

## THE COMPLETELY DISTRIBUTIVE LATTICE OF MACHINE INVARIANT SETS OF INFINITE WORDS

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### Abstract

We investigate the lattice of machine invariant classes. This is an infinite completely distributive lattice but it is not a Boolean lattice. The length and width of it is  $\mathfrak{c}$ . We show the subword complexity and the growth function create machine invariant classes.

**Keywords:** Mealy machine, machine invariant class, completely distributive lattice, length, width.

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### REFERENCES

- [1] J. Berstel and J. Karhumäki, *Combinatorics on Words – A Tutorial*, Bulletin of the European Association for Theoretical Computer Science **79** (2003), 178–228.
- [2] J. Buls, *Machine Invariant Classes*, p. 207–211 in: "Proceedings of WORDS'03, 4th International Conference on Combinatorics on Words", September 10–13, 2003, Turku, Finland, Tero Harju and Juhani Karhumäki (Eds.), TUCS General Publication (No 27, August).
- [3] J. Dassow, *Completeness Problems in the Structural Theory of Automata*, Mathematical Research (Band 7), Akademie–Verlag, Berlin 1981.

- [4] B.A. Davey and H.A. Priestley, *Introduction to Lattices and Order*, Cambridge University Press, 2002.
- [5] J.A. Goguen, *L-fuzzy sets*, J. Math. Anal. Appl. **8** (1967), 145–174.
- [6] J. Hartmanis and R.E. Stearns, *Algebraic Structure Theory of Sequential Machines*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 1966.
- [7] A. de Luca and S. Varricchio, *Finiteness and Regularity in Semigroups and Formal Languages*, Springer-Verlag, Berlin, Heidelberg 1999.
- [8] B.I. Plotkin, I.Ja. Greenglaz and A.A. Gvaramija, *Algebraic Structures in Automata and Databases Theory*, World Scientific, Singapore, New Jersey, London, Hong Kong 1992.
- [9] D.R. Stinson, *Cryptography*, Theory and Practice, CRC Press 1995.
- [10] V.B. Kudryavcev, S.V. Aleshin and A.S. Podkolzin, *Vvedenie v teoriyu avtomatov*, An Introduction to the Theory of Automata, Moskva, Nauka (Russian) 1985.
- [11] A.A. Kurmit, *Posledovatel'naya dekompoziciya konechnyh avtomatov*, Sequential Decomposition of Finite Automata, Riga, Zinatne (Russian) 1982.
- [12] B.A. Trahtenbrot and Ya.M. Barzdin, *Konechnye avtomaty povedenie i sintez*, Finite Automata (Behaviour and Synthesis) Moskva, Nauka (Russian) 1970.
- [13] V.M. Fomichev, *Diskretnaya matematika i kriptologiya*, (Discrete Mathematics and Cryptology), Moskva, DIALOG-MIFI (Russian) 2003.

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