**CS 583 Final Report**

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1. Our project is to implement board game called “Five in a Row” (which is also known as “Gomoku” in Japanese). It is a two players game that is suitable for all ages. The principle for this game is the first player who make a coherently sequence of five stones will win the game. The sequence can be vertically, horizontally or diagonally. The user can choose to play against another user or the A.I. The program will check if there is a winner at the end of every turn.
2. Types:

* Cell = Black | White | Blank

This data type represents the state of the stone.

* Player = First | Second | AI

This data type represents the player.

* Board a = Board [[a]]

This data type represents the board.

Functions:

* showBoard: this function is used to print out the current board.
* updateBoard: this function is used to update the board at the end of every turn.
* checkFive: this function is used to check if there is a winner at the end of every turn.
* isGood: this function is used to check if the input position is legal.
* playerHelper: this function is a high-order function that help to identify the player for several functions.
* gameLoop: this function is the main function to control the logic of whole game.

1. We applied 3 ideas from the course to the design of our project. They are high-order function, refactoring and zipper.

* High-order function
* Refactoring
* Zipper