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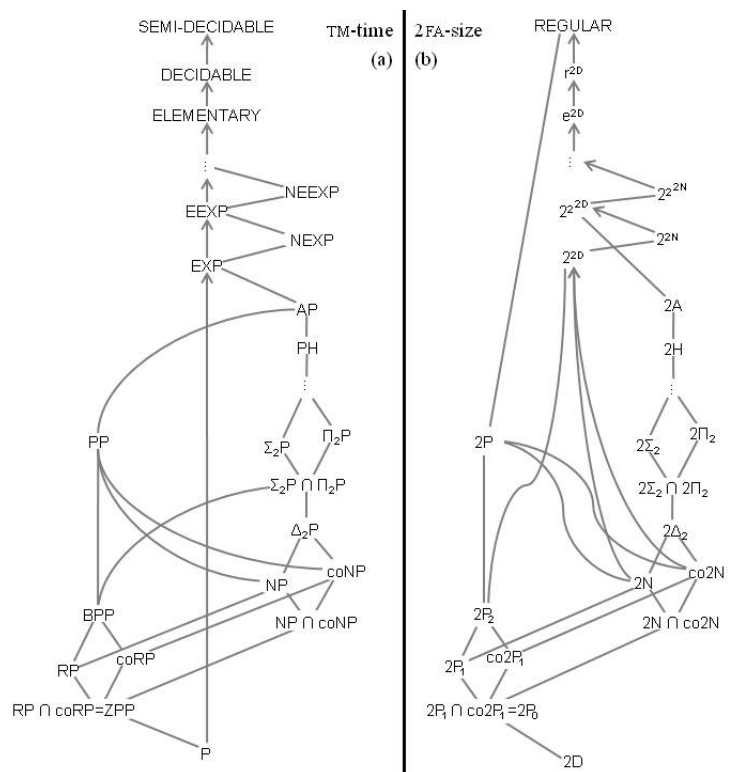
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B. Work and results

This project was implemented by Christos A. Kapoutsis (scholar.google.com/citations?user=VW8XujEAAAAJ) under the supervision of Jean-Éric Pin (www.liafa.univ-paris-diderot.fr/~jep) at the Laboratoire d'Informatique Algorithmique: Fondements et Applications (LIAFA, www.liafa.univ-paris-diderot.fr) in Paris, France between 1 September 2010 and 31 August 2012. Our results include:

- *Tighter versions of the Berman-Lingas Theorem.* Revisiting an old theorem by Berman and Lingas, we proved tighter connections between two-way finite automata and logarithmic-space Turing machines [K11a, Ka].
- *Proof of $2D \neq 2N$ for 2FA with few reversals.* Advancing towards a proof of $2D \neq 2N$, we showed that a 2DFA with sub-linearly many reversals may need exponentially many states to simulate a general 1NFA. [K11b, Kb].
- *Reversal hierarchies for small 2DFA.* Refining [K11b], we proved that 2DFAs with constant number of reversals may become exponentially more succinct whenever an additional reversal is allowed [KP12b].
- *New reductions, new complete problems, and new understanding for the unary case.* We proved that resolving the unary case of $2D$ vs. $2N$ is equivalent to resolving the long-standing open question of TM-space complexity whether $L/poly$ contains NL [KP12a, KP].
- *Descriptive minicomplexity.* Refining Buchi's Theorem, we characterized certain minicomplexity classes ($1N$, RN , SN corresponding to one-way, rotating, and sweeping automata) in terms of $MSO[S]$ (*monadic second-order logic with successor*) [KL12].
- *Minicomplexity overview.* We wrote an overview article that presents minicomplexity in the Sakoda-Sipser framework, in a way that is more inviting for people familiar with standard complexity theory [K12, Kc].
- *Alternation.* We reviewed the literature on alternating 2FA, clarifying differences in definitions, proving appropriate equivalences, and characterizing the polynomial-size hierarchy in terms of quantifiers and deterministic verifiers. (Article in preparation.)
- *Website.* We started developing a website, accessible at www.minicomplexity.org, dedicated to the study of the complexity of 2FA. (Still under construction.)

These results have been published in 6 articles in international conferences (including 1 best paper award, 5 invitations to contribute to the respective special issues of journals, and 1 invited talk) and 2 pending articles in international journals, plus 2 more articles that have been submitted for publication.

C. Publications

- [K11a] C. A. Kapoutsis. *Two-way automata versus logarithmic space*. Proceedings of International Computer Science Symposium in Russia – CSR 2011, LNCS 6651, Springer, pp. 359-372.
 - [K11b] C. A. Kapoutsis. *Nondeterminism is essential in small 2FAs with few reversals*. Proceedings of International Colloquium on Automata, Languages, and Programming – ICALP 2011, Part II, LNCS 6756, Springer, pp. 198-209.
 - [KP12a] C. A. Kapoutsis, G. Pighizzini. *Two-way automata characterizations of $L/poly$ versus NL* . Proceedings of International Computer Science Symposium in Russia – CSR 2012, LNCS 7464, Springer, pp. 222-233. Best paper award.
 - [K12] C. A. Kapoutsis. *Minicomplexity*. Proceedings of International Workshop on Descriptive Complexity of Formal Systems – DCFS 2012, LNCS 7386, Springer, pp. 20-42. Invited talk.
 - [KL12] C. A. Kapoutsis, N. Lefebvre. *Analogs of Fagin's Theorem for small nondeterministic finite automata*. Proceedings of International Conference on Developments in Language Theory – DLT 2012, LNCS 7410, Springer, pp. 202-213.
 - [KP12b] C. A. Kapoutsis, G. Pighizzini. *Reversal hierarchies for small 2DFAs*. Proceedings of International Symposium on Mathematical Foundations of Computer Science – MFCS 2012, LNCS 7464, Springer, pp. 554-565.
 - [Ka] C. A. Kapoutsis. *Two-way automata versus logarithmic space*. Theory of Computing Systems (special issue for CSR 2011), to appear.
 - [Kb] C. A. Kapoutsis. *Nondeterminism is essential in small two-way finite automata with few reversals*. Information and Computation (special issue for ICALP 2011), to appear.
 - [Kc] C. A. Kapoutsis. *Minicomplexity*. Journal of Automata, Languages, and Combinatorics (special issue for DCFS 2012), submitted.
 - [KP] C. A. Kapoutsis, G. Pighizzini. *Two-way automata characterizations of $L/poly$ versus NL* . Theory of Computing Systems (special issue for CSR 2012), submitted.
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