HPC Assignment 5 Writeup

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(Together with Jared Corman)

For this project, we opted to create a program that could solve the children’s game Chopsticks.

For those unfamiliar, it is a game played with the hands, where “attacking” your opponent’s hands with one of yours adds together the number of fingers displayed on the hands. When a hand reaches its maximum number of fingers, it is “out”, and cannot be attacked unless brought back “in” by a number-splitting move (where one hand’s numbers are split between both). Only one hand may be attacked per turn. When both of a player’s hands are “out”, that player loses.

Special rules our program uses are as follows:

* Splits are disallowed – they were planned to be implemented, but due to time constraints (and research showing the game would nearly always result in a tie should they be included) they were omitted.
* The game ends early at a tie if a game state identical to a previous game state is reached. This is done to prevent infinite loops, as these loops in gamestates mean the game will never end.
* The tree assumes optimal play but in real life this assumption should not be made.

Our initial program used min max trees, but after those proved to be slow we added alpha-beta pruning. As a result the game can be solved in less than a second.

The screenshots below depict results for a given number of fingers.

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Description automatically generated

Figure 1: 5-finger results – Player 1 wins.

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Figure 2: 50-finger results – Player 1 wins.

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Figure 3: 69-finger results – Player 2 wins.