MCAST UNIVERSITY COLLEGE,
INSTITUTE OF INFORMATION TECHNOLOGY AND COMMUNICATION TECHNOLOGY

B.Sc. (Hons.) 2nd Year Project - Initial proposal

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1 PERSONAL DETAILS

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2 PROJECT DETAILS

Research Question / Aim: Identifying and implementing an efficient Battleship AI algorithm by using educated guessing and a probabilistic approach.

Objectives:

1. **Research**
   a) Research the rules of the game and various techniques that humans use to efficiently play the game.
   b) Research current algorithms that can efficiently win a game of Battleships
   c) Research techniques to implement an efficient algorithm that can finish a game of Battleships in as little tries as possible
2. **Development**
   a) Create multiple boards that the simulations of the different algorithms will run on

b) Develop utilities that will be used, including a database, database handlers and a file parser

c) Develop the logic and rules of the game

d) Develop three algorithms that can be simulated for a defined amount of times

e) Develop a way to record every move done in each simulation

3. **Analysis**

a) Analyse the efficiency of each algorithm on different datasets

b) Analyse and compare the overall efficiency of the algorithms used

c) Identify the limitations of the prototype

d) Identify the most efficient algorithm

e) Identify the improvements that can be made on the best performing algorithm

Rationale: There are many different variations of Battleship AI, each taking a different approach to solve the problem. This research will compare the different approaches. An implementation that combines the most efficient approaches will be developed, tried and tested against the existing algorithms. This will be done by analysing the average amount of shots each algorithm takes to win a single games for a set amount of times. This data will be compared with the new algorithm and its efficiency is deduced.

Current Solutions/Alternatives: Many implementations can be found on websites such as Github.

Current Solutions/Alternatives::

1. Meuffels, W.J.M. and den Hertog, D., 2010. PuzzleâĂŤSolving the Battleship puzzle as an integer programming problem. informs Transactions on Education, 10(3), pp.156-162.

2. Port, A.C. and Yampolskiy, R.V., 2012, July. Using a GA and Wisdom of Artificial Crowds to solve solitaire battleship puzzles. In Computer Games (CGAMES), 2012 17th International Conference on (pp. 25-29). IEEE.

Desired End Product: The prototype should utilizes three different algorithms to solve the Battleships problem. It should have the capabilities to record every move to a database for further analysis.

TimeFrame:

Task	Deadline
Literature Review	Mid March
Prototype Development	End of April
Data Analysis	Mid of May
Write-up	Near End of May
Submission	Beginning of June

Table 2.1: Schedule

Research Method

1. Develop a console application that has the functions of a Battleship game with the ability to simulate a set number of games and output the data gathered.
2. Implement the algorithms that will be analysed.
3. Run the algorithms for large number of times and gather the results.
4. Tabulate and analyse the results gathered.