

## **Activity 3: Heuristics Analysis Report**

The heuristic function is evaluated based on 10 matches to reduce the time required for the whole evaluation. The overall idea of the heuristics function is to check whether a move is close to a corner or the walls of the game board.

### **Strategy used**

#### **Check for corner evaluator**

1. In the early game, the strategy is to move towards the corner of the game board.
2. In the late game, the strategy is to move away from the corner of the game board.
3. If the move selected is not towards the corners, only little score is awarded.

#### **Check for walls evaluator**

1. In the early game, the strategy is to move towards the walls of the game board.
2. In the mid game, the strategy is to move away from the walls of the game board but not too intense.
3. In the late game, the strategy is to move away from the walls of the game board intensely.
4. If the move selected is not towards the walls, only little score is awarded.

The custom heuristics function will return the weighted summation of the combination of both the evaluators with a higher weightage, 0.7 on the corner evaluator's score and 0.3 on the walls evaluator's score.

### **Results**

This script evaluates the performance of the custom heuristic function by comparing the strength of an agent using iterative deepening (ID) search with alpha-beta pruning against the strength rating of agents using other heuristic functions. The `ID\_Improved` agent provides a baseline by measuring the performance of a basic agent using Iterative Deepening and the "improved" heuristic (from lecture) on your hardware. The `Student` agent then measures the performance of Iterative Deepening and the custom heuristic against the same opponents.

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Evaluating: ID\_Improved

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Playing Matches:

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Match 1: ID_Improved vs Random	Result: 32 to 8
Match 2: ID_Improved vs MM_Null	Result: 26 to 14
Match 3: ID_Improved vs MM_Open	Result: 18 to 22

Match 4: ID\_Improved vs MM\_Improved    Result: 21 to 19  
Match 5: ID\_Improved vs AB\_Null        Result: 27 to 13  
Match 6: ID\_Improved vs AB\_Open        Result: 24 to 16  
Match 7: ID\_Improved vs AB\_Improved    Result: 21 to 19

Results:

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ID\_Improved        60.36%

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Evaluating: Student1

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Playing Matches:

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Match 1: Student1 vs Random    Result: 32 to 8  
Match 2: Student1 vs MM\_Null    Result: 30 to 10  
Match 3: Student1 vs MM\_Open     Result: 20 to 20  
Match 4: Student1 vs MM\_Improved    Result: 21 to 19  
Match 5: Student1 vs AB\_Null    Result: 25 to 15  
Match 6: Student1 vs AB\_Open    Result: 28 to 12  
Match 7: Student1 vs AB\_Improved    Result: 22 to 18

Results:

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Student1        63.57%

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Evaluating: Student2

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Playing Matches:

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Match 1: Student2 vs Random    Result: 34 to 6  
Match 2: Student2 vs MM\_Null    Result: 30 to 10  
Match 3: Student2 vs MM\_Open     Result: 25 to 15  
Match 4: Student2 vs MM\_Improved    Result: 24 to 16  
Match 5: Student2 vs AB\_Null    Result: 27 to 13  
Match 6: Student2 vs AB\_Open    Result: 22 to 18  
Match 7: Student2 vs AB\_Improved    Result: 21 to 19

Results:

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Student2          65.36%

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Evaluating: Student3

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Playing Matches:

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Match 1: Student3 vs Random    Result: 35 to 5

Match 2: Student3 vs MM\_Null   Result: 27 to 13

Match 3: Student3 vs MM\_Open     Result: 27 to 13

Match 4: Student3 vs MM\_Improved   Result: 23 to 17

Match 5: Student3 vs AB\_Null    Result: 28 to 12

Match 6: Student3 vs AB\_Open   Result: 26 to 14

Match 7: Student3 vs AB\_Improved   Result: 24 to 16

Results:

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Student3          67.86%

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Evaluating: Student4

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Playing Matches:

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Match 1: Student4 vs Random    Result: 31 to 9

Match 2: Student4 vs MM\_Null   Result: 29 to 11

Match 3: Student4 vs MM\_Open     Result: 18 to 22

Match 4: Student4 vs MM\_Improved   Result: 24 to 16

Match 5: Student4 vs AB\_Null    Result: 22 to 18

Match 6: Student4 vs AB\_Open   Result: 24 to 16

Match 7: Student4 vs AB\_Improved   Result: 20 to 20

Results:

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Student4          60.00%

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Evaluating: Student5

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#### Playing Matches:

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Match 1: Student5 vs Random Result: 37 to 3  
Match 2: Student5 vs MM\_Null Result: 25 to 15  
Match 3: Student5 vs MM\_Open Result: 21 to 19  
Match 4: Student5 vs MM\_Improved Result: 20 to 20  
Match 5: Student5 vs AB\_Null Result: 25 to 15  
Match 6: Student5 vs AB\_Open Result: 22 to 18  
Match 7: Student5 vs AB\_Improved Result: 24 to 16

#### Results:

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Student5 62.14%

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#### Evaluating: Student6

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#### Playing Matches:

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Match 1: Student6 vs Random Result: 32 to 8  
Match 2: Student6 vs MM\_Null Result: 33 to 7  
Match 3: Student6 vs MM\_Open Result: 22 to 18  
Match 4: Student6 vs MM\_Improved Result: 20 to 20  
Match 5: Student6 vs AB\_Null Result: 25 to 15  
Match 6: Student6 vs AB\_Open Result: 25 to 15  
Match 7: Student6 vs AB\_Improved Result: 25 to 15

#### Results:

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Student6 65.00%

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#### Evaluating: Student7

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#### Playing Matches:

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Match 1: Student7 vs Random Result: 32 to 8  
Match 2: Student7 vs MM\_Null Result: 29 to 11

Match 3: Student7 vs MM\_Open Result: 23 to 17  
Match 4: Student7 vs MM\_Improved Result: 23 to 17  
Match 5: Student7 vs AB\_Null Result: 27 to 13  
Match 6: Student7 vs AB\_Open Result: 22 to 18  
Match 7: Student7 vs AB\_Improved Result: 26 to 14

Results:

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Student7 65.00%

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Evaluating: JXScore

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Playing Matches:

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Match 1: JXScore vs Random Result: 35 to 5  
Match 2: JXScore vs MM\_Null Result: 29 to 11  
Match 3: JXScore vs MM\_Open Result: 20 to 20  
Match 4: JXScore vs MM\_Improved Result: 28 to 12  
Match 5: JXScore vs AB\_Null Result: 33 to 7  
Match 6: JXScore vs AB\_Open Result: 24 to 16  
Match 7: JXScore vs AB\_Improved Result: 26 to 14

Results:

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JXScore 69.64%