Turing Machine Documentation

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1   Roles

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2   Definition

A Turing machine is meant to make a stack and queue depending on the input. It's meant to be a visualization tool for CS 202 students studying these data structures. This is a really good visualization tool, as the program used to build the Turing Machine provides the overhead for the visualization.

3   States and Transitions

The Turing machine operates by moving between states and performing transitions on the tape. The states and transitions are labelled as follows:

- *Red* are all the reject states (q_{reject})

- *Green* are all the accept states (q_{accept})

- *Blue* is the Queue's add States

- *Yellow* is the Queue's remove States

- *Magenta* is the Stack with the add states

- *Cyan* is the Stack with the remove states

- *Black* are the initial states to set up the #

The transitions can be summarized as follows:

- xxxxxx

- xxxxxx

4 Image

5 Instructions

A's mean to add the next character and D's mean to delete from the top or the bottom, depending on whether you specified a stack or a queue by either inputting an S or Q at the beginning of the string. You can add a,b,c, or d. This can, of course, be implemented with any character, but using only 4 characters makes it easier to visualize the states.

6 Examples

Here are some examples of input and output for the Turing machine:

- `Input: SAaAbD, Output: xxxxxx#a`

- `Input: QAaAbD, Output: xxxxxx#b`

- `Input: QA#AbD, Output: INVALID`

- `Input: QA1A2D, Output: INVALID`

7 Conclusion

The Turing machine is a powerful tool for performing computations on input tapes. It has applications in computer science, mathematics, and other fields.