COMP 3981: Project Description (Part #3)

Search Strategy and Performance Enhancements

General Instruction:

For this part of the project, you will work (with your team members) on completing the design and implementation for the abalone game-playing agent in preparation for tournament.

I Game-playing Agent

The game-playing logic of the agent must include:

- minimax algorithm with alpha-beta pruning
- heuristic evaluation function for real-time decisions
- integration with Part #1 and Part #2 deliverables

In addition, you must also incorporate at least one of the following performance enhancements to your game-playing agent (you may expect that the per-move time limit can be as small as 5 seconds):

- node ordering
- transposition tables
- quiescence search

II Heuristic Evaluation Function

The performance of a game-playing agent depends strongly on the quality of its heuristic evaluation function. Now that you have had the opportunity to brainstorm and discuss evaluation functions in general with your team members, you are required to individually:

(i) design and implement a heuristic evaluation function
(ii) evaluate the performance of your heuristic evaluation function
(iii) convince your team members to adopt your heuristic evaluation function for your team's game-playing agent

BONUS: The team member, whose heuristic evaluation function is adopted for the team's game-playing agent, will be awarded an individual 5% bonus course mark. Note that the bonus mark will only be awarded to one (1) team member per team and is not dividable among team members. Hence, it is imperative that you rigorously convince your team members, based on performance evaluation, to adopt your heuristic evaluation function for your team's game-playing agent. In the event that decision unanimity is not reached within a team, the bonus for that team is forfeited.

Deliverables:

You are expected to deliver a fully functional abalone game-playing agent as specified in (I) for Part #3. Only minor bug-fixes, further performance enhancements, additional testing and final documentation should be done for Part #4. The deliverables for Part #3 are as follows:

1) [dropbox] Search Strategy and Performance Enhancement Report – the submitted report must include, at a minimum, the following:
   a) design and architecture of your game-playing agent
   b) detailed description of the adopted heuristic evaluation function, including performance results as well as how the heuristic evaluation function was evaluated
   c) detailed description of all the performance enhancement(s) incorporated to your game-playing agent
   d) if your heuristic evaluation function in (1-b) and/or performance enhancement(s) in (1-c) make(s) use of any constants/weights, clearly explain and justify the choice of values
   e) the name of the team member whose heuristic evaluation function was adopted, including justification for the decision
   f) per team member contribution
   g) list of references used in the development of your abalone game-playing agent
   h) any additional documentation (as determined by each team) pertinent to the assessment of your deliverable
2) [dropbox] Each team member must submit, in the appendix of the report in (1), a detailed description of the heuristic evaluation function proposed, including performance results as well as how the heuristic function was evaluated.
   [Note that if your heuristic evaluation function was adopted and detailed in (1-b), you do not have to submit this individual write-up]
3) [dropbox] Source code and executable including detailed instructions on how to build and run the executable.
   [Note that you will receive a mark of zero if your code does not compile or execute on the (freshly-imaged) instructor terminal in the option lab (SE12-306)]

Due Date:

In addition to the dropbox submissions on the due date, there are two (2) in-class checkpoints prior to the due date as follows:

March 27, 2018: Progress Demonstration (10 mins per team)
April 3, 2018: Trial Tournament (round robin)

The deliverables for Project Part #3 are due on April 3, 2018 by 2359 (dropbox submissions) at the latest. Late submissions will not be accepted.

Upcoming Project Due Dates:

April 10, 2018: Project Part #4 – Tournament – round-robin heats
April 11, 2018: Project Part #4 – Tournament – semi-final, final
April 13, 2018: Project Part #4 – Final Deliverable Submission