CPSC 439 (Spring 2022) Project 1: Turing Machines

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Github Link: https://github.com/duong-jason/CPSC-439-Project-1-TM

There are two turing machines that were created by our group and both of them were made using https://turingmachinesimulator.com/. The first turing machine, the one that was not made with any encoding, was made in a way that easily satisfies Figures 6.3 and 6.4. The diagram below shows how the machine functions:
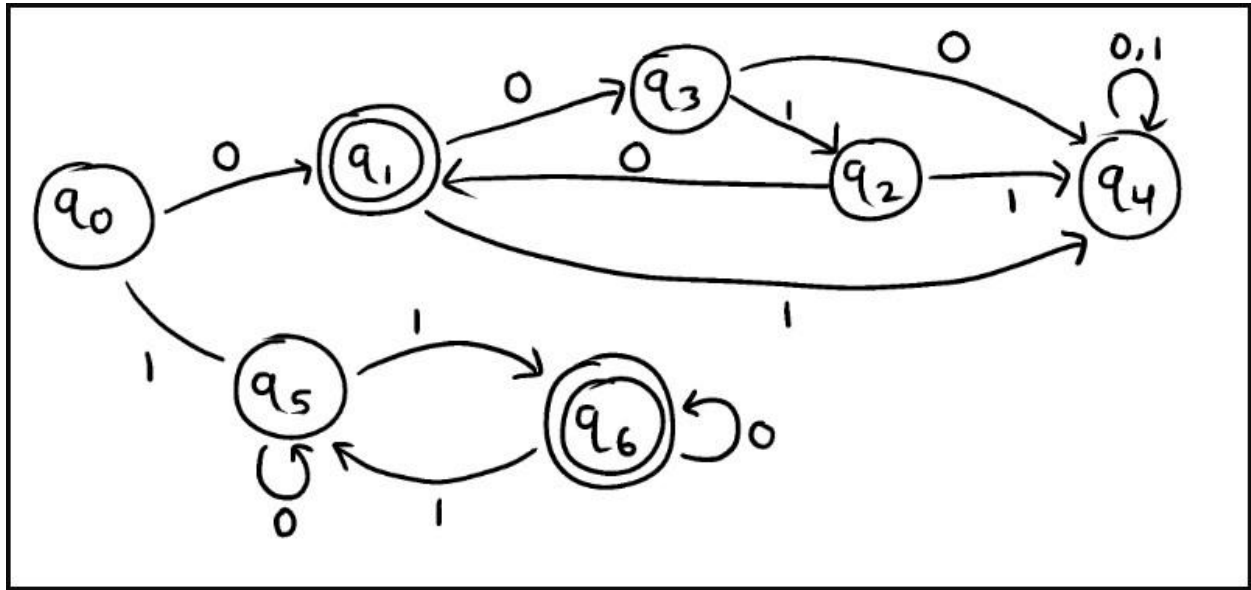
How the machine works depends on its input, with it splitting off into two areas depending on the input value. If the number on the string is a 1, then the Turing Machine will simulate the DFA shown in Figure 6.3. If the number on the string is a 0, then the Turing Machine will simulate the DFA shown in Figure 6.4.

For the dfa encoding description, please refer to the ***jupyter notebook file***. For the other Turing Machine, we separate the dfa encoding with its input. The turing machine transitions right on the first tape until the '#' symbol is read. This signifies that every symbol following is the input which will be written to the second tape. Secondly, the turing machine will rewind itself on both tapes to start processing. As the dfa encoding implies, from the given input, we need to match the first symbol on the dfa's transition. By matching the number of ones to the input, we move right to the second transition symbol. Otherwise, the state of 'SKIP2' is assigned which continues to the start of the next transition. On failure of the second transition symbol, the turing machine will

enter the 'SKIP1' state which is nearly identical to the prior except we only need to identify one less '0' symbol. If both symbols match exactly the number of ones provided in the dfa encoding, we proceed to write to the output tape (3rd tape) the new state (the third transition symbol). At this moment, the turning machine will proceed to its next input symbol and rewind only the first tape. The turing machine will end up in its accept state if the current state on the 3rd tape matches with any one of the symbols following the '00' symbols on the dfa portioned tape.