Uno-Cards

Documentation

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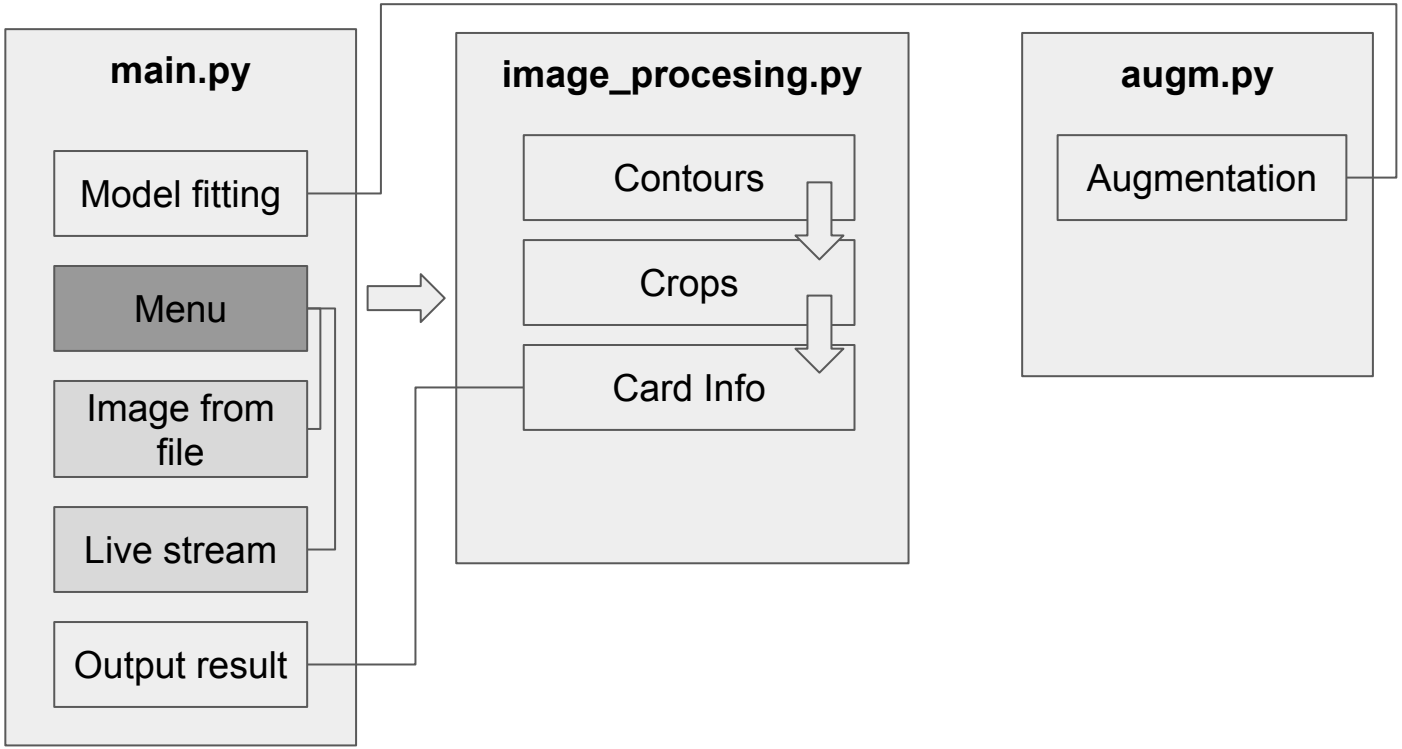
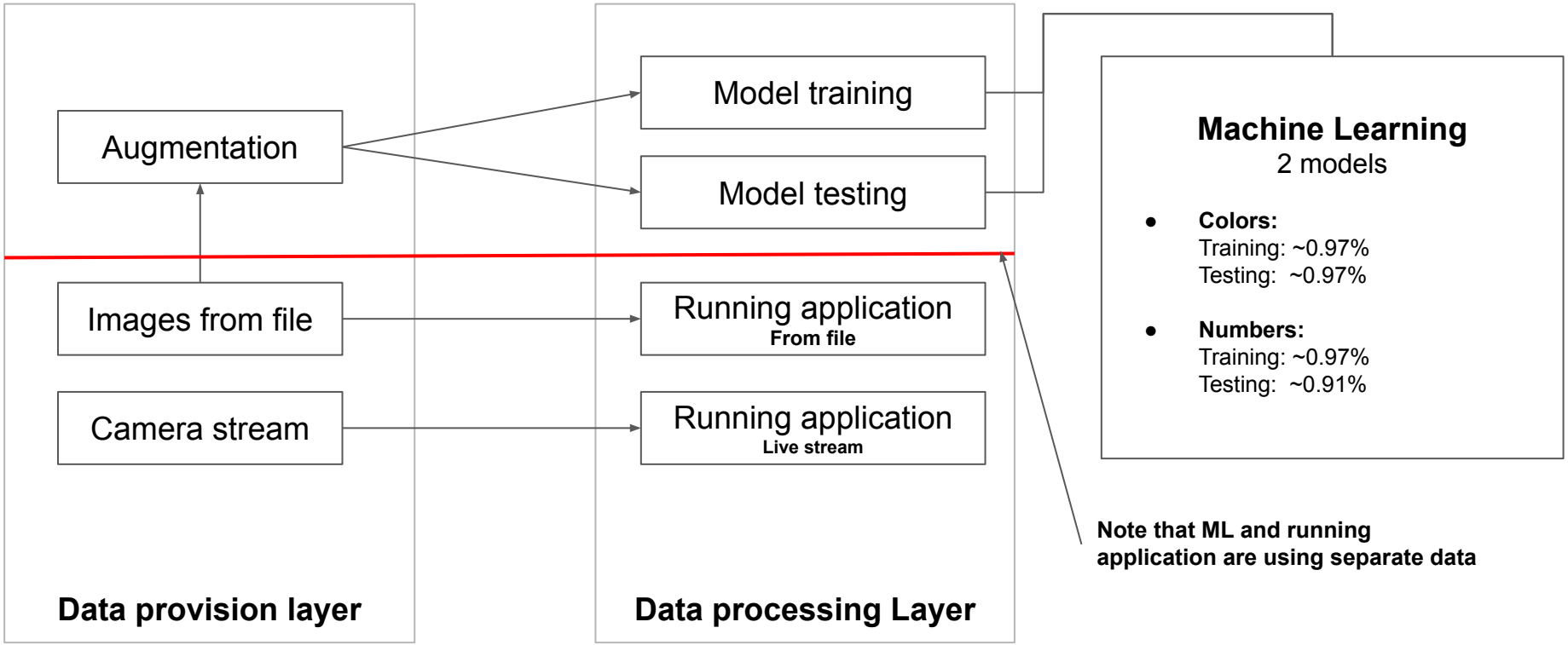
Uno-Cards: Code structure diagram



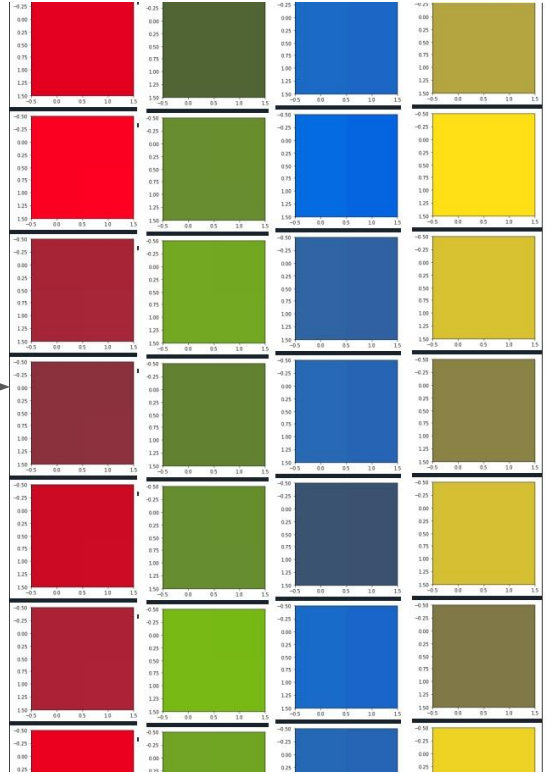
Uno-Cards: Data methodology and Machine Learning



Uno-Cards: Augmentation of Colors

Color Augm

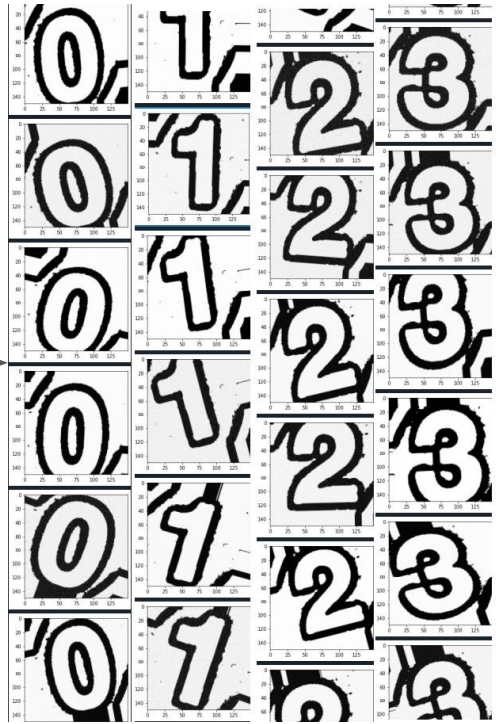
- 5200 images
  100/card
- 2x2px color image crop
- Brightness in HSV
- 0.7 - 1.3 range
- Hue and Saturation



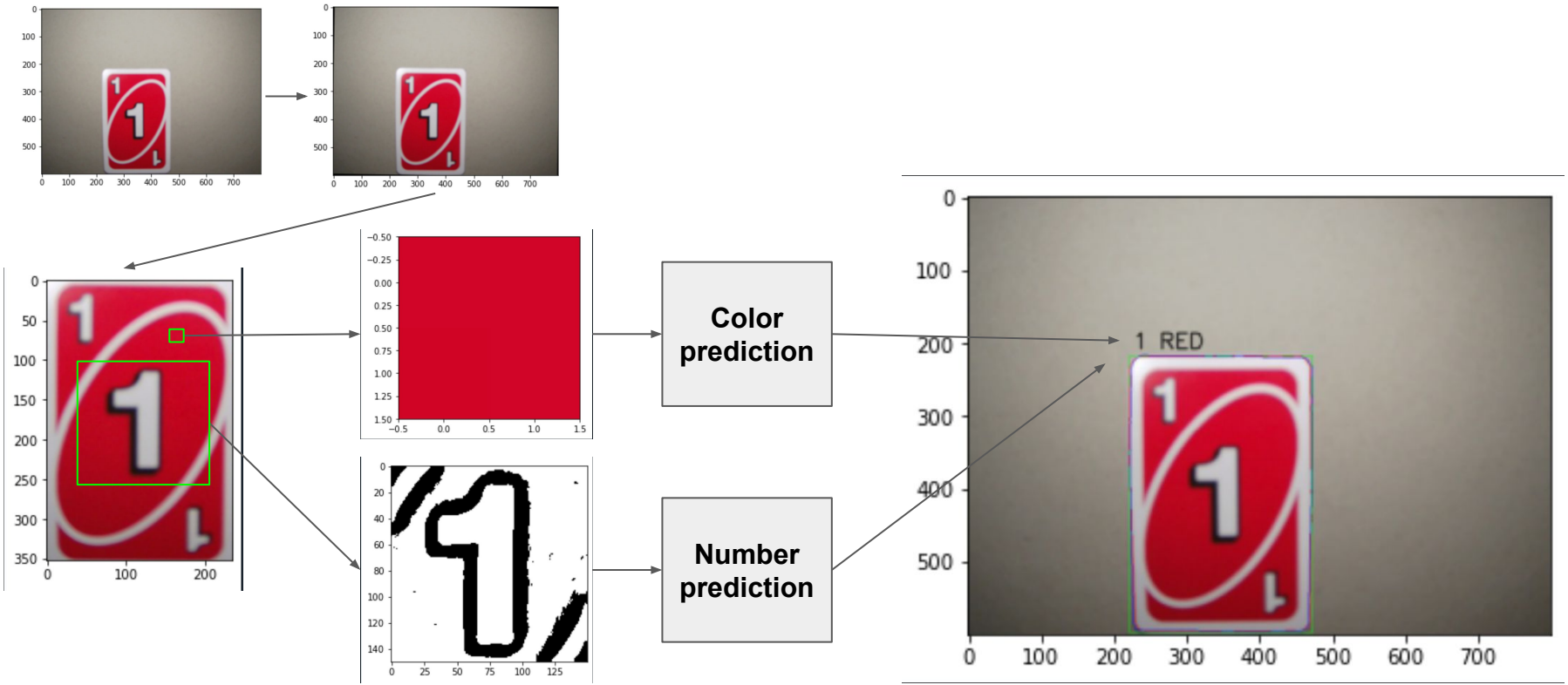
Uno-Cards: Augmentation of Numbers

Number Augm

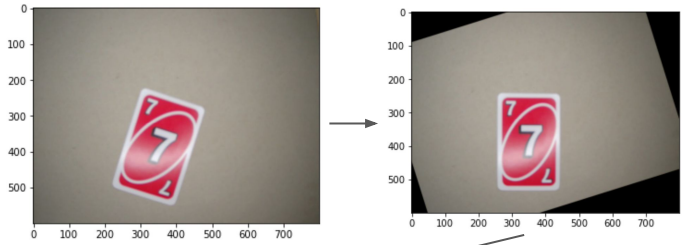
- 5200 images
  100/card
- 150x150px binary thresholded image crop
- Rescale= 1/255
- Rotation 20 degrees
- Width & height shift 0.1
- Zoom 0.1
- Noise 0.1

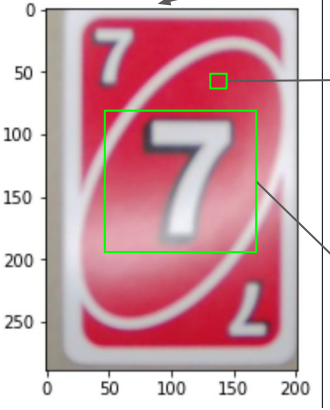


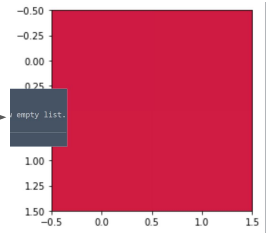
Uno-Cards: Process sequence **From File**

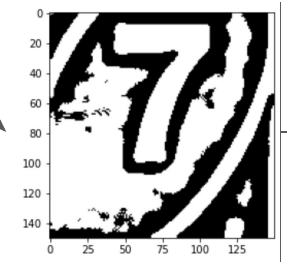


Uno-Cards: Process sequence **Live Stream**



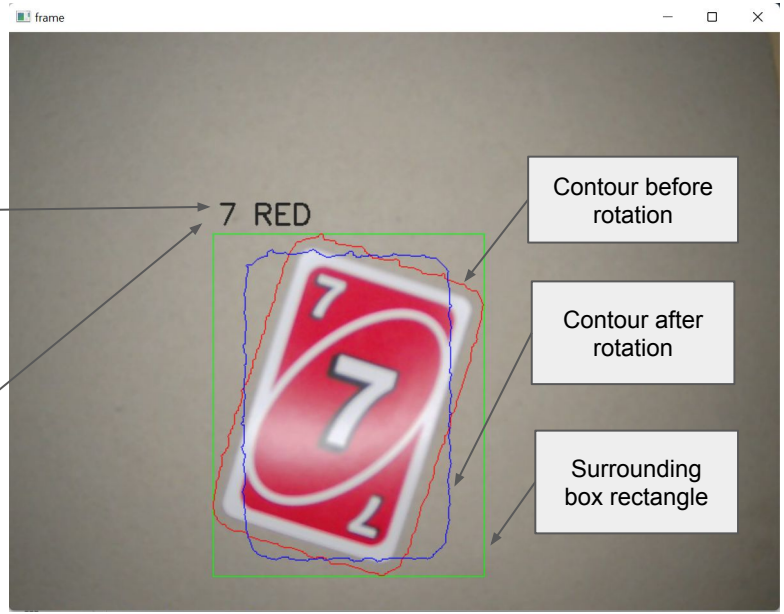






Color prediction

Number prediction



Uno-Cards: Test results

Testing

- **From file**
  Colors: 52/52
  Testing: 48/52

- **Live Stream:**
  Colors: 3/4 - 4/4 (Small gap between green and yellow color ranges)
  Numbers: <10/52 (Inconsistent card/number crop)

Uno-Cards: Conclusion and Further Work

Current status

- Separate ML data from real testing in demonstration
- High accuracy rate with images from files & Low accuracy in live stream

Issues:

- Inconsistencies generated by the environment and system variability:
    - light, color spectrum, noise
    - camera zoom, quality, processing time (for real time systems)
- Computer vision seems to be reliant on machine learning
- Training data (augmented or not) needs to be similar to the real application data.

Further work:

- Generate training augmented data from live stream snapshots might improve number recognition
- Define color spectrums ranges for every color to ensure better separation between green and yellow