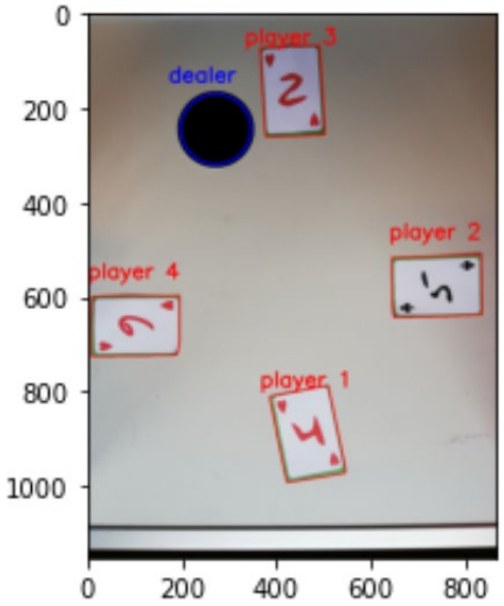


Teaching Skynet to play cards

Image analysis and pattern recognition

Students:

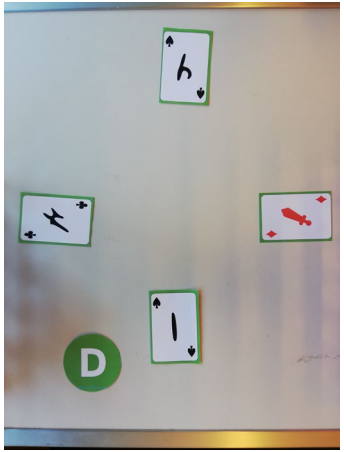
Marcel Dubach, Lorenzo Panchetti, Maxime Gardoni

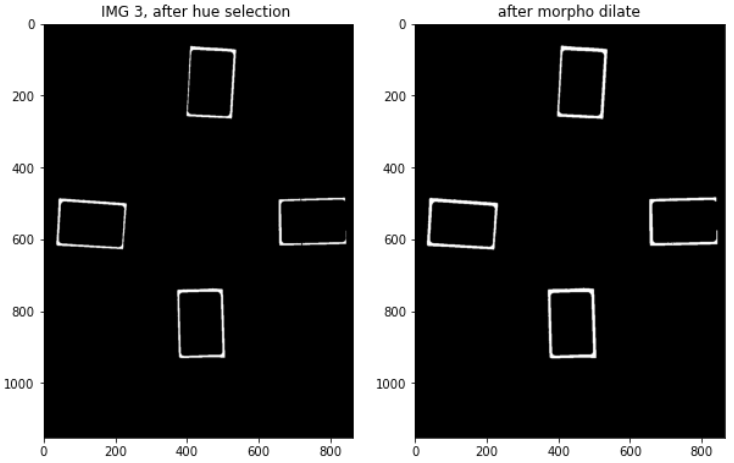
Prof. Jean-Philippe Thiran

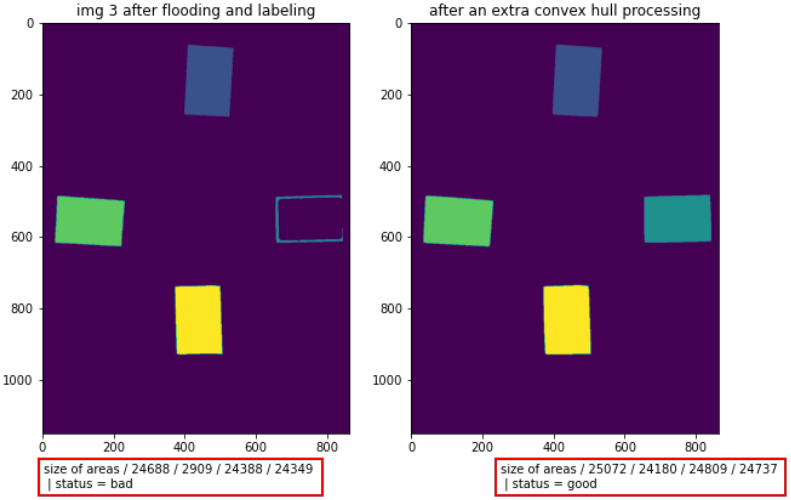
Getting the cards mask

Maxime Gardoni

- HSV transform, select green color
- Hough to get rid of dealer
- Dilatation
- Region growing on background
- Closing
- Sanity check
- If not, redo the same with convex hull in the middle
- If not, do the same workflow with more dilation iteratively

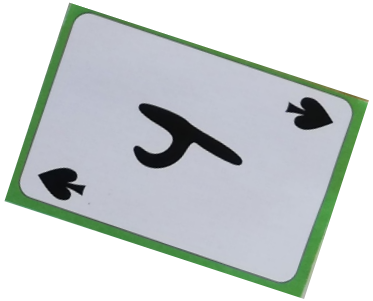


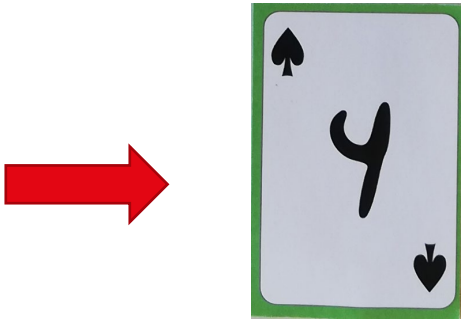




Lorenzo Panchetti

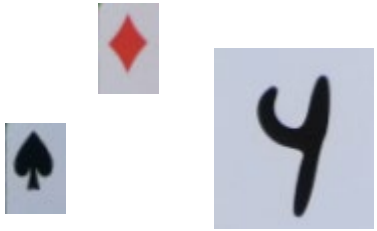
Card redressing





- Cropped cards received
- Hsv color space to extract again green mask
- Convex hull to extract full card
- Approximate perimeter to 4 coordinates
- Retrieve the order 4 angles, width, length
- Construct destination points
- Calculate transform
- Warp perspective

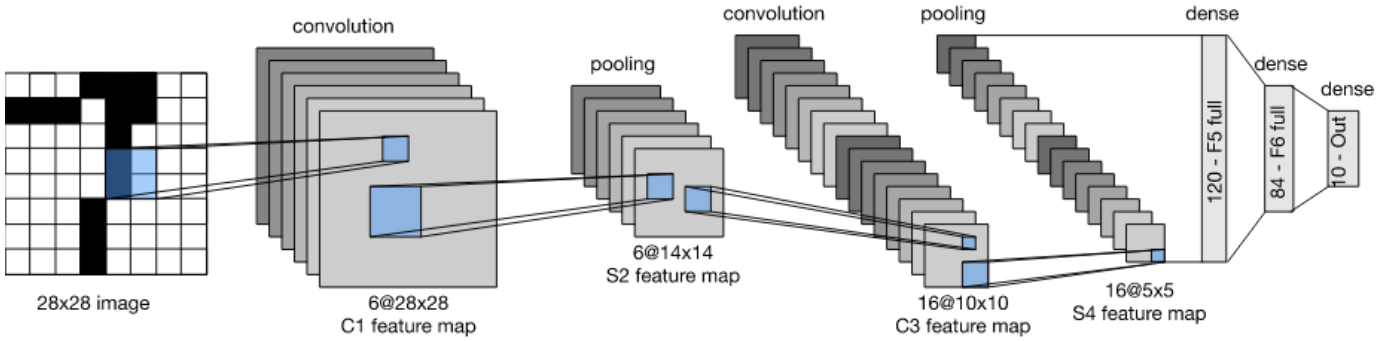
Top-down view



Ready to crop out suits and numbers from redressed cards

Digits recognition

- Lenet5 CNN network trained on MNIST, 60’000 images with Adam



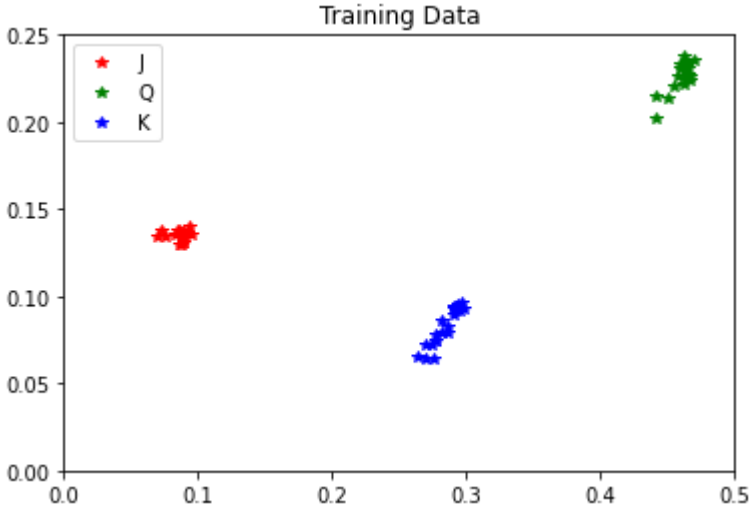
- Finetuning : freeze the convolutional layers, replace the last layer to 11 nodes outputs (11th class is “other” aka king queen jack), train on our digits with a small LR

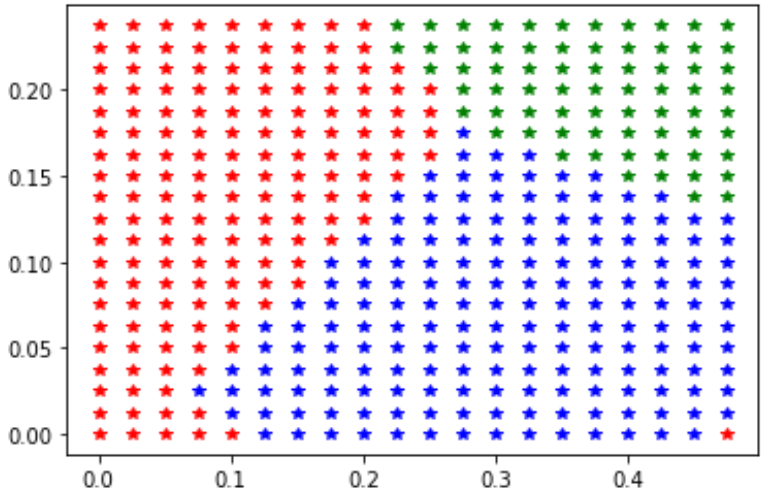
Maxime Gardoni

Maxime Gardoni

King Queen Jack recognition

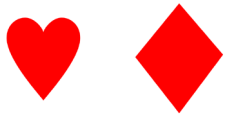
- Via Fourier transform
  - Because not enough data sample for robust neural nets



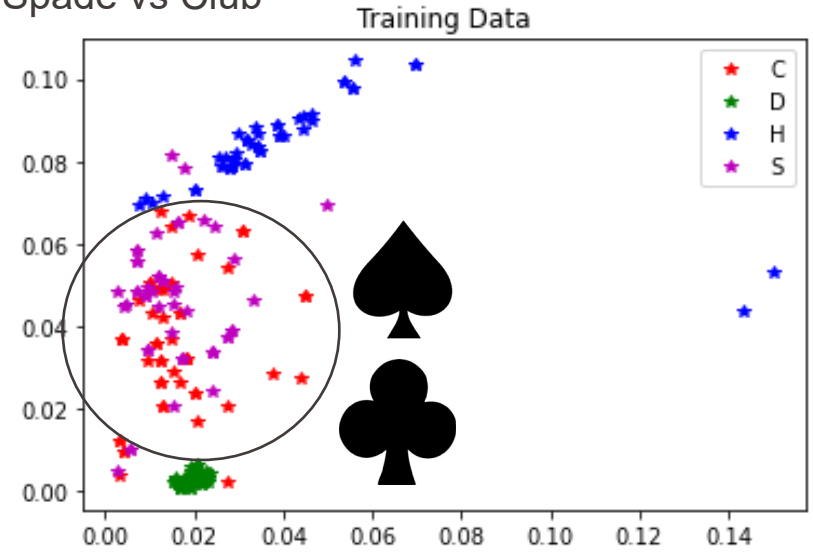


Suits recognition

- Condition on colors via HSV space
  - Red
    - Heart, diamond recognition via Fourier coefficient



  - Black
    - Fourier coefficient were not enough for Spade vs Club
    - Take the Lenet5 trained on MNIST
    - Freeze the convolutional layers
    - Reduce the numbers of weight
    - Replace last layer to one with only 2 outputs
    - Add L2 loss
    - Finetune for Clubs and Spade



Thank you !

Questions ?