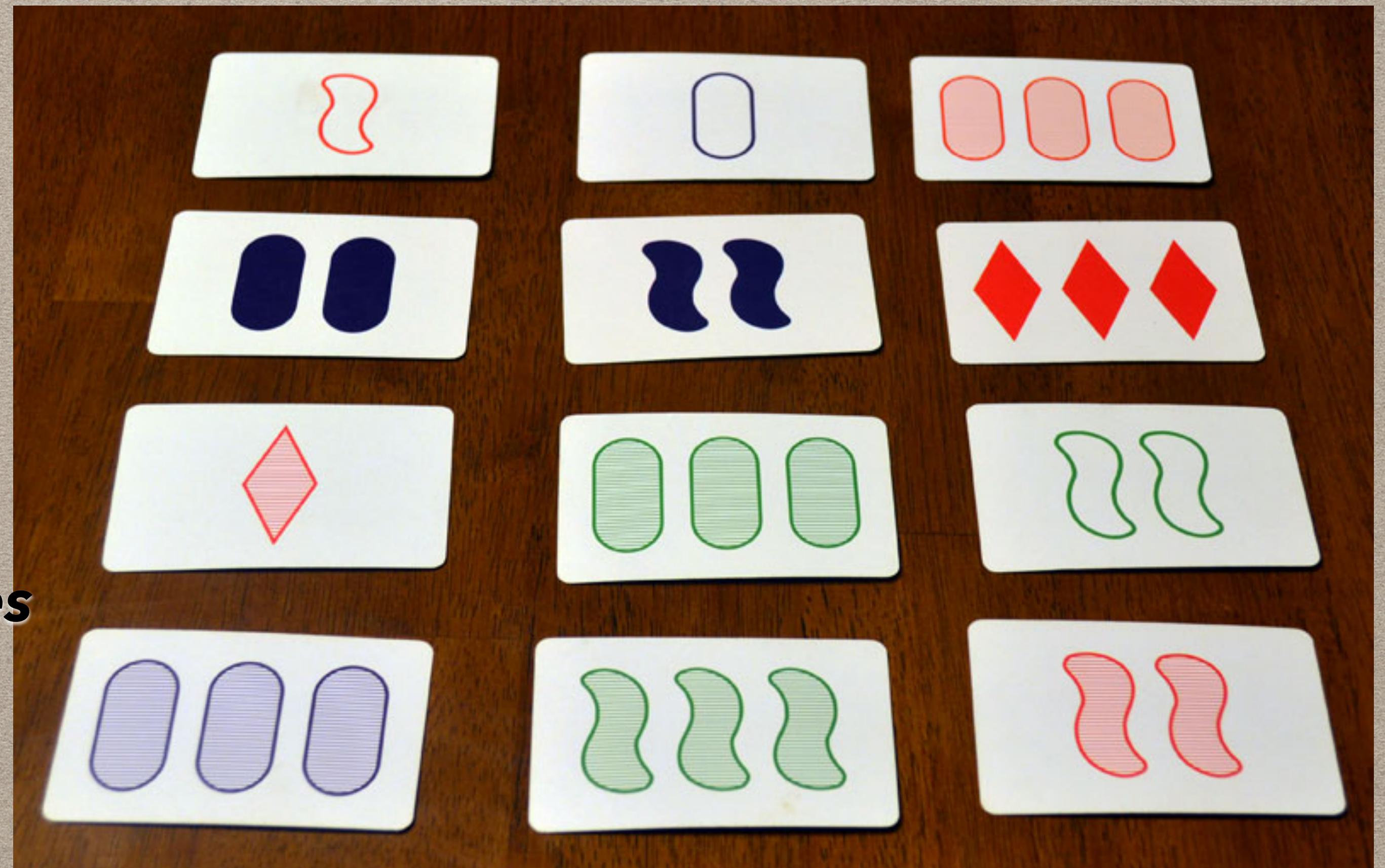


IMAGE CLASSIFICATION OF SET CARDS USING DEEP LEARNING

SET is a game of pattern recognition

A Set consists of 3 cards

The golden rule is that all three Cards in a set must be the all the same Or all different across the four attributes



Every card can be identified by four attributes

Shape

Diamond, Oval, Squiggle

Number

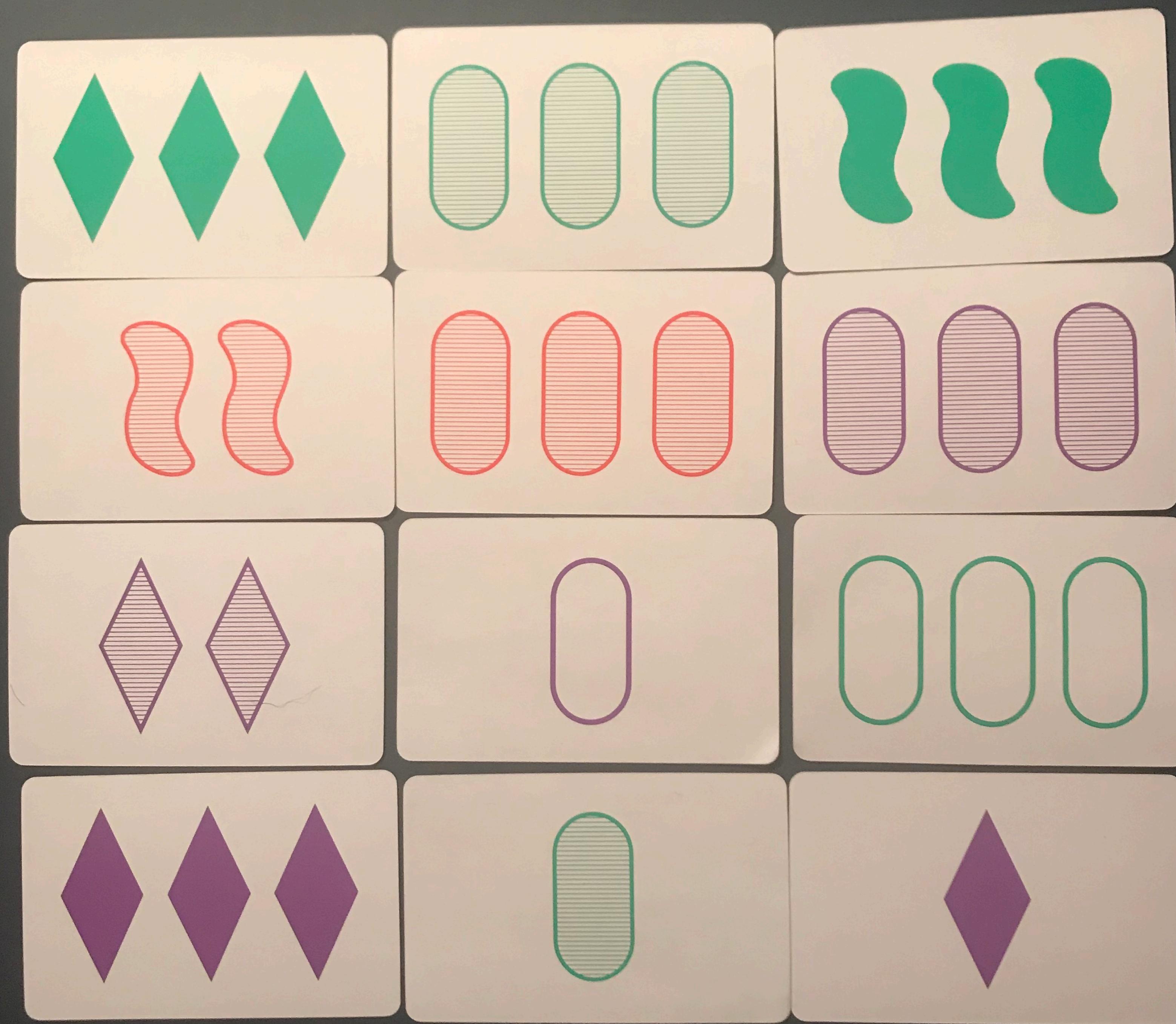
One, Two, or Three

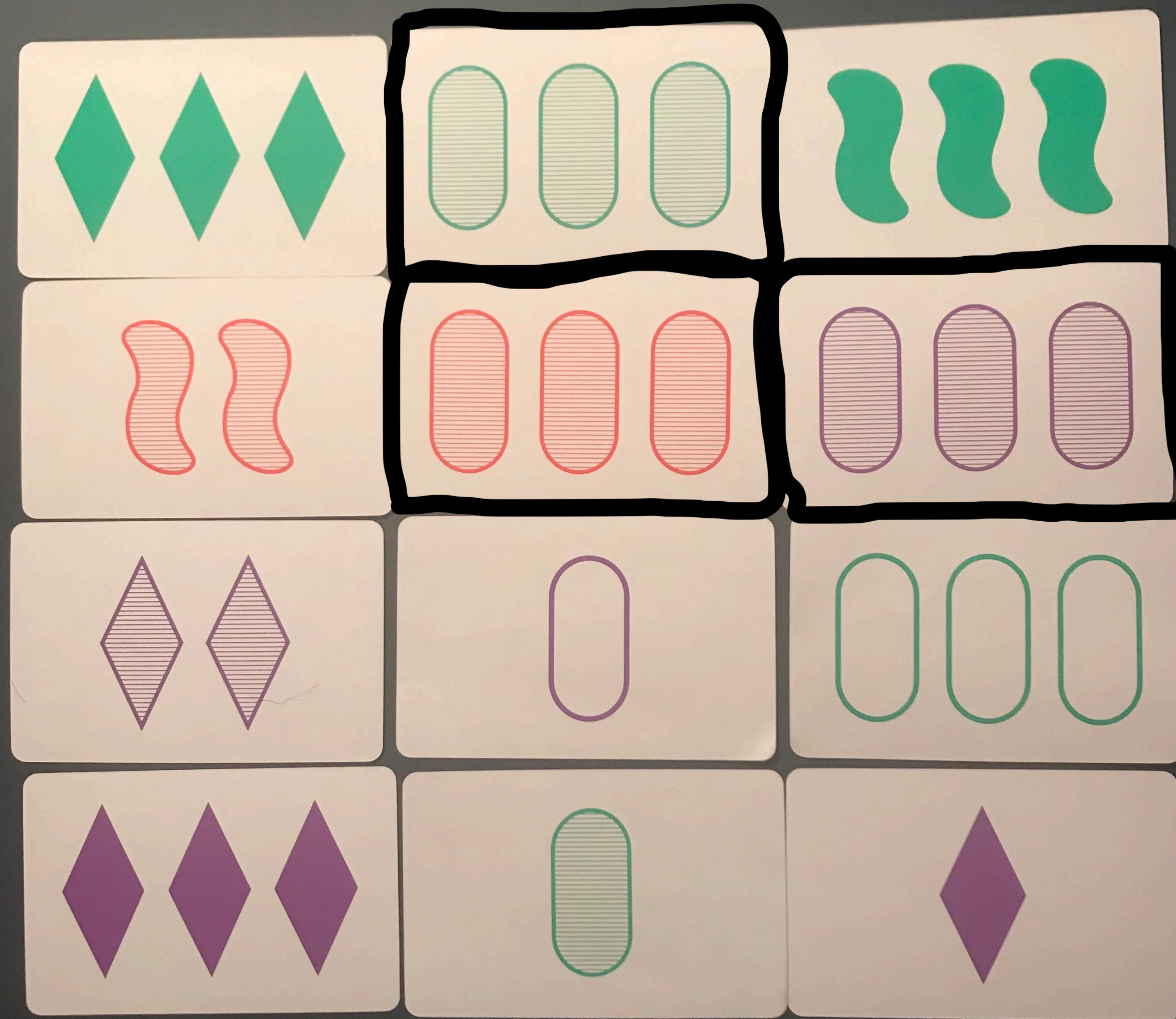
Shading

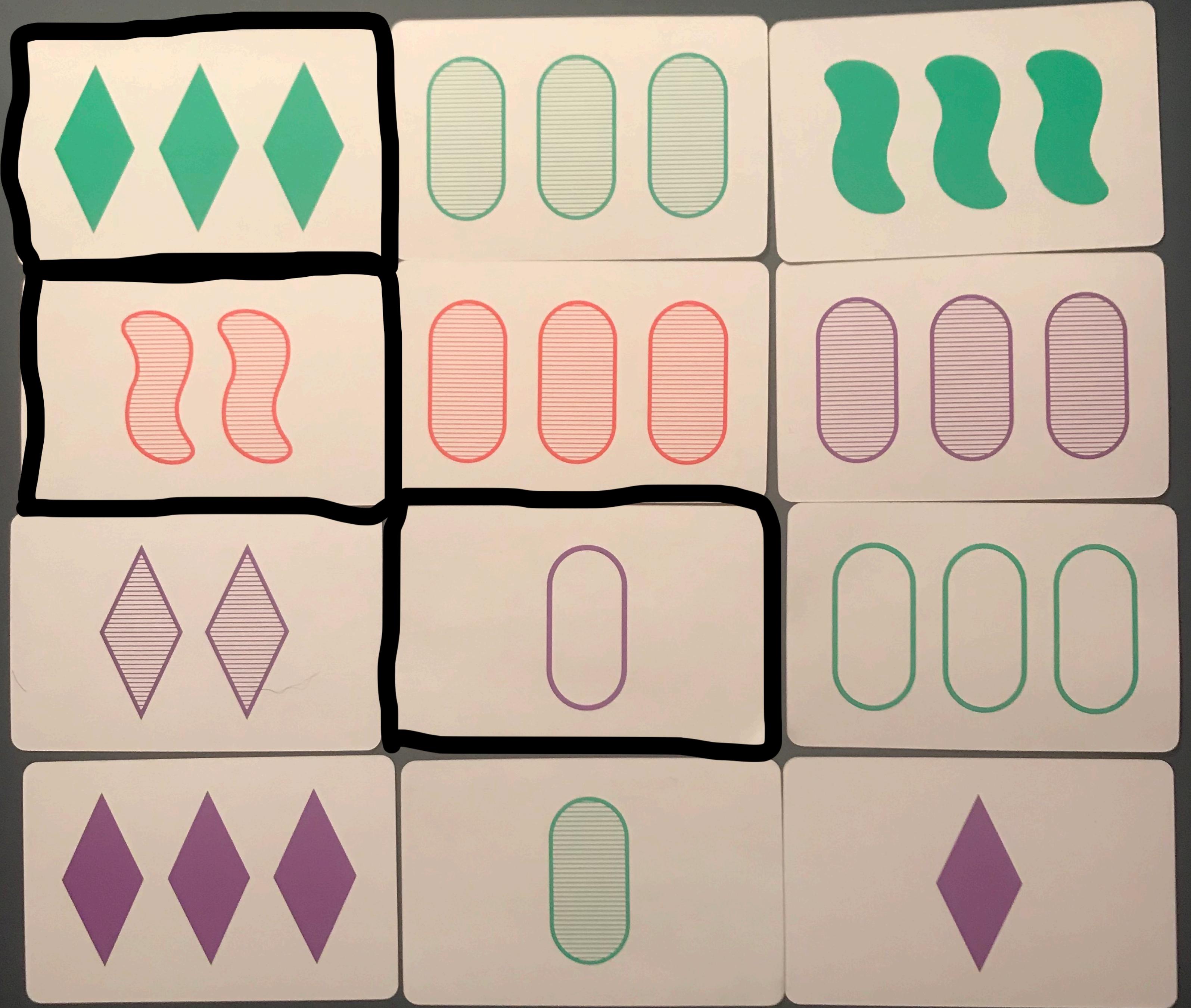
Empty, Striped, Filled

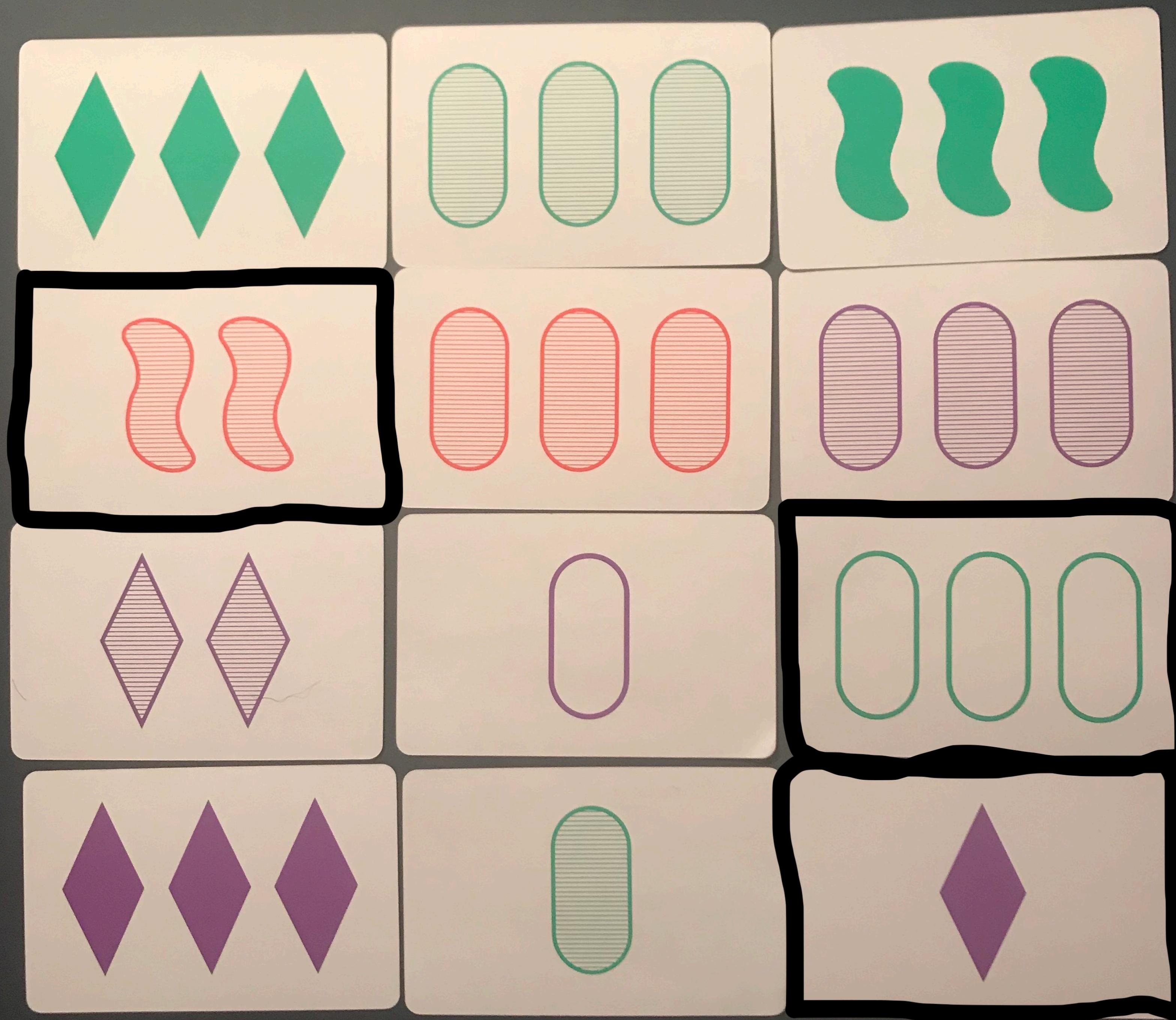
Color

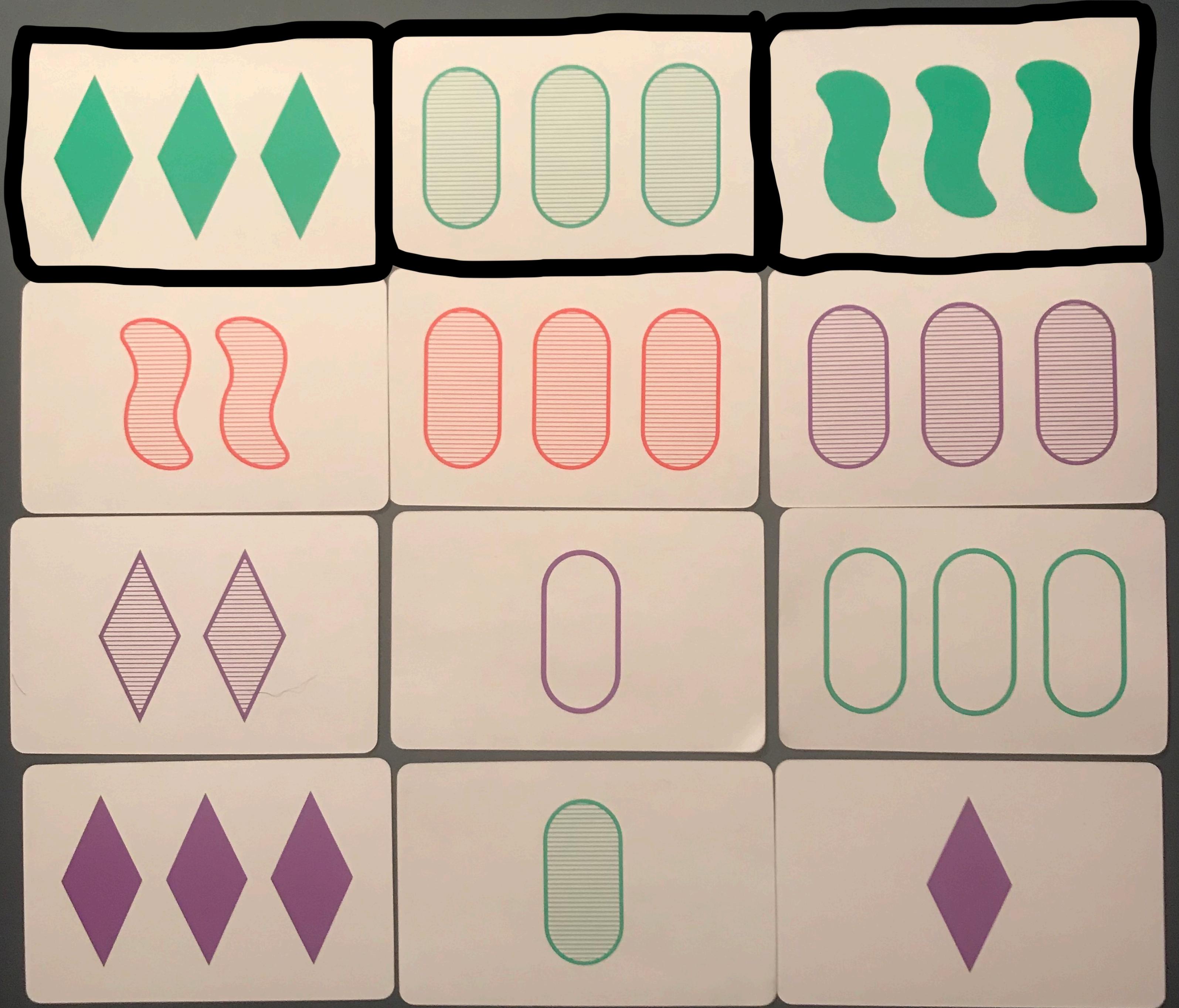
Red, Green, Purple











DATA AND METHODS

Four CNNs, each tasked with learning one of the four attributes

**Dataset included roughly 13,000 images from Github and a few dozen
From my phone.**

Metric used: Accuracy

Activation functions: Relu and Softmax

Tuning steps that led to big improvements:

- 1. Greatly increasing the number of nodes in the Dense layers.**
- 2. Use Flatten() for shape, color, and shading.**
- 3. Use Global Average Pooling for Number.**

RESULTS

**Color CNN: 99% training accuracy,
12/12 test cards classified correctly**

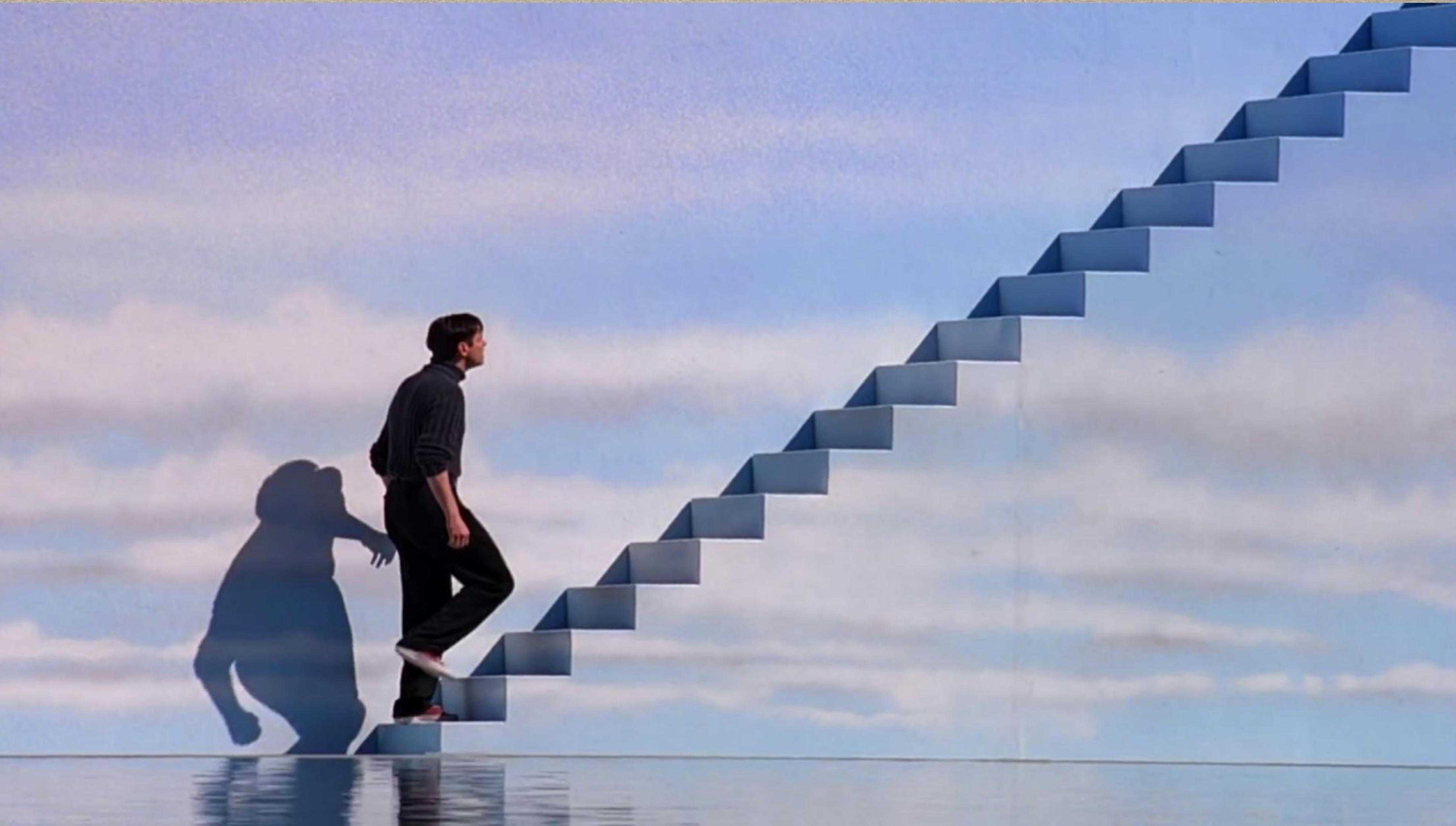
**Number CNN: 98% training accuracy,
11/12 test cards classified correctly
(This one was the hardest for the model!
74% accuracy when using Flatten())**

**Shape CNN: 99% training accuracy,
12/12 test cards classified correctly**

**Shape CNN: 99% training accuracy,
12/12 test cards classified correctly**



FUTURE STEPS



ISSUES AND FUTURE STEPS

- 1. Revisit train/validate/test process. Try Transfer learning.**
- 2. Create an object identification model To identify individual cards from images That contain 12 cards.**
- 3. Write a program that can identify SETS that Are consistent with the rules.**

