Turing Machine Documentation

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1 Introduction

This document provides documentation for a Turing machine, which is a mathematical model of computation. The purpose of this machine is to perform computations on an input tape, which is a sequence of symbols.

2 Definition

A Turing machine is defined by a 7-tuple $(Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$, where:

- Q is a finite set of states.

- Σ is a finite set of input symbols.

- Γ is a finite set of tape symbols, where $\Sigma \subseteq \Gamma$.

- δ is the transition function, which maps $Q \times \Gamma$ to $Q \times \Gamma \times \{L, R\}$, where L and R represent left and right movement on the tape.

- q_0 is the initial state.

- q_{accept} is the accepting state.

- q_{reject} is the rejecting state.

3 States and Transitions

The Turing machine operates by moving between states and performing transitions on the tape. The states and transitions are defined by the 7-tuple above.

4 Examples

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

- Input: 0011, Output: 1100

- Input: 101, Output: 010

5 Conclusion

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