Project Proposal for Image Analysis : **All-In**

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August 28, 2018

Abstract

Automation using machine learning, deep learning and image analysis techniques has recently gained a lot of significance and appreciation in the gaming industry. The aim of this project is to use image analysis in card games like poker in order to perceive the state of the game, the current cards in action and possibilities and suggestions for further moves to achieve some credits by processing and analyzing a camera image capturing the scene of the play table at any given instant. In order to achieve such goals firstly, we aim to **detect cards** on the table using **edge detection** techniques. Secondly, we **register** the image by cropping and realigning it to get a clearer front view of each card for further processing. Next, we aim to find the **suit, color and rank of the card** using various **matching techniques** and **optical character recognition**. Also, at any instant, the state of the game can be recognised according to the number of folded and unfolded cards present on the table. The camera is considered to be placed behind the player so that it captures the images of the two cards possessed by the player as well as five other cards (folded or unfolded), kept on the table. We also aim to achieve the targets of edge detection and matching using more than one state of the art techniques and then compare their accuracies among each other to obtain optimal results.

1 Objectives

We divide the entire task into 4 smaller objectives which are defined as follows :

- **Edge Detection** - Detect each card present on the table by recognizing the edges and corners for each one of them.
- **Registration** - Align the image according to the required affine transformations to get a comprehensible frontal image for each card.
- **Matching** - For each card present on the table, find its suit, color and rank.
- **Detect the state of the game and Recommend** - According to the present state of the game, determine the number of folded and unfolded cards, the number of rounds left and recommend further possible moves of advantage using various poker recommendation APIs available online.

2 Timeline

Here, is the timeline that we have proposed:

- **Phase I -** Edge Detection : Week 1 - 2
- **Phase II -** Registration : Week 3
- **Phase III -** Matching : Week 4 - 5
- **Phase IV -** Detect the state of the game and Recommend : Week 6 - 8

3 Applications and further Scope

Such ideas can be further extended to build entire automated bots for playing the poker game. Further, deep learning, reinforcement learning and other techniques can be also used to train the bots based on the rewards to achieve winning states.

References

[1] Poker vision: playing cards and chips identification based on image processing 2011.
[2] Edge Detection Methods
[3] Playing card recognition using rotational invariant template matching 2007.
[4] A neural network approach to character recognition 1989.
[5] Image Tracking Algorithm using Template Matching and PSNF-m