Group 6 presentation

Wen shuo
Wu ju
Zheng yuanyuan

General process flow

Card segmentation → Recognition digit/suit

Isolation of 4 cards from the image by using:

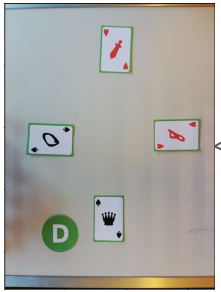
- Edge detection
- Find 4 corners for each card
- Affine transformation

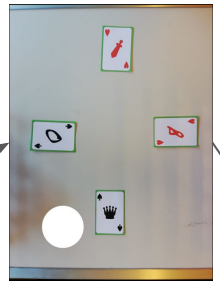
Recognition of digit and suit of each card by using:

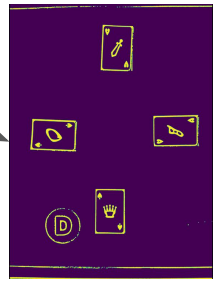
- Color detection
- Template matching
- Ensemble network

Card segmentation

detect and remove dealer

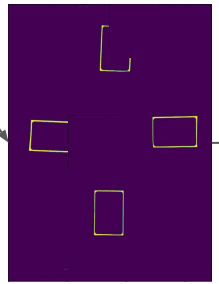






adaptive threshold

merge them by connected component



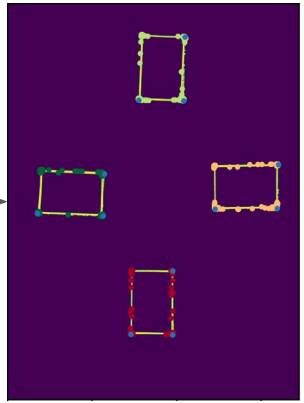
green range mask

line detection

Kmean

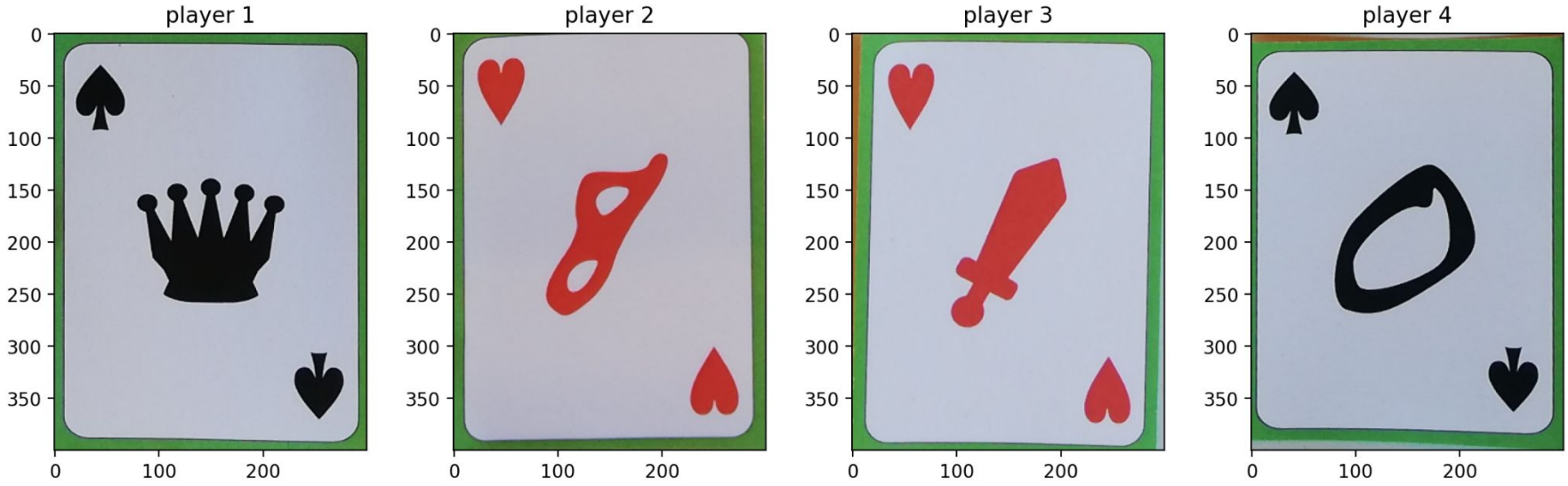
find the corners of cards

affine transform



Card segmentation

Result



Recognition digit and suit

Recognition suits

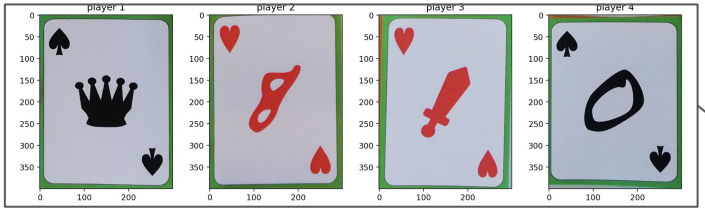
1. Find suit region by looking for the most frequent connected component in a predefined area
2. Extract the position of this connected component
3. Crop and resize it
4. Perform the normalized convolution between the template and extracted suit to find which is the best suit.

Recognition digits

1. Extract the digit from six first games
2. Preprocess the extracted digits
3. Mix training datas from extracted digits and 2000 samples from MNIST
4. Use of ensemble network for the classification

Recognition suits:

four templates, one suit for each



four extracted cards

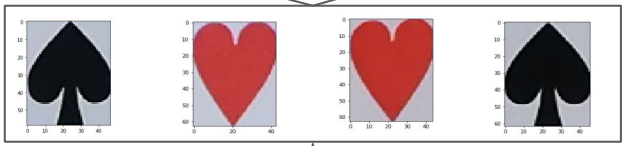
Find which template gives the best result

template matching

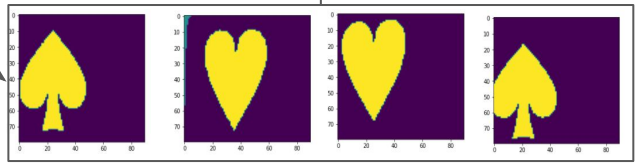
template matching

RED?

BLACK?

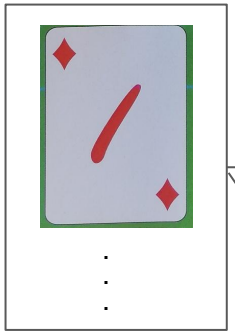


crop suit figures and resize them into the same size as templates



object labeling in a given region to find suit, then find the x and y ranges for suit location

Recognition digits



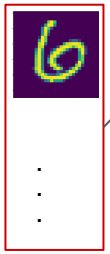
extract
and
preprocessing

extracted digits (JQK included)

Ensemble
network 1

Ensemble
network 2

extracted digits (JQK excluded)



2000 samples from MNIST

preprocessing:

RGB -> grayscale
adaptive threshold(avoid
ambient light condition)

Ensemble
network 1

if digits?

No

output J Q K

Y

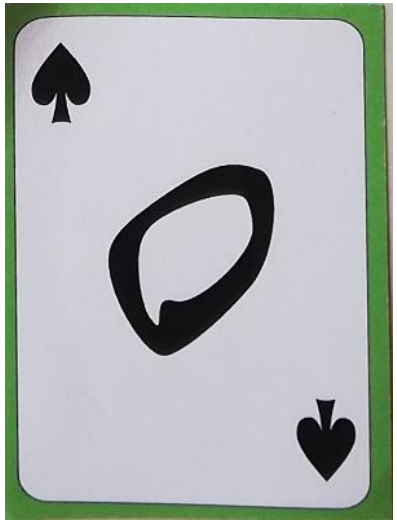
Ensemble
network 2

output digit

Conclusion

MLP: Standard=0.885, Advanced=0.885

Ensemble SVC: Standard=0.962, Advanced=0.962



2S

8H