

ChessGPT V1.0

Thomas Yeung	yeungks@uci.edu
Yixuan Jing	yixuanj9@uci.edu
Yian Lin	yianl8@uci.edu
Tangqin Zhu	tangqinz@uci.edu
Rishi Tirumala	rtiruma1@uci.edu

Affiliation: Team ChessGPT

Table of Contents

0. Glossary

- 0.1. Chessboard
- 0.2. Pieces
- 0.3. Special moves
- 0.4. Conditions

1. Computer Chess

- 1.1. Usage Scenario
- 1.2. Goals
- 1.3. Features

2. Installation

- 2.1. System Requirements
- 2.2. Installation
- 2.3. Uninstalling

3. Chess Program Functions and Features

Copyright

Error Messages

Index

0. Glossary:

0.1 Chessboard:

A chessboard is a game board used to play chess. It consists of 64 squares, 8 rows by 8 columns, on which the chess pieces are placed.

1. Rank: The eight horizontal rows of the chess board numbered from 1 to 8.
2. File: The eight vertical columns of the chess board lettered from A to H.

0.2 Pieces:

A chess piece is a game piece that is placed on a chessboard to play the game of chess. It can be either white or black, and it can be one of six types: king, queen, rook, bishop, knight, or pawn.

1. Pawn
Moves forward one square, but captures diagonally one square. On its first move, it has the option to move forward two squares.
2. Knight
Moves in an "L" shape: two squares in one direction and then one square perpendicular to that, or one square in one direction and then two squares perpendicular. Can jump over other pieces.
3. Bishop
Moves diagonally any number of squares. Each bishop starts on either a light or dark square and remains on that color for the entire game.
4. Rook
Moves horizontally or vertically any number of squares. Special move: "castling," in which the rook and the king move simultaneously under certain conditions.
5. Queen
Combines the power of the rook and bishop, moving any number of squares horizontally, vertically, or diagonally.
6. King
Moves one square in any direction.

0.3 Special moves:

1. "En Passant": when a pawn is moved two squares from the starting position and ended in the same rank as the enemy pawn, the enemy pawn can capture it by moving to the first square of its path. This can only be done in the very next round.
2. "Castling": the king moves two squares toward the nearest rook and the rook moves to the other side, right next to the king. Doable when none of the two pieces can be moved previously and no pieces are between them.

0.4 Conditions:

1. Check:
A check occurs when a player's king is under immediate threat of capture by one or more of the opponent's pieces on their next move. The player in check must make a move to remove the threat.
2. Checkmate:
Checkmate refers to the situation where there is no move for the player possible which would get his king out of check. Then the player loses.
3. Stalemate:
A situation where the player whose turn it is to move has no legal move and their king is not in check. It results in a draw.
4. Draw:
A situation in which neither player can force a win. Draws occur under several conditions, including stalemate, insufficient material, threefold repetition, and the fifty-move rule.
5. Promotion:
Promotion is the replacement of a pawn with a new piece when the pawn is moved to its last rank. The player replaces the pawn immediately with a queen, rook, bishop, or knight of the same color.

1. Computer Chess

1.1 Usage scenario

Sketch of a typical screenshot.

	a	b	c	d	e	f	g	h
8	r	h	b	q	k	b	h	r
7	p	p	p	p	p	p	p	p
6	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.
2	P	P	P	P	P	P	P	P
1	R	H	B	Q	K	B	H	R

Movement of chess pieces:

Enter your move (e.g., e2e4): e2e4

Log file:

1: White pawn moved from e2 to e4.

1.2 Goals

The goal of a chess game is to checkmate your opponent's king. This occurs when the king is in a position to be captured (in "check") and there is no legal move the player can make to remove the king from threat. Essentially, this means the king is under direct attack, cannot move out of attack, and cannot be defended by another piece. If a player's king is checkmated, that player loses the game.

1.3 Features

1. Menu

The program will prompt the user to enter options for selecting different game modes and choosing sides.

2. User vs. Computer

The user is able to play against the computer in the Chess game.

3. Player vs. Player

The user is able to play against other local players.

4. Computer vs. Computer

The user is able to make both sides operate by the computer and they will play against each other like in PvE mode.

5. Log

The software is able to generate a log file that records each move of the game.

6. Gameplay

The game follows the standard rules of chess.

2. Installation

2.1 System Requirement

System Requirements	
RAM	512MB, or more
CPU	Intel Pentium, AMD K5, or better
Memory	2-3GB, or more
OS	Linux
Display	1024*768 screen resolution or higher

2.2 Setup and configuration

Setup

1. Verify that the computer either runs on Linux or has a virtual machine that runs on Linux.
2. Download the software files and open the software.

Building, compilation, installation

1. Download Chess_V1.0_src.tar.gz
2. Use command "tar -xvzf Chess_V1.0_src.tar.gz"
3. Use command "cd Chess_V1.0_src.tar.gz"
4. Use command "make"
5. Use command "cd bin"
6. Use command "./chess"

2.3 Uninstalling

Delete all the software files.

3 Chess Program Functions and Features

3.1 Menu

Display a menu that allows users to select different functions

Welcome to Chess, Please select game mode (PVP,PVE): PVE

3.2 Chess Board

Create and display a chess board that users can interact with.

	a	b	c	d	e	f	g	h
8	r	h	b	q	k	b	h	r
7	p	p	p	p	p	p	p	p
6	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.
2	P	P	P	P	P	P	P	P
1	R	H	B	Q	K	B	H	R

GUI:



3.3 Move Chess Piece

Read the input by the user and move the chess piece to the required location if it is valid.

Enter your move (e.g., e2e4): e2e4

	a	b	c	d	e	f	g	h
8	r	h	b	q	k	b	h	r
7	p	p	p	p	p	p	p	p
6	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.
4	.	.	.	.	P	.	.	.
3	.	.	.	.	.	.	.	.
2	P	P	P	P	.	P	P	P
1	R	H	B	Q	K	B	H	R

3.4 Check the movement of chess pieces

Check validity of movement input by the user. To ensure every move in the game is legal under the rule of a typical chess game. The function should include checking rules for every piece type movement and some special cases as well.

	a	b	c	d	e	f	g	h
8	r	h	b	q	k	b	h	r
7	p	p	p	p	p	p	p	p
6	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.
2	P	P	P	P	P	P	P	P
1	R	H	B	Q	K	B	H	R

Enter your move (e.g., e2e4): h7h4

Invalid Move! Try again!

3.5 Computer Move

Read the move of the user and move correspondingly by the automatic player.


```

      a b c d e f g h
8  r n b q k b n r
7  p p p p . p p p
6  . . . . . . . .
5  . . . . p . . .
4  . . . P . . . .
3  . . . . . N . .
2  P P P . P P P P
1  R N B Q K B . R
Enter your move (e.g., e2e4): a7a5
Latest log: Black pawn moved from a7 to a5.
Latest algebraic log: a5
      a b c d e f g h
8  r n b q k b n r
7  . p p p . p p p
6  . . . . . . . .
5  p . . . p . . .
4  . . . P . . . .
3  . . . . . N . .
2  P P P . P P P P
1  R N B Q K B . R
Latest log: White pawn moved from e2 to e3.
Latest algebraic log: e3
      a b c d e f g h
8  r n b q k b n r
7  . p p p . p p p
6  . . . . . . . .
5  p . . . p . . .
4  . . . P . . . .
3  . . . . P N . .
2  P P P . . P P P
1  R N B Q K B . R
Enter your move (e.g., e2e4): 

```

3.6 Secondary menu

Display a secondary menu that prompts the user to choose a side and begin a new game.

```
Enter a color. Enter 0 for white, and 1 for black. 1
```

3.7 Log

Each move of the user and computer will be recorded in a log file.

```
Log:
1. White pawn moved from f2 to f3.      Black pawn moved from e7 to e5.
2. White pawn moved from g2 to g4.      Black queen moved from d8 to h4.
Algebraic log:
1. f3      e5
2. g4      Qh4

```

Copyright

ChessGPT

Copyright © 2024 Team ChessGPT: Yian Lin, Thomas Yeung, Yixuan Jing, Tangqin Zhu, Rishi Tirumala. All Rights Reserved.

Error messages

Error messages will display in following scenarios:

1. Moving the opponents pieces
2. Moving no piece
3. Moving a Piece Illegally:
 - Movement is not possible with a piece's ability to move
 - Another piece is blocking a position
 - King still remain in check
4. User fails to enter a proper menu select option

Index

B

Bishop, 3

C

Check, 4

Checkmate, 4

Castling, 4

Chessboard, 3

E

En Passant, 4

F

Features, 5

File, 3

K

Knight, 3

King, 3

P

Pawn, 3

Promotion, 4

Q

Queen, 3

R

Rook, 3

Rank, 3