PS06-01

February 9, 2018

Regular Languages can be recognized by Turing Machines that only go right or stay put.

Given a TM $M = \langle Q, \Sigma, \Gamma, \vdash, \_, \delta, s, t, r \rangle$, let N be an NFA that recognizes the same language as M. Let $N = \langle Q_N, \Sigma_N, \delta_N, s_N, F_N \rangle$.

Let $Q_N = Q$.

Let $\delta_N(q_i, a) = q_j$ if $\delta(q_i, a) = \langle q_j, b, R \rangle$

and $\delta_N(q_i, \varepsilon) = q_j$ if $\delta(q_i, a) = \langle q_j, b, S \rangle$

Let $s_N = s$

Let $t \in F_N$ and $r \notin F_N$

Since there is no way for the machine to look back on what it wrote, it loses its memory capability, which means that it cannot recognize context free languages;in other words, the head is only a read head. Essentially, moving right is equivalent to consuming a character and staying put is equivalent to an epsilon transition. Therefore, any situation where the TM would stay put is Trivial.