
Final Year Project Report

Formalising Alternative Models of Computation in Isabelle



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ABSTRACT

The goal of this project was to implement and formalise alternative models of computation inside the proof assistant Isabelle, and then to make use of this to assist in proving various results about these models. In particular it focuses on Cellular Automata, and certain more computationally simple variants.

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INTRODUCTION

Software and proof verification is an interesting and emerging field.

1.1 TOPIC ADDRESSED IN THIS PROJECT

We look at formalising models of computation to help deal with the complexity that comes with trying to mathematically prove results about them.

1.2 MOTIVATION

It is very difficult to work with high level concepts while still being rigorous. Theoretical Computer Science is a very abstract and mathematical discipline at its core and this requires the same level of rigour in dealing with its complex models.

BIBLIOGRAPHY

- [1] Jian Xu, Xingyuan Zhang, and Christian Urban. “Mechanising Turing Machines and Computability Theory in Isabelle/HOL”. In: *Interactive Theorem Proving*. Ed. by Sandrine Blazy, Christine Paulin-Mohring, and David Pichardie. Berlin, Heidelberg: Springer Berlin Heidelberg, 2013, pp. 147–162. ISBN: 978-3-642-39634-2.