change of Description?'*, only with traditional trouser holders (the shirt became too old). Starting with an explanation of **Justus Liebig**, the name patron of the University **Giessen** where **DCFS 2011** will take place, and talking on minimal representations of DFA's, NFA's, regular expressions (RE), complexity of conversion of RE into FA and vice versa, language operations on RE, descriptional and computational complexity, and suitable measures, finishing with his traditional slide for *Thanks*.

Oscar H. Ibarra, with the third one *'On Decision Problems for Simple and Parameterized Machines'*, slightly changed into *'On the Boundaries between Decidability and Undecidability for some Classes of Machines'*, presented a very good and interesting overview on motivation (emptiness, universe, containment, equivalence, disjointness problems for various automata classes), the universe problem for a fixed machine with variable initial configuration (1 counter, 1 reversal), disjointness, containment, equivalence problem (DPDA), counter machines and pushdown machines (PDA, DFCM, DPCM, NPCM), NGSM's and tranducers (NFT, DFT, NPDT, DPDT), linear context-free grammars, parameterized machines (NTM with bounded number of states, tapes, symbols in work tapes), showing many results on (un)decidability of the various problems, many of them the strongest.

Unfortunately the proceeedings contain only a rather short abstract. **Dora Giammarresi** presented a very good fourth one with *'A Brief Excursion Inside the Class of Tiling Recognizable Two-Dimensional Languages'*. It was a survey on 1D recognizable, local 1D and 2D languages, stability, robustness, and nonclosure under complement, on properties and open problems of 2D unambiguous and 2D line-unambiguous languages, and relations between unambiguity and determinism.

An excellent and very interesting fifth invited talk was presented by **Michel Rigo** with *'A Link between Number Theory and Formal Language Theory*, introduced by **Jeffrey Shallit** with *'Not as unpleasant medicine'*. He gave an overview numeration systems and relations to many fields (number theory, combinatorics of words, cryptography, combinatorial games, fractals, logic, measure theory, etc.) and results based on such by **Alan Cobham**, in particular on sets of integers and reals with integer base, nonstandard systems, transcendence of reals, results on primes, and positive view on k-recognizable sets, also referring to the book *Automatic Sequences* by **Jean-Paul Allouche** and **Jeffrey Shallit**.

Lila Kari presented an excellent, fast sixth invited lecture with *'DNA Computing and its Implications for Theoretical Computer Science'*. She was introduced by **Grzegorz Rozenberg** who first introduced a new tradition with the **Juhani Day** (Juhani had birthday that Friday, and answered *'Hunting season of ducks*

starts today' not to be taken as serious!). Then she started with an illustration of a flat forehead and big ear *'What that noise?* (The Niagara falls). It was a survey on the history of the genetic code (4 letters for DNA, RNA tie club, Gamow, diamond code, wrong ideas, redundancy), splicing systems and recombination (Tom Head), the way from DNA to TCS (Adleman, DNA computing, encoding information, DNA-complemenatary model, bond-free languages), sticker systems, Watson-Crick automata, combinatorics on words (primitive words, palindromes, conjugacy, commutativity, Fine-Wilf theorem, Lyndon-Schützenberger equation), cellular and ciliate computing, and DNA computing by self-assembly (DNA tiles, dynamic self-assembly, DNA nanotechnology), all having impact on CS and leading to a new definition of computation (natural process computation, physical substrates, new paradigms) with future challenge (biology and CS are related). Unfortunately there is only a short abstract in the proceeedings.

All invited speakers got a present by **Sheng Yu**.

Since all submissions were of high level only some personal impressions can be given here.

Good and interesting presentations were given by **Tommi Lehtinen** on two special language equations over a unary alphabet, by **Johannes C. Schneider** on restricted ambiguity of erasing morphisms, by **Alexander Okhotin**, speaking fast, on fast parsing for Boolean grammars, **Henning Bordihn** with a changed title *'Parallel Comunicating Finite Automata - Undecidability and Hierarchy Results'*, by **Manfred Droste** on Kleene and Büchi theorems for weighted automata and multi-valued logics, by **Szabolcs Iván** on linear orders, countable words and Müller context-free grammars, by **Arseny M. Shur** on power-free words, circular power-free words and minimal powers, and by **Pascal Vanier** on periodicity in tilings.

Very good and interesting submissions were presented by **Dominik D. Freydenberger** on patterns with bounded number of variables, some connected to the Collatz problem, by **Philippe Schnoebelen** on computability of solutions for the regular Post Embedding Problem, by **Tomi Kärki** on periodicity of morphic words, and by **Christian Matthisen** on the word problem for outer morphism groups of graph groups.

Also to mention are **Galina Jirásková**, starting with a map to show the position of **Brno** and finishing with a red marple leaf with face, **Paritosh Pandya** with the fastest DLT talk, **Sylvia Friese**, having changed her name into **Pott**, showing a picture with a cat and the comment *'Auf diesem Bild ist ein Vogel versteckt'* (on this picuture a bird is hidden), **Suna Bensch** giving a talk with strong relations to linguistics, **Roberto Vaglica** *'Condition C_3 is not necessary!'*, **Tom Head** starting with *'My talk is entirely different'*, talking on light to implement parallel Boolean algebra, with many bit pictures produced by Xerox copies, and **Benjamin Stein-**

berg thanking previous speakers and *'I have almost nothing to say'*.

After the last talk **Michel Rigo** thanked **Sheng Yu** and the organizers.

The proceedings, edited by **Yuan Gao, Hanlin Yu, Shinnosuke Seki**, and **Sheng Yu**, containing all invited lectures, long and short contributions, although those of **Grzegorz Rozenberg**, **Oscar Ibarra** and **Lila Kari** only as short abstracts, have been published as Springer **LNCS 6224**.

In the general assembly on Friday late afternoon **Juhani Karhumäki** thanked the organizers, in particular for the excursion. **Sheng Yu** then had a surprise with the best DLT paper award, which received **Dominik D. Freydenberger** (coauthor **Joachim Bremer**) for *'Inclusion Problems for Patterns with a Bounded Number of Variables'*. **Juhani Karhumäki** then informed us on the fact that **Grzegorz Rozenberg** retired from the steering committee and that he has the job now. **Sheng Yu** presented detailed information on DLT 2010. In the following **Giancarlo Mauri** presented **Università degli Studi di Milano-Bicocca**, the DLT site for 2011. Finally, **Oscar Ibarra** presented the DLT site for 2012, **National Taiwan University** in **Taipeh**. A special issue of DLT 2010 papers is planned for **IJCS**.

In the breaks coffee, tea mineral water, and cakes were offered. Lunch, a warm buffet, was also served at the conference site.

Access to internet was possible by wireless or by the PC's in the computer with a special account for each participant which was also valid on the PC's in the student residence.

Most participants either stayed in **Elgin Hall** on the campus or in **Windermere Minor** a little further away. The social program consisted of a reception on Tuesday late afternoon at **Michael's Garden, Sommerville House**, with white and red wine from California, Canadian beer, mineral water, bread, cheese, fruits, shrimps and chicken sticks. Unfortunately the food, not the drinks, were not sufficient for all participants such that some remained hungry.

On Thursday afternoon we had the highlight with the excursion to **Niagara Falls** and the conference dinner. On the way we also passed the only wine cultivation area in Canada before we reached the falls. There, after free time to walk around and admire the falls, in particular the *Horse Shoe Falls* on the Canadian side (USA on the other side), we had a **Journey behind the Falls**, receiving yellow rain coats, going down about 40 m by elevator, through a tunnel to a window behind the falls, and to a platform in front of the falls where our feet got wet by water spray.

After having time to look into a souvenir shop we had the banquet at **Elements on the Falls Restaurant** in the same building, with a nice view on the falls. There we had a really good dinner with soup, beef or salmon, dessert, fruits, white and red wine from the region, beer and other drinks. When **Janusz Brzo-**

zowski wanted to announce a short speech by klicking on his glas, it broke. He thanked the organizers for the successful conference and excursion. It was around 23.30 h when we were back at our accomodations.

Weather was warm, rather humid (more than 80% just before the conference), with highest temperatures between 25 and 30°C, and occasional light rain fall.

DLT 2010 was again a very successful conference, of high level, in a really warm and relaxed atmosphere, very well organized. It is planned to put pictures of the conference on the web, most probably on the **DLT 2010** web site.

Next **DLT** will be held from July 19-22, 2011 at **Milano-Bicocca**.