



DeepClue

John Rutledge, Brian Gilmore, Zoe Romo,
Nayana Ravi, Harshitha Ambilpur, Tallon Coxo



Motivation

The motive for this project was to take a fun approach to creating an AI agent that could make its own decisions based on autonomous actions and reinforcement learning.

A popular murder mystery game, Clue® was chosen for our agent to compete in, against 5 other players.

Interested in seeing how well the agent would perform in such a complex, strategic game.

Wanted to be able to play against the bot, and therefore would have a GUI implemented.

Demonstration

The image shows a Visual Studio Code editor window with a Python script open. The script is titled "deepclue_put_code_here - Copy.py" and contains the following code:

```
stored_player_guesses=current_player.stored_player_guesses,final_player_certainty=current_player.certainty,reward=current_player.earned_rewards)#Gather training data for heuristic evaluation function
```

The terminal window shows the following output:

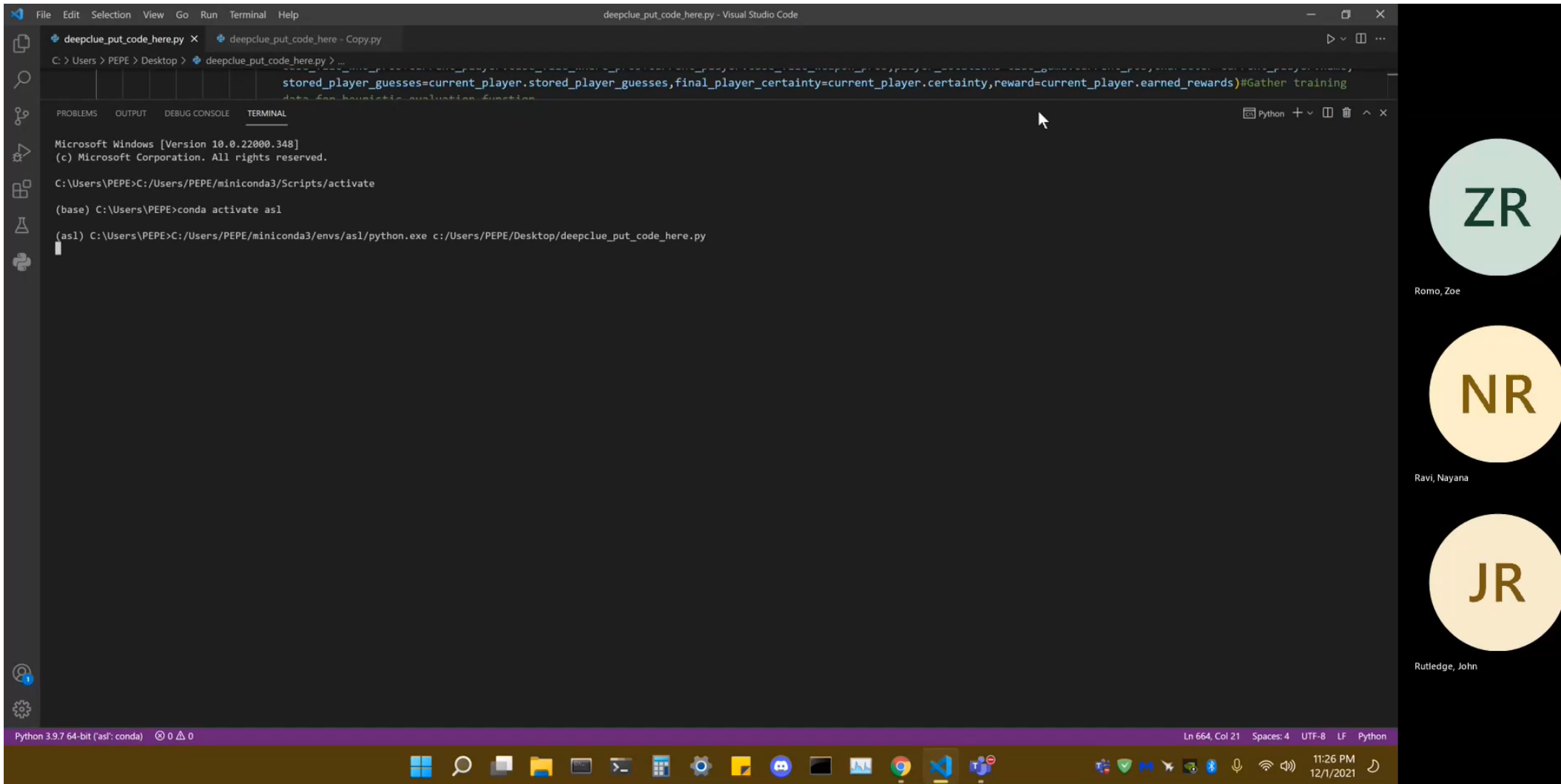
```
Microsoft Windows [Version 10.0.22000.348]  
(c) Microsoft Corporation. All rights reserved.  
  
C:\Users\PEPE>C:/Users/PEPE/miniconda3/Scripts/activate
```

The sidebar on the right displays three colored circles with labels:

- ZR** (Light Green circle) labeled "Romo, Zoe"
- NR** (Yellow circle) labeled "Ravi, Nayana"
- JR** (Yellow circle) labeled "Rutledge, John"

The status bar at the bottom indicates "Python 3.9.7 64-bit (asf: conda)" and "Ln 765, Col 27 Spaces: 4 UTF-8 LF Python".

Demonstration



The screenshot displays the Visual Studio Code interface. The editor window shows a Python file named `deepclue_put_code_here.py` with the following code:

```
stored_player_guesses=current_player.stored_player_guesses,final_player_certainty=current_player.certainty,reward=current_player.earned_rewards)#Gather training data for heuristic evaluation function
```

The terminal window shows the execution of the script:

```
Microsoft Windows [Version 10.0.22000.348]  
(c) Microsoft Corporation. All rights reserved.  
  
C:\Users\PEPE>C:/Users/PEPE/miniconda3/Scripts/activate  
  
(base) C:\Users\PEPE>conda activate asl  
  
(asl) C:\Users\PEPE>C:/Users/PEPE/miniconda3/envs/asl/python.exe c:/Users/PEPE/Desktop/deepclue_put_code_here.py
```

The status bar at the bottom indicates the Python version is 3.9.7 64-bit (asl: conda) and the file encoding is UTF-8.

On the right side of the image, there are three circular icons representing players:

- ZR** (Romo, Zoe)
- NR** (Ravi, Nayana)
- JR** (Rutledge, John)



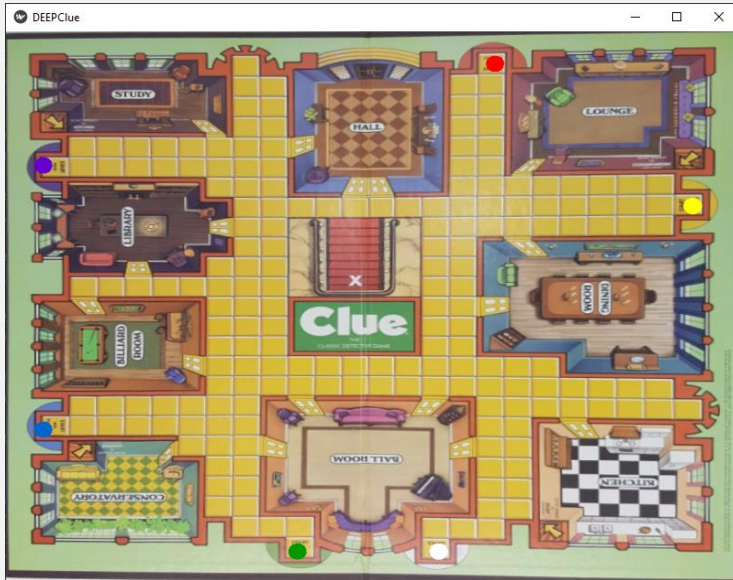
Basic functions created for game set up and actions (environment, card distribution, dice roll, navigation, suggesting, accusing, etc.)

Functions storing information on probabilities, previous guesses made by other players, etc.

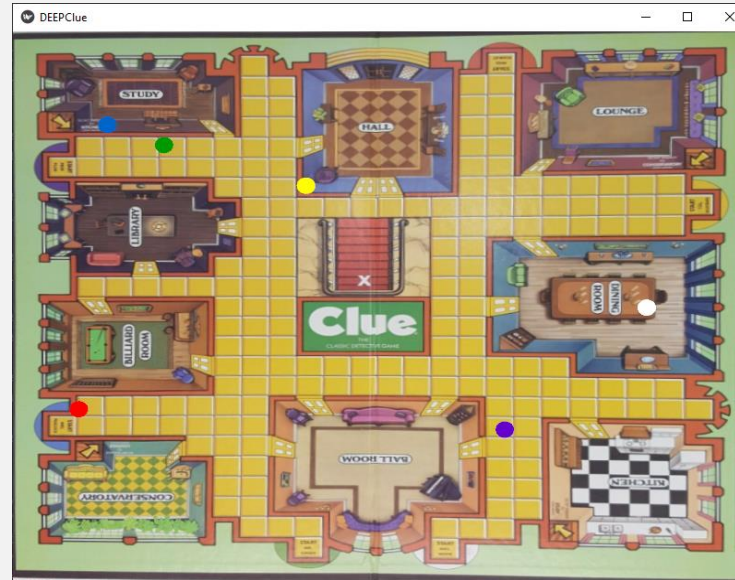
Functions were then inserted into classes, allowing each of the 6 players to perform and keep track of information equally and separately.

We implemented a neural network since the state space was too large for plain Q-learning. However, we were not able to get working results in our timeframe

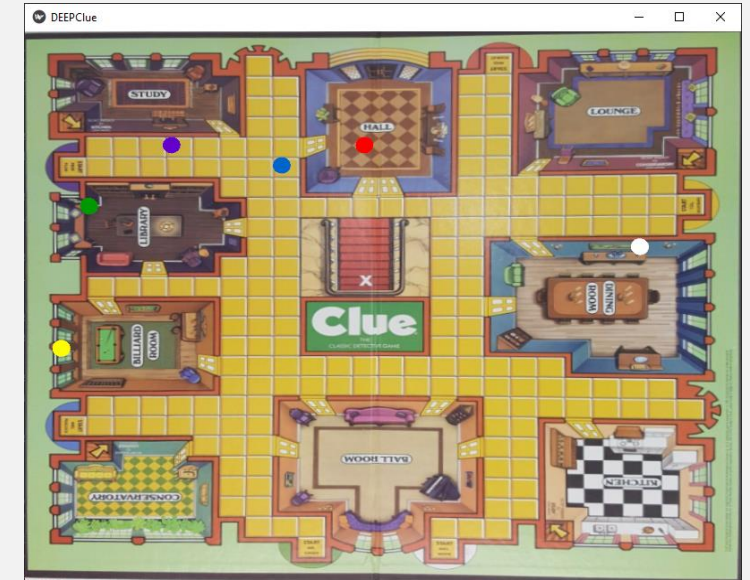
Design



Initial game state



After one click



After two clicks

Design – Visual Gameplay

- Use Clue® board picture as background
- Colored circles represent players
- Move players based on grid coordinates
- Requires mouse click on board to get new sets of coordinates and update positions

Next

- Further enhancement of reinforcement learning and training.
- Add ability to play with/against deception.
- Interface GUI with game code