Haskell

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1 Team Members

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2 Objectives of the project

1. Learn basic functional programming with Haskell.
2. Implement Taylor Series of Sin function for a given value of x and a given error term.
3. Make a 2 player game of a N X N Tic-Tac-Toe in Haskell.
4. Apply AI (Minimax algorithm) to the game in Haskell.

3 About Minimax Algorithm

Minimax is a kind of backtracking algorithm that is used in decision making and game theory to find the optimal move for a player, assuming that your opponent also plays optimally. It is widely used in two player turn based games such as Tic-Tac-Toe, Backgamon, Mancala, Chess, etc.

In Minimax the two players are called maximizer and minimizer. The maximizer tries to get the highest score possible while the minimizer tries to get the lowest score possible while minimizer tries to do opposite.

Every board state has a value associated with it. In a given state if the maximizer has upper hand then, the score of the board will tend to be some positive value. If the minimizer has the upper hand in that board state then it will tend to be some negative value. The values of the board are calculated by some heuristics which are unique for every type of game.

4 Time line

4.1 Week 1-2

- Learned basic git : fork, branch, minor change, remote host update, pull request
- Learned basic text editing using vim/emacs (optional)
- Learned basic command line navigation : cd, mkdir, rm, printenv ,man.

4.2 Week 2-3

- Read the first four chapters of LYAH (Learn You a Haskell)
- Setup Haskell stack with latest version of GHC.

4.3 Week 3-4

- Learned about standard input/output in Haskell.
- Learned about Data.List and higher order functions.
- Implemented N X N grid of Tic-Tac-Toe in Haskell.

4.4 Week 4-5

- Read up to chapter 8 of LYAH (Learn You a Haskell)
- Approximated the value of Sin function using Taylor's series for a given error value
- Read about folds, maps, lambdas, higher order functions.

4.5 Week 5-8

- Read about Minimax algorithm for the AI of the game.
- Designed a profit function for evaluating a particular state of the game.
- Implemented the AI on the game.

5 Link to Github repository

`https://github.com/abhiyad/ACA_Haskell`