ROCK PAPER SCISSORS

Team Members' Name	SRN	Section
Deepika Seervi	PES1UG25EE012	C6
Disha Mailar	PES1UG25EC085	C6
Eshani Dharnish	PES1UG25EC090	C6
Felicia Andrew	PES1UG25EC092	C6

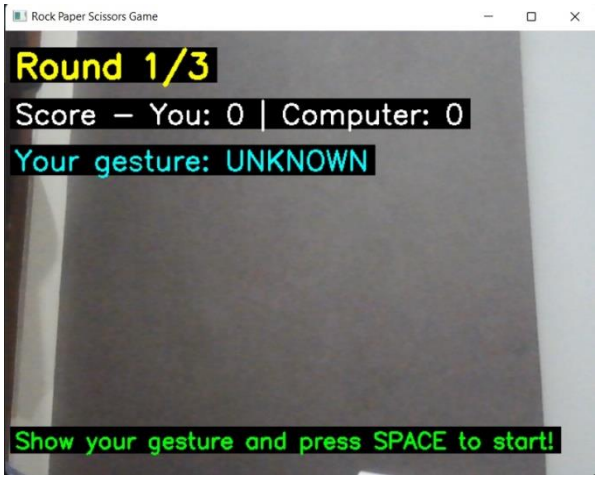
Problem Statement:

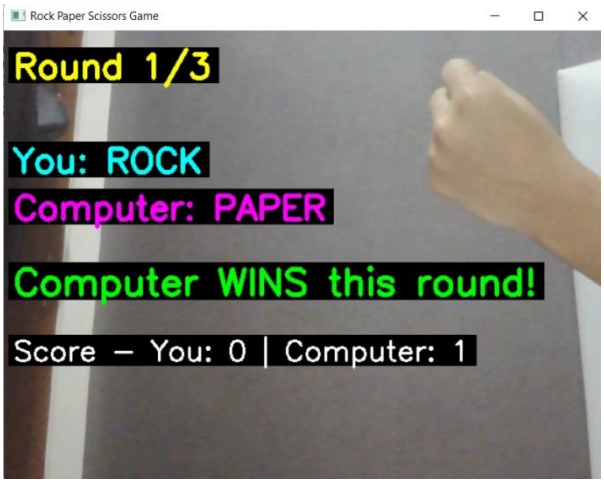
To develop an interactive game of Rock-Paper-Scissors. The application must accurately recognize the gestures for Rock, Paper, and Scissors, track the score, and announce the outcome in real-time.

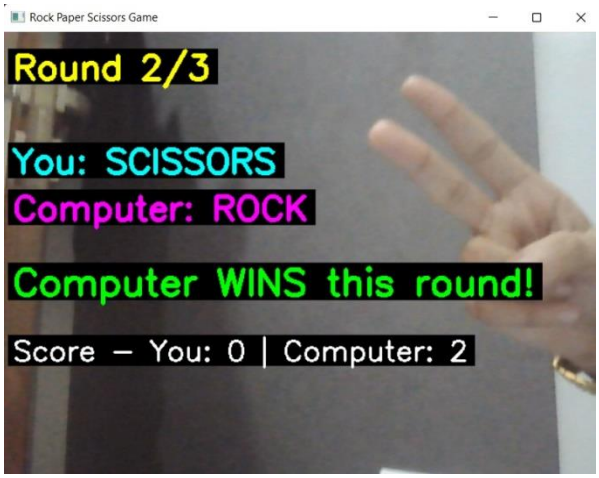
Approach/Methodology/Data Structures Used:

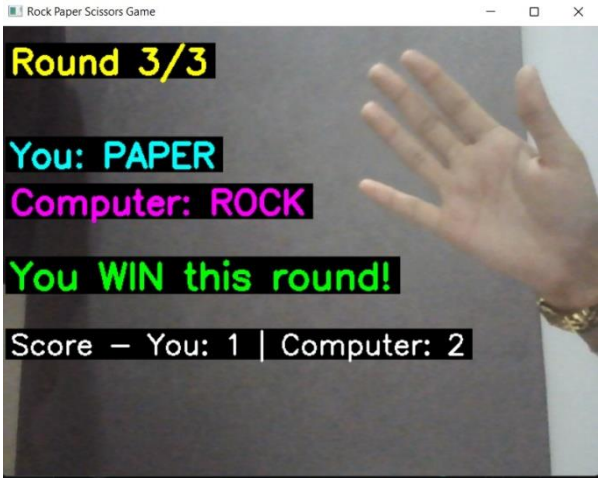
- **Open cv-python (cv2):** Used for accessing the webcam, capturing video frames, and displaying the output window with overlaid text (the GUI).
- **mediapipe:** the module is used for high-accuracy hand and finger landmark detection in real-time.
- **random module:** Used to generate the computer's choice impartially.
- **user_score, computer_score:** Python integer variables to track the current running score.
- **Hand Landmark Processing:** mediapipe provides 21 key points (landmarks) for each detected hand.
- **Finger Counting:** A dedicated function iterates through the tips of the four main fingers (Index, Middle, Ring, Pinky). It compares the tip's Y-coordinate to its immediate lower joint's Y-coordinate. If the tip is significantly higher (lower Y-value in screen coordinates), the finger is counted as "extended."
- **Gesture Mapping:**
    - **Rock:** 0 extended fingers.
    - **Scissors:** 2 extended fingers (Index and Middle).
    - **Paper:** 5 extended fingers (including the Thumb)
- **Game State Management:** The game operates in 3 rounds to allow the user time to present their hand before the computer makes a choice

Sample Input/Output:









Challenges Faced:

- **Python version applicability**: mediapipe being an accurate hand gesture live video capture model only works for python 3.11 and not the most popular version being python 3.13
- **Handling Multiple Hands:** The system must be robust enough to ignore potential background distractions or, if necessary, only focus on the largest, central hand.

Scope for Improvement:

- **Persistence:** Add file saving (e.g., using pickle or JSON) to store the all-time highest score.
- **Hand Recognition stability:** we want to update mediapipe to detect hand gestures accurately even in unstable environment
- **Game Level Advancement:** as the game progresses, the level gets harder by adding more gestures. Hence, increasing the number of pairs within the game
- **Advanced Aesthetics:** Use dedicated image assets or draw more sophisticated graphics (e.g., using libraries like Pillow) onto the cv2 frames instead of simple text.