Team “Neocognitron”
Magic the Gathering Card Reader

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Goal: Take an image of a Magic the Gathering (MtG) card, determine the name, and then provide a clean image of that corresponding card.

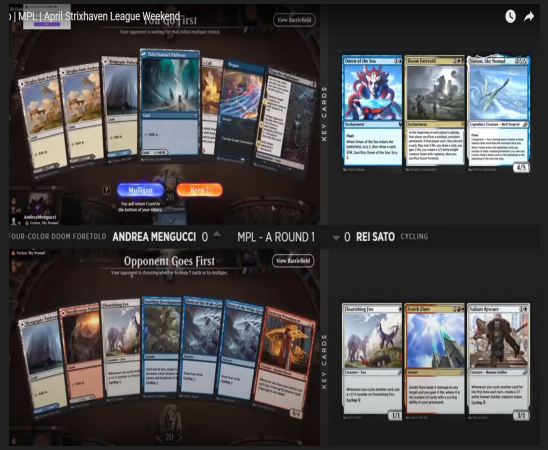


Image gets extracted

Neural Net Determines and returns card

Also Rotation of Cards

General Strategy Steps

Originally, we wanted to determine the card from the name from the input. However, as we continued working on the network, we determined that scanning the whole image would be simpler for detecting both clean images during training and real images in testing.

Despite looking at the entire card, our system still focuses on the name that a card has (the portion in the red box).

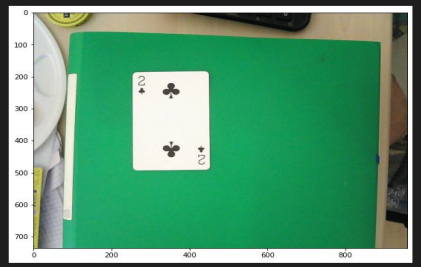
```
            cv2.imshow("Contour with biggest area",edge_bgr)
            if valid:
                cv2.imshow("Alphachannel",alphachannel)
                cv2.imshow("Extracted card",imgwarp)

        return valid,imgwarp
```

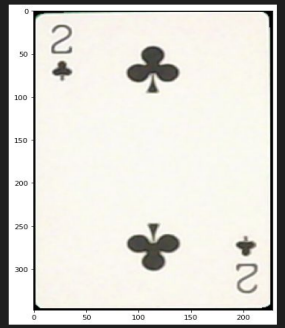
[42] ✓ 0.3s Python

```
# Test on one image
debug=False
img=cv2.imread("test/scene.png")
display_img(img)
valid,card=extract_card(img,"test/extracted_card.png", debug=debug)
if valid:
    display_img(card)
if debug:
    cv2.waitKey(0)
    cv2.destroyAllWindows()
```

[43] ✓ 0.4s Python

```
/tmp/ipykernel_4672/3913746665.py:65: DeprecationWarning: `np.int` is a deprecated alias for the
builtin `int`. To silence this warning, use `int` by itself. Doing this will not modify any
behavior and is safe. When replacing `np.int`, you may wish to use e.g. `np.int64` or `np.int32`
to specify the precision. If you wish to review your current use, check the release note link
for additional information.
Deprecated in NumPy 1.20; for more details and guidance:
https://numpy.org/devdocs/release/1.20.0-notes.html#deprecations
  cntwarp=cntwarp.astype(np.int)
```



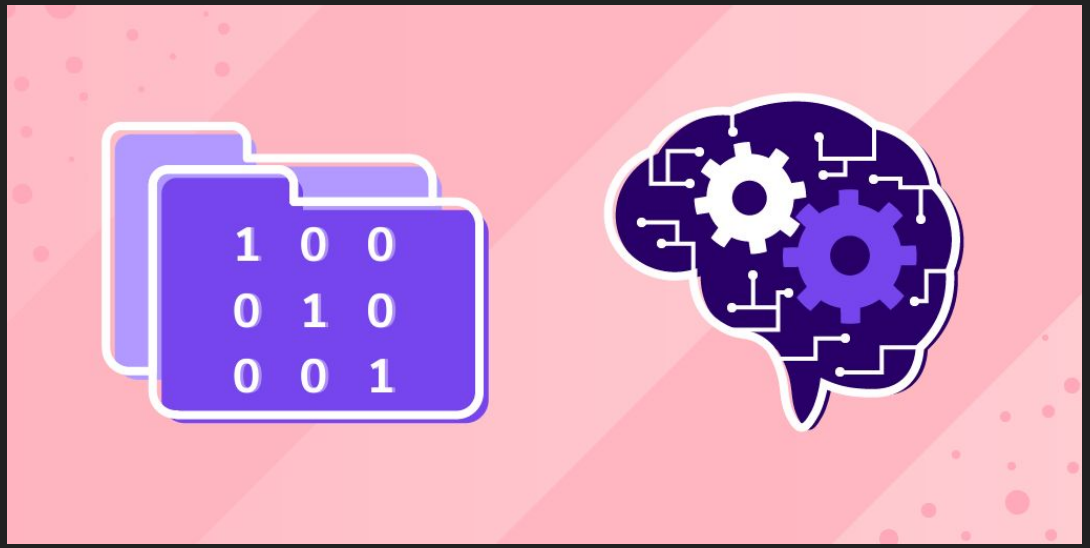


Before we could find a name in an image, we needed to be able to find a card in a given image. Here, you can see the initial tests (Left) made to do just that, and also the final output (Below)! The functions within cv2 are from the OpenCV library.

Data Treatment

Scryfall API

Over 30,000 MtG Cards were used in training.



One-Hot Encoded Labels

The encoding has 69 unique characters. A-Z, a-z, 0-9, space, comma, -, *, /, and misc. characters.

Network Architecture

input_9 (InputLayer)	input: / output:	[(None, 300, 250, 3)]	[(None, 300, 250, 3)]
conv2d_26 (Conv2D)	input: / output:	(None, 300, 250, 3)	(None, 147, 122, 64)
max_pooling2d_16 (MaxPooling2D)	input: / output:	(None, 147, 122, 64)	(None, 36, 30, 64)
dropout_24 (Dropout)	input: / output:	(None, 36, 30, 64)	(None, 36, 30, 64)
conv2d_27 (Conv2D)	input: / output:	(None, 36, 30, 64)	(None, 15, 12, 128)
max_pooling2d_17 (MaxPooling2D)	input: / output:	(None, 15, 12, 128)	(None, 3, 3, 128)
dropout_25 (Dropout)	input: / output:	(None, 3, 3, 128)	(None, 3, 3, 128)
flatten_11 (Flatten)	input: / output:	(None, 3, 3, 128)	(None, 1152)
dense_19 (Dense)	input: / output:	(None, 1152)	(None, 2484)
reshape_11 (Reshape)	input: / output:	(None, 2484)	(None, 36, 69)