

Project Proposal: The Dependence of Turing Machine Productivity on the Size of Transition Space

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Abstract

The Busy Beaver and Scoring problems for Turing Machines are well defined problems which are known to be Turing-uncomputable. These problems both place attention on the quantity of states in a given Turing machine. My work will focus on some of the same questions, including productivity of Turing Machines on certain inputs, but with attention placed on the number of *transitions* in the Turing Machine.

Research Directions

Likely directions include the questions of blank tape input, input of $[n]$ for n -transition machines, output in terms of number of tape cells traversed, output in terms of contiguous symbols, and phenomena concerning number of states and number of transitions.

Research Motivation

I am of the opinion that some properties of these questions may lend themselves to mathematical induction more easily than the Busy Beaver / Productivity functions due to the similarity of logical proofs of soundness and completeness. (e.g. whereas in the state bounds problems, we know little nothing about properties of the states, in these we know transition are a finite number of transitions, and some properties thereof.

Mechanism

Formal logic and mathematical induction will likely play a part in this research. Simulation of certain Turing Machine will also be necessary. This simulation will likely be performed in an existing Turing Machine Simulation/Creation software (which is still under development, however) written in COMMON LISP.