**CS 404 – Assignment 3 Report**

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**Players:**

-Player 1

-Player 2

**States:**

-Grid : the main game matrix where each node can have the following values:

1) 0: no island or a bridge.

2) -1: an unlabeled island where a value can be placed.

3) 1-4: an island with the appropriate value associated.

-BridgeGrid: the bridge matrix used to identify the bridges and their alignment:

1) 1,2: single and double vertical bridges respectively.

2) -1,-2: single and double horizontal bridges respectively.

*We’ve taken this approach of numbering on a single grid to remove the need to handle the hashi puzzle using multiple matrixes for each bridge type using unique numbers and negative numbers as a means to identify a bridge using whether a value is 1 or 2 and identify its alignment by looking at the sign of the value. To simplify the calculations the negative and positive pair are the same so that calculation operations based on the bridges yield the same result using abs() functionality.*

-Score: scores for both players that is re-calcualted at the end of the each turn.

**Initial State:**

-The grid layout where each node within the grid can have a values consisting of {-1, 0, 1, 2, 3, 4}

**Terminal State:**

-State which fulfills all the following requirements:

1) There are no unlabeled nodes (no node with -1 value).

2) No possible bridge placement in between 2 islands that complies with the rules.

**State Transition Function:**

**-**Placing a horizontal bridge (or two) in one or two continious nodes that connect two islands that comply with the game rules.

-Placing a vertical bridge (or two) in one or two continious nodes that connect two islands that comply with the game rules.

-Give values of 3 or 4 to an unlabeled node (node with a value of -1).

**Payoff Function:**

The condition whether a player wins by having more score than the other player thus the payoff function is the total score gained.