CHESS

CS-154 PROJECT

- **Team members:**

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- **Description of the problem:**

This program is for playing chess game in two player and one player game against AI. Two player game can also be played on LAN.

- **Variables and important functions in the program:**
    1. piece%: class which represent all the pieces.
    2. board-conf: this variable is mlist of mlist to represent what are the pieces on every position of the board.
    3. attack-w, attack-b: all the attacks at every position.
    4. possible-attacks: takes piece as an input and returns a lambda which tells if the piece attacks on the give position.
    5. check-condition: Checks whether any king is under check-or-not also look after check-mate.
    6. tree: a struct to represent tree.
    7. leaf: a struct to store value of evaluation function.
    8. best-move: function which gives best possible move for computer for a given board-configuration.

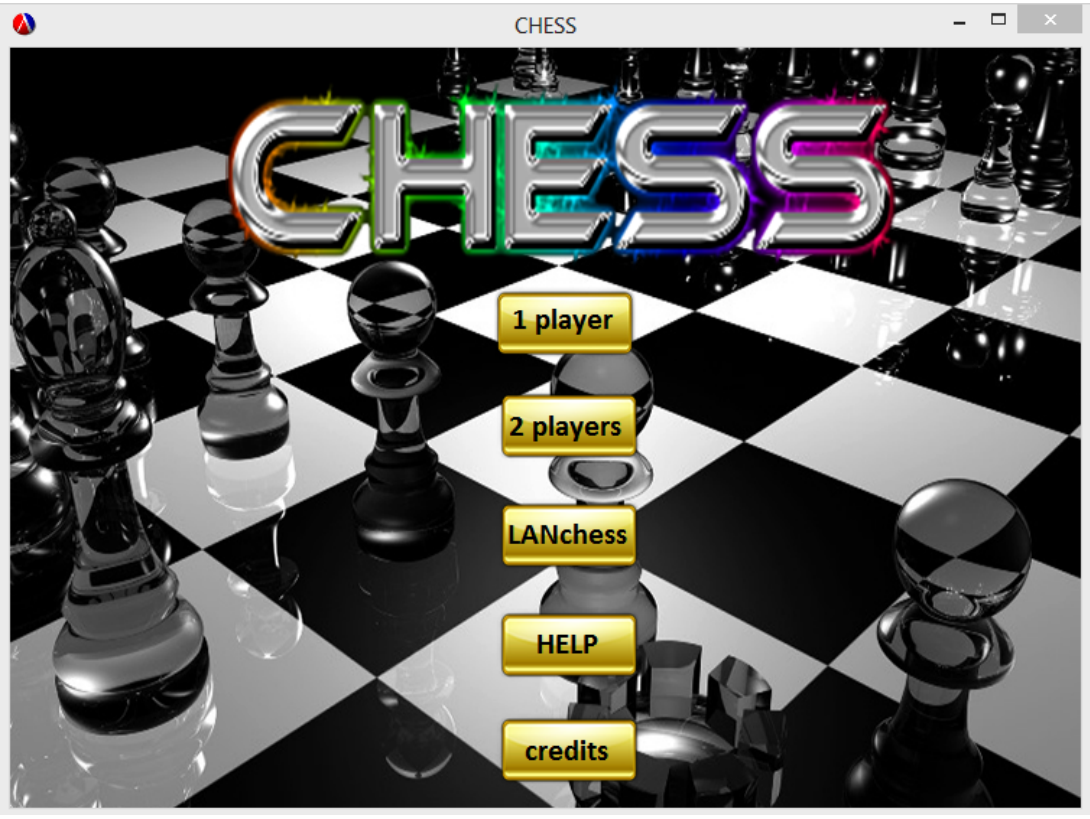
- **Functioning of the program:**
    - For two player game:
        1. Identifying mouse clicks.

2. Suggesting moves for the selected piece. AI is used for ensuring that the suggested moves don't imply check on the playing side. If there is already a check, it only suggests the moves which remove the check.
3. Moving the piece after mouse click on suggested moves.
4. Updating the board configuration and the valid moves of the pieces.
5. Identifying check, check-mate and stale-mate.

- For two player game on LAN:
  After the move of one player, the program sends information of the last move to the other player through the server. Then the program on the other machine shows the move.
- For one player game:
  Similar to two player game except it calls the function (best-move) which makes a **mini-max tree** and finds best-move using **alpha-beta-pruning**.

➢ **Sample input and output:**

Main menu:



Queen's possible moves:

Black Queen, knight, bishop move to only one position due to check:

- **Limitations of the program:**
  1. Castling is not enabled.
  2. The pawn is only promoted to queen.
  3. AI only plays with black color. (It can be made to play with white color using a command but due to some bug it gives wrong answer for depth greater than 2)

- **Points of interest:**
  1. We haven't used any other software like X-board. All the graphics is programmed in Pretty Big using universe library and racket GUI. Added timer in two player game and LAN chess.
  2. In the mini-max tree we haven't saved the board configuration on every node. We have first moved the piece, updated the original board configuration, evaluated it and undo the last move.
  3. At any point of time we can switch between one player game and two player game with same board configuration.
  4. Evaluation function used in hard level (walk in the park) depends also upon supports given to each piece by its teammate.