ARTIFICIAL INTELLIGENCE

ASSIGNMENT NO. 3

Report:

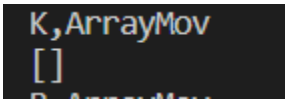
Board:

Starting from the initialization and printing of board. This is how I initialized board. There is a 2D array of size (8x8), White pieces are donated by capital letters and smaller are of black.

There are 8 pawns of each player, 2 rooks, 2 knight, 2 bishop, 1 queen and 1 king. Empty spaces are shown by sterik.

King Moves:

We know that king can move 1 unit in any direction. If we place K at its initial position, there wouldn't any chance for it to move.



Empty array is showing that.

Let's change the place of K and then check its positions, valid moves.

If King is at (4,4) then these are the valid moves, it can take:

```
K,ArrayMov
[(3, 5), (5, 5), (5, 3), (5, 4), (3, 3), (3, 4), (4, 5), (4, 3)]
```

There are 8 possible positions as showing in the screenshot.

Knight Moves:

Capital N, i.e. white Knight according to our logic, is placed at its initial position i.e. (0,6). It can take 2 moves those are following, showing in screenshot

```
N,ArrayMov
[(2, 7), (2, 5)]
```

The one that is placed at (0,1) has following valid moves

```
N,ArrayMov
[(2, 2), (2, 0)]
```

Knight can move in 8 directions if there is no hindrance in between. Those are:

2 spaces vertical up and then 1 space perpendicularly right.

2 spaces vertical up and then 1 space perpendicularly left.

2 spaces vertical down and then 1 space perpendicularly left.

2 spaces vertical down and then 1 space perpendicularly right.

1 space vertical up and then 2 spaces perpendicularly right.

1 space vertical up and then 2 spaces perpendicularly left.

1 space vertical down and then 2 spaces perpendicularly right.

1 space vertical down and then 2 spaces perpendicularly left.

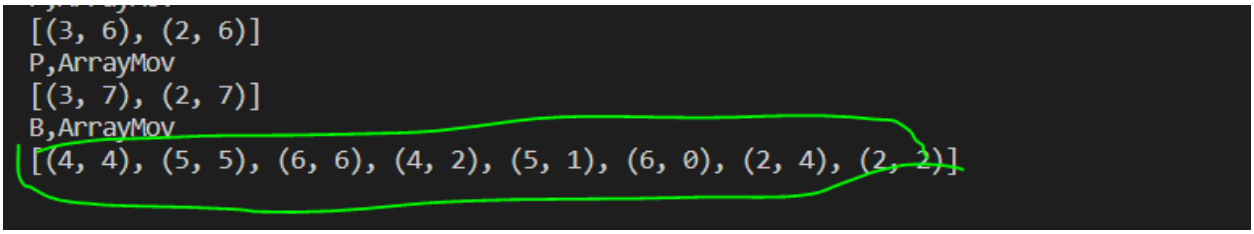
Same moves would be taken by smaller pieces that are black one.

Bishop Moves:

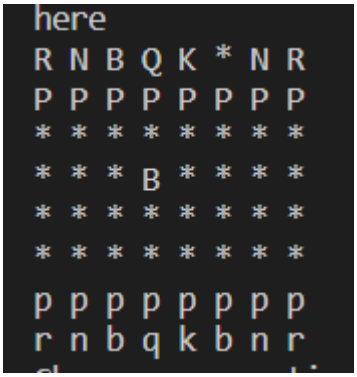
Bishop can move diagonally anywhere in the board, as far as it got by some hindrance. Like if there would be any piece of opponent then it will capture that piece.
When it is at initial position and and it is blocked by all sides, then it wouldn't be able to take

move. But for just showing lemme change it's position to (3,3) and check what are it's valid moves position. I am placing B whose initial position was (0,5) to the (3,3).

Here are the possible moves:



This is where I placed the B:

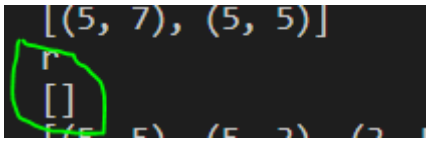


Rook Moves:

Rook is approx. same as Bishop, but it moves horizontally and vertical as far as there isn't any hindrance in the way. Bishop moves diagonally up and down, and rook move perpendicularly up and down.

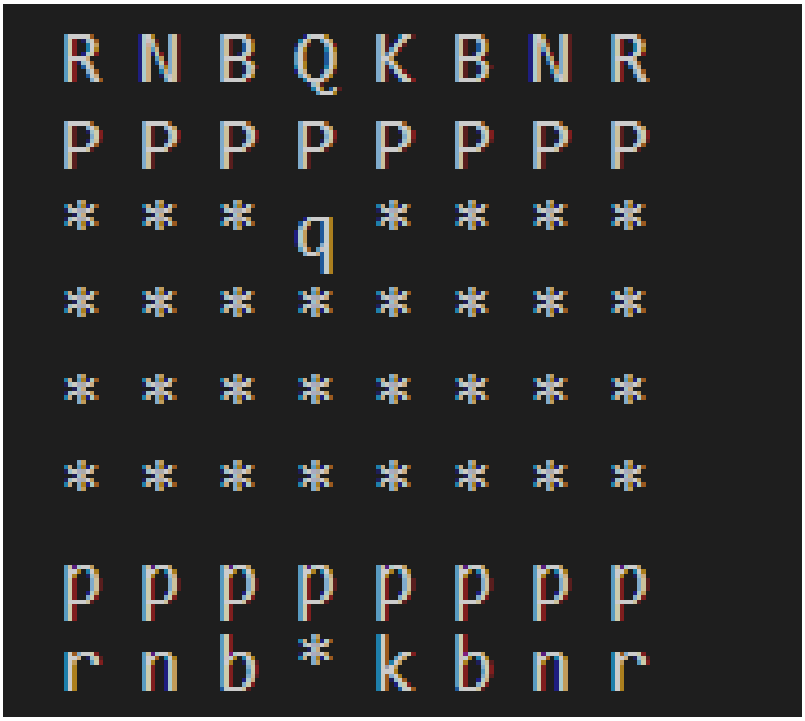
If the board is at initial position, rook can't move anywhere. To see that let's print possible moves of black rook that is small r.

1st rook: 

2nd rook: 

Queen Moves:

Queen is like a mixture of rooks and bishop it can take moves in both way horizontal and vertical and diagonally too. Let's place a queen of black piece at (2,3) and check it's possible moves.



There would be total of 19 possible moves it would be able to take. In which 3/ 19 say it would be able to capture opponent piece. Here is the screenshot of all possible moves it can take:

```
[(3, 4), (4, 5), (5, 6), (3, 2), (4, 1), (5, 0), (1, 4), (1, 2), (3, 3), (4, 3), (5, 3), (
1, 3), (2, 4), (2, 5), (2, 6), (2, 7), (2, 2), (2, 1), (2, 0)]
```

Pawn Moves:

If pawn is placed at its home base it can take move 2 units up or 1 unit up (means opposite of home) (if white, then down if black then up in my case) if those places are blank. If it isn't in home base, then it can only take move one piece. But for capturing it can take move in diagonally one unit. It can never move backwards, in direction of it's home.

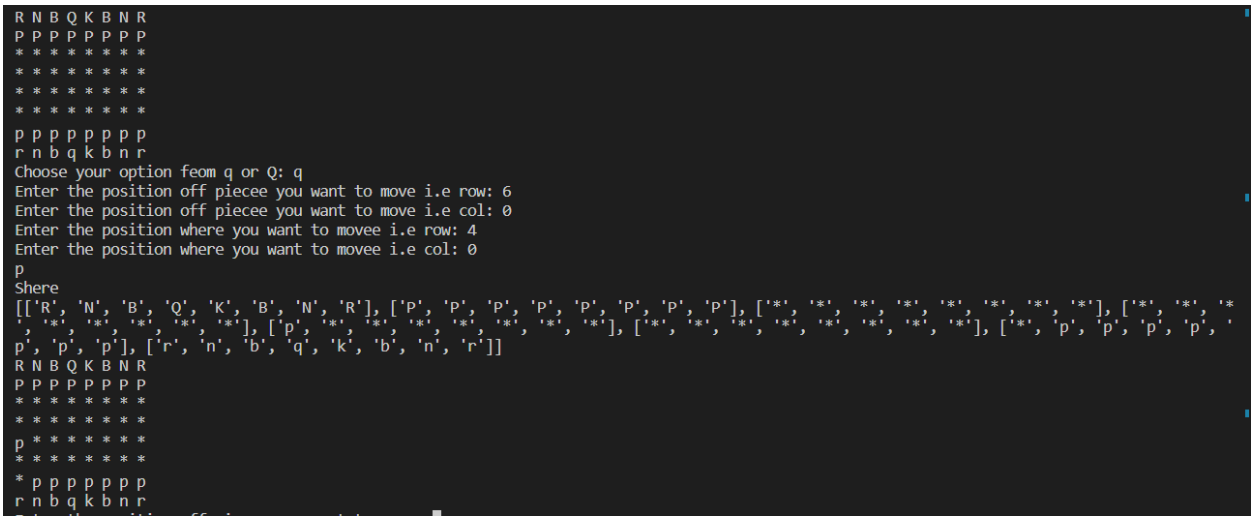
User Turn and movement on board:

```
while True:
    if( playerC == 'q'):
        spos = int(input("Enter the position off piecee you want to move i.e row: "))
        epos = int(input("Enter the position off piecee you want to move i.e col: "))
        nspos =int( input("Enter the position where you want to movee i.e row: "))
        nepos = int(input("Enter the position where you want to movee i.e col: "))

        BOcHEss= movement(BOcHEss,spos,epos,nspos,nepos)
        PrintingBoard(BOcHEss)
        playerC = 'Q'
```

My movement function is taking 5 arguments. The board row and column of piece to move and row and column where to move.

Here is the screenshot:



Moved small p (6,0) to (4,0).