

GandALF — Exercise Sheet 10

Exercise 1. Consider a weighted automaton \mathcal{A} depicted below. Explain what is the function expressed by this automaton? Describe the set of words w such that $\mathcal{L}_{\mathcal{A}}(w) = 0$.

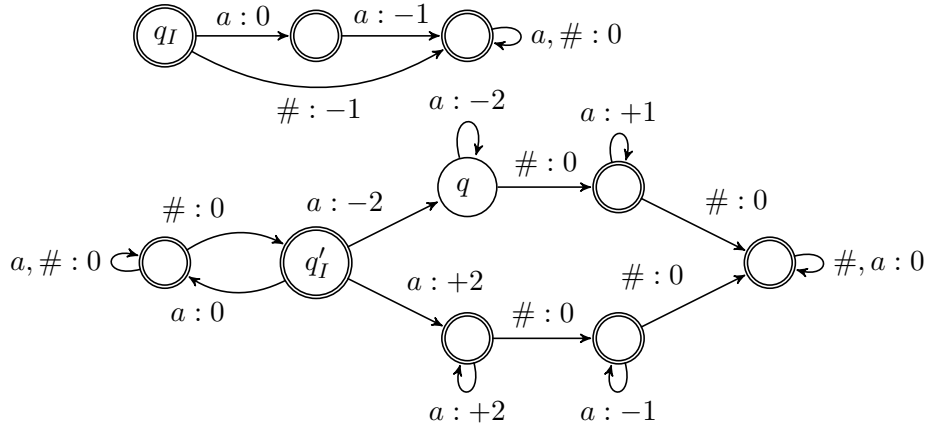


Figure 1: The automaton \mathcal{A} with two initial states q_I and q'_I .

Exercise 2. Show undecidability of the universality problem for weighted automata with the LIMAVG value function.

Exercise 3. Discuss whether the universality problem for weighted automata with the LIMAVG value function and non-negative weights remains undecidable.

Exercise 4. Construct computable value function f on finite sequences such that the emptiness problem for weighted automata with f is undecidable.

Exercise 5. For two automata $\mathcal{A}_1, \mathcal{A}_2$, the disjoint union of $\mathcal{A}_1, \mathcal{A}_2$ is the automaton whose set of states (resp., set of initial states, set of final states, transition relation) is the disjoint union of the sets of states (resp., sets of initial states, sets of final states, transition relations) of $\mathcal{A}_1, \mathcal{A}_2$. We define the disjoint union of k -automata accordingly. We say that a weighted automaton is k -deterministic if it is a disjoint sum of k deterministic weighted automata. What is the complexity of the universality problem for k -deterministic weighted automata with the SUM value function?