

SEPARATING WORDS WITH WEIGHTED AUTOMATA

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Abstract: The separating words problem is the problem of finding the smallest deterministic finite automaton that behaves differently on two given strings, meaning that it accepts one of the two strings and rejects the other string. If the words have different length, one can compute this length modulo b for a well chosen b , which is logarithmic in the sum of the length. If the lengths are equal, however, the problem is surprisingly difficult : the best lower bound on the number of states is logarithmic, while the upper bound is $O(n^2/5(\log n)^3/5)$. With weighted automata, one can imagine separating all words with finitely many automata. It happens for weights in $(\mathbb{R}, +, \times)$. With Zur Izhakian, we inductively build pairs of words that can not be separated by any max-plus automaton of a given size. In this talk, I will present this problem in more detail, and the strategy of our proof, which is based on the analysis of ranks of large powers of tropical matrices.