

CMSC 452 Project – Part 1. Morally Due April 8
LEO is in charge of the Project. Any Questions Go To Him

1 Intro

Point Of This Assignment To learn about DFA Minimization and help prepare for Part 2 of the Project.

1. Two DFA's are 'equivalent' if they recognize the same language.
2. Given a DFA, we want to know if we can somehow construct another DFA that recognizes the same language, with the minimum possible number of states.

Can we do this? Yes! Through a process known as DFA minimization.

Your task:

- Research DFA minimization. Here are some resources to get you started:
 - Wikipedia: https://en.wikipedia.org/wiki/DFA_minimization
 - G4G: <https://www.geeksforgeeks.org/minimization-of-dfa/>
 - UC Davis: <https://www.cs.ucdavis.edu/~rogaway/classes/120/winter12/minimization.pdf>

These should suffice for the assignment, but feel free to use other resources as well.

- Answer the prompts under the **Assignment** section based on your research.

2 Assignment

1. Let $M = (Q, \Sigma, s, \delta, F)$ be a DFA,
 - (a) Let q and q' be states in Q . In the context of DFA Minimization, what does it mean for q to be non-distinguishable from q' ?

- (b) Suppose that we begin partitioning Q by grouping together non-distinguishable states. Let P_k be a partition of Q and $\sigma \in \Sigma$. If q and q' belong to the same block in P and $\delta(q, \sigma) \neq \delta(q', \sigma)$, will they still be in the same block in the next partition? Why or why not?

2. Give pseudo-code that outputs the partition of non-distinguishable states from a DFA $M = (Q, \Sigma, s, \delta, F)$, i.e outputs the states for the minimized DFA:

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new_states(M=(Q, Sigma, s, delta, F)):
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3. Give pseudo-code that outputs the new transition function for the minimized DFA of M with new states P :

`new_delta(M=(Q, Sigma, s, delta, F), P):`