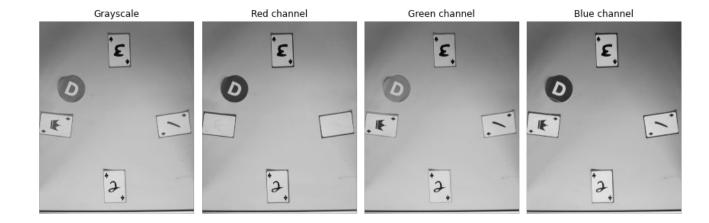
EPFL



 EE-451 Image Analysis and Pattern Recognition

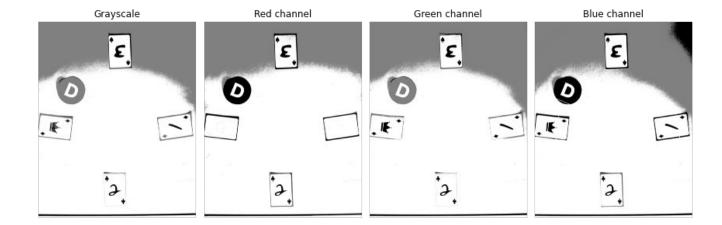
Import image and plot image channels

- First, we import the image of the game
- Then we decompose it into its RGB channels and greyscale



Pre-processing

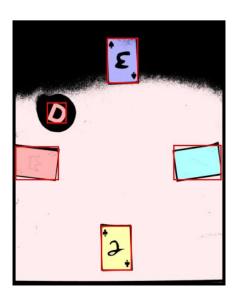
- Contrast stretching + multi-otsu thresholding
- Testing red and blue channels to find the best contours

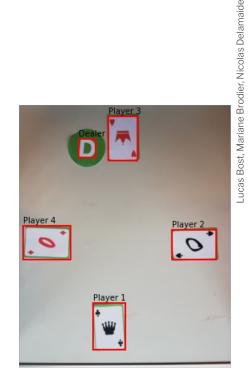


EPFL

Pre-processing

- Find the bounding boxes
 - Binary closing
 - Remove artifacts
 - Measure the image regions
- Returns the number of boxes
- Remove overlapping boxes and rearrange boxes
- Extract the cards and token
- Plot the boxes in original image





Card extraction

- Deblur/denoise algorithms does not work well
- Dealer found by calculating the distance between boxes
- Rotation and binarization of cards













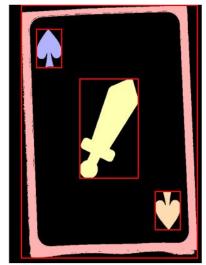




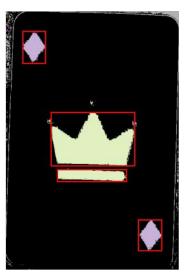
Card extraction

 Find the bounding boxes on the card to detect the rank and the suite of the card









Rank and suite extraction

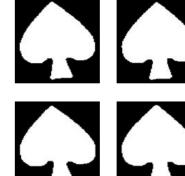
- Box for the rank is bigger than other boxes
- Rotate the suite boxes
- Filter the suite boxes if more than 2
- Binary morphology

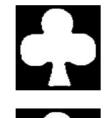










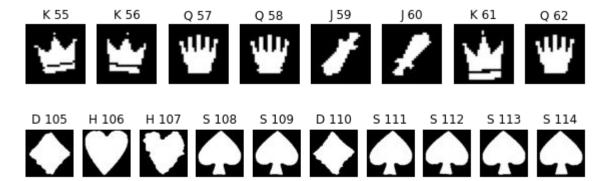






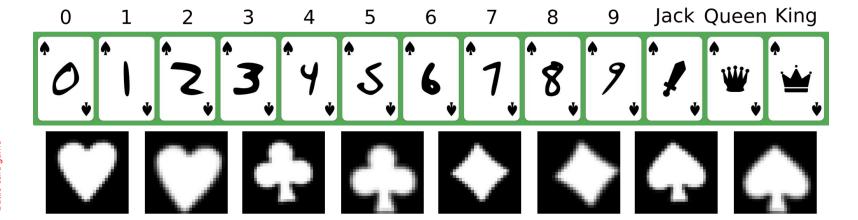
Training set

- Extract all ranks and suites of games
- Save them with correct labels
- Remove the incorrect images
- Double-check and save the training set



Training set

- MNIST dataset for digits
- Unbalanced dataset : generate ~7000 samples for J, Q and K
- MLP classifier



Game analysis

- Use lists for the cards played and the dealers and arrays for the points in both standard and advanced rules
- Update at each round
- Functions to assign the cards and the points

Game analysis

Cards assignment

Assign the good nomenclature depending on the suit and the rank

Dealer

Assign the dealer ID

Game analysis

Points for standard rules

Assign 1 if the rank is the maximum between all the ranks

Points for advanced rules

 Assign 1 if the suit of the player is the same as the on of the dealer and if the rank is the maximum between ranks of all players that have the same suit as the dealer