

PROJECT REPORT

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Description

A checker program with the option of a pc player or a human player on both ends. The pc player use the iterative deepening & minimax alpha-beta search on the whole legal moves on the board and try to pick the best move against the other player.

Dependency

- CMAKE 3.0
- MAKE

Usage

```
./checker  
Follow the Prompt
```

Build

```
cd submission/  
mkdir build && cd build  
cmake .. && make  
./checker
```

Clear Build

```
cd submission/  
rm -rf build
```

Structure

Agent class

- ```
agent()
agent(checker *, bool, double)
add_total_move_time(const duration &) : void
alpha_beta_search(const Board &) : move
append_move(const move &) : void
get_max_depth() : int
get_prev_move_time() : duration
get_total_move_time() : duration
play(const Board &) : move
score_board(const Board &) : int
set_prev_move_time(const duration &) : void
```

### Checker class

- ```
checker()  
end_game() : void  
get_board_in_play() : Board  
get_current_player() : uint8_t  
get_legal_moves(const Board &, unsigned short) : vector<move>  
get_move_start_time() : time  
init_game() : void  
load_game(const string &) : void  
pretty_print_moves(const move &) : string  
print_board() : void  
save_game(const string &) : void  
set_board_in_play(const Board &) : void  
start_game(bool, bool, unsigned short, double) : void  
start_game(unsigned int, gameinfo) : void  
transition_board(const move &) : Board  
transition_board(const move &, const Board &) : Board
```

Heuristic Ideas Applied

Clear Difference

1. if the board has no piece left for one, set his score to be minimum and his opponent score to be maximum.
2. if the board has no legal left for one, set his score to be minimum and his opponent score to be maximum.

Zero Sum score

1. Each player will have a positive base score of 300.
2. King is worth 1.6 and the Normal one worth 1 relatively.[1000 vs 1600]
3. Deduct point if I am not in the middle of the board.
4. Add point if I am closer to the enemy piece and I have my square behind me filled with my own piece.
5. Non-king piece will be awarded to stay in back rank and given incentive to move forward.