OFFICIAL ABSTRACT and CERTIFICATION

The Halt to the Halting Problem: Utilizing Artificial Intelligence to Detect the Halting Behavior of Functions

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The Halting Problem, proved unsolvable by Alan Turing in 1936, shows that it is impossible to know with certainty whether a function will halt. The problem stands as a fundamental limitation in the abilities of computers. This research aimed to utilize a neural network to find observable patterns in halting and non-halting functions. The network was trained on 200 sample functions with a known halting behavior and its hyperparameters were optimized. The model reached a mean accuracy of 62.0% based on 100 trials. An accuracy greater than 50% indicates that the model recognizes patterns in the functions and correctly classifies them most of the time.

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