Poker Odds Calculator can be used for multiple purposes such as to display the odds in a live poker game or to cheat in a poker game. This tool captures the image from a mobile camera or a webcam in an ongoing poker game to correctly identify the suit and rank of the playing cards using image processing techniques. After the suit and rank of playing cards is correctly identified, poker statistics are applied to compute the winning probability of a player in real-time. A GUI has been built in MATLAB using MATLAB App Designer to display the identified ranks and suits of the playing cards and to display the winning probability of the respective player.

**Introduction**

- Artificial intelligence is often used in board/card games to simulate the moves of an opponent.
- It is difficult to simulate the opponent’s moves in poker since its game state is hidden.
- Computing winning probabilities can help players place the bets based on the odds.
- Texas Hold'em is chosen to be the variant of poker that will be used in this project because of its popularity.
- Images are captured using a webcam in a live poker game to identify the suit and rank of playing cards.
- Images of each card are stored as a dictionary in order to compare the templates of the dictionary cards with the captured cards. Then, by using template matching the suit and rank of cards is identified.

**Design Considerations**

- MATLAB 2016b
- Mobile/Web camera
- Bicycle Playing Cards
- Green Cloth for background
- No occlusion among table cards but allowed for hand cards

**References**


**Overview**

**Architecture**

- Greyscale
- Thresholding with Otsu's method
- Edge Detection
- Hough Transform
- Endpoints of lines
- Perspective Transform

**Results**

- Detected the rectangular portion of the cards correctly.
- Identified the rank and suit of playing cards with a perfect accuracy of 100%.
- Computed the winning probability based on detected cards and display the results on GUI.

**Implementation**

- **Dictionary**: Creating a dictionary of cards by capturing images from camera and saving their rank and suit as templates.
- **Thresholding**: Convert the image to binary using Otsu's method.
- **Edge Detection**: To detect the borders of all the cards in the image.
- **Hough Transform**: Used to detect the edge lines of the cards.
- **Template Matching**: Compare the top left portion of cards with the templates of dictionary cards to get the rank and suit.
- **Probability Calculation**: Using poker statistics and poker evaluator to compute winning probability.

**Conclusions**

- This project has been successful in recognizing the rank and suit of playing cards accurately while being resistant to visual clutter and perspective transformations.
- Template matching has been proven to be more robust for card detection when compared to other techniques such as OCR, Shape Detection, SIFT and SURF.

**Future Work**

- Implement the algorithm to work in all rounds of a poker game.
- Implement similar algorithm to calculate winning probabilities in other games such as blackjack and variants of poker.
- Improve the algorithm to work for different sets of playing cards and different capturing angles.
- Implement the algorithm in Android platform.

**Contact**

Rohit Aila
Rochester Institute of Technology
ra2562@rit.edu