Finite Automata over Matrix Groups

by

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Date and Time: March 20th, 2019 (Wednesday), 13:00
Place: Room Z23, Computer Engineering Building, GTU

All interested are cordially invited.

ABSTRACT:

Due to limited language recognition power of finite automata, various extensions of finite automata have been proposed. One such variant is the finite automaton over a group (group automaton), which is a nondeterministic finite automaton equipped with a register holding an element from a group. The register is initialized with the identity element of the group, and an input string is accepted if after completely reading the string the machine enters an accept state and the register is equal to the identity element after being multiplied by a group element at every step. Group automata allow generalization for different finite automaton models with storage such as counter machines and pushdown automata.

In this talk, we will focus on finite automata over matrix groups and investigate the class of languages corresponding to integer and rational matrix groups of various dimensions. We will see that finite automata over 2x2 integer matrix groups characterize exactly the class of context-free languages. We will prove that corresponding group automata for rational matrix groups are more powerful than the corresponding group automata for integer matrix groups for the case of 2x2 matrices. We will establish a connection between the membership problem for matrix groups and group automata and show that the problem is decidable for 2x2 integer matrix groups.

BIOGRAPHY:

Özlem Salehi Köken received her B.S. degree from the Department of Mathematics in 2011 and M.S. degree from the Department of Computer Engineering in 2013 from Boğaziçi University. Currently she is a Ph.D. student in the Department of Computer Engineering at Boğaziçi University under the supervision of Cem Say. She has been working as a teaching assistant at Boğaziçi University since 2011. Her research interests are in the area of theoretical computer science focusing on automata theory, formal languages, group theory and decidability.