Playing Card Detection and Identification

Dan Snyder

Motivation: I play a lot of tabletop card games. One thing I have found is that the programs commonly used to identify cards come with a set of restrictions such as card placement, and background setup.

Goal: When given an image, identify and recognize all cards from a standard 52 card deck of playing cards, regardless of location in the image.

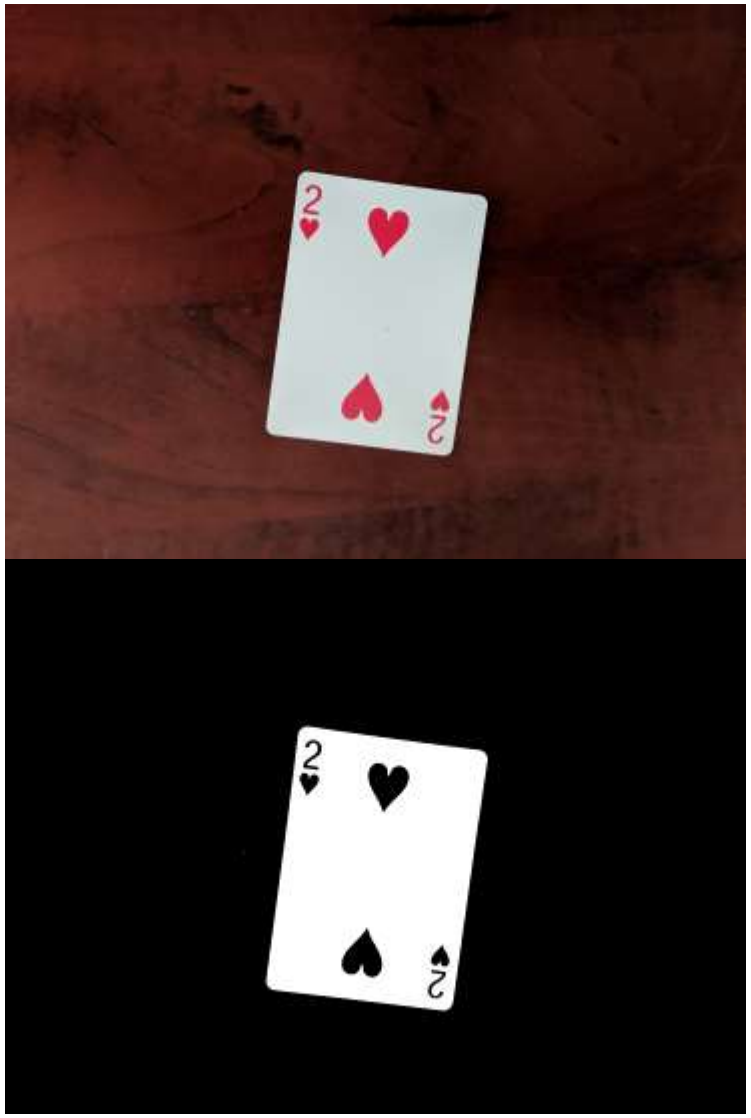
Approach and Considerations

Approach to problem

1. Detect where all the cards are in the image
2. Crop and rotate individual cards in preparation for identification using hough transform.
3. Identify the rank and suit of each card found in previous steps using template matching.

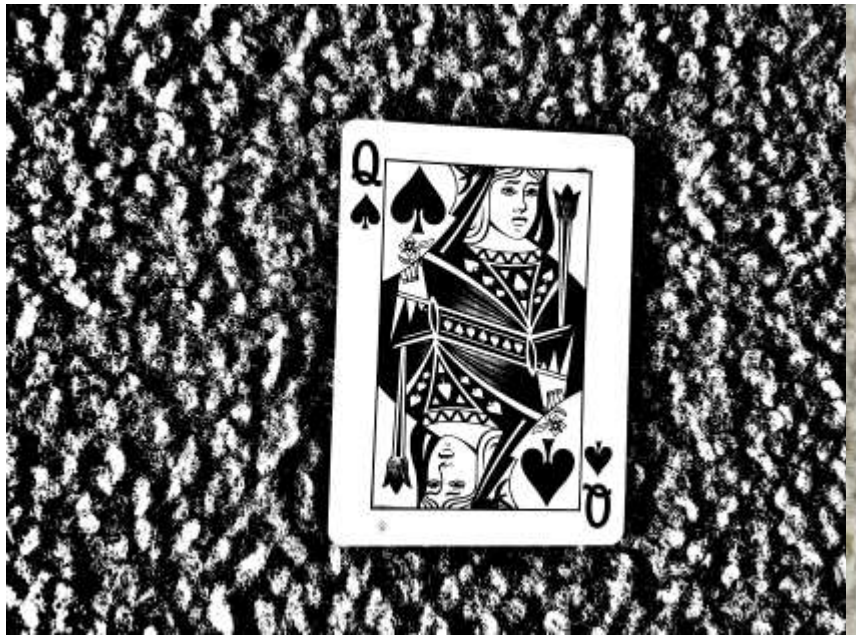
Additional Considerations

- Identify cards in a variety of orientations and on a variety of backgrounds



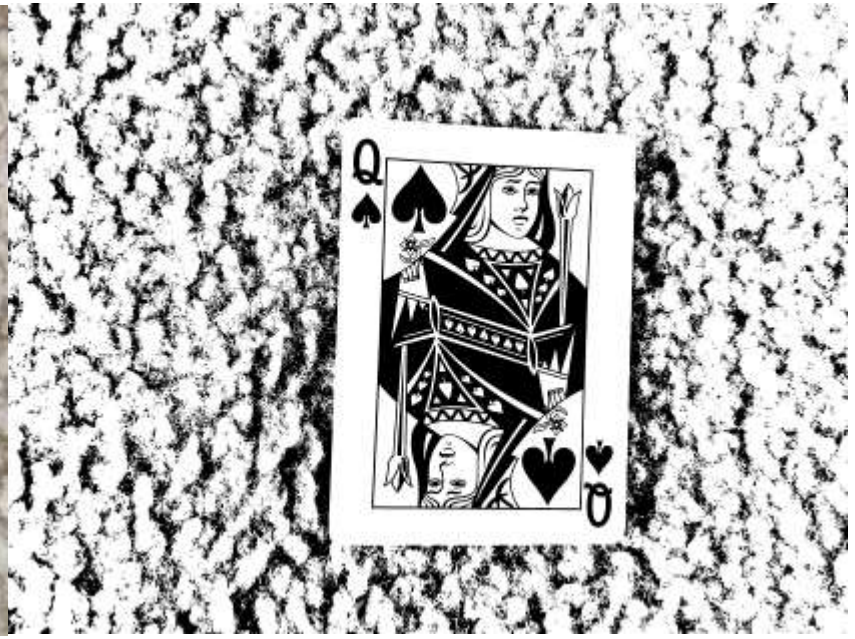
Challenges and Initial Results

- Initial Challenge: Background removal
  - Bright, non-uniform backgrounds are not easy to remove.



Adaptive Thresholding

Base Image



Otsu’s Method

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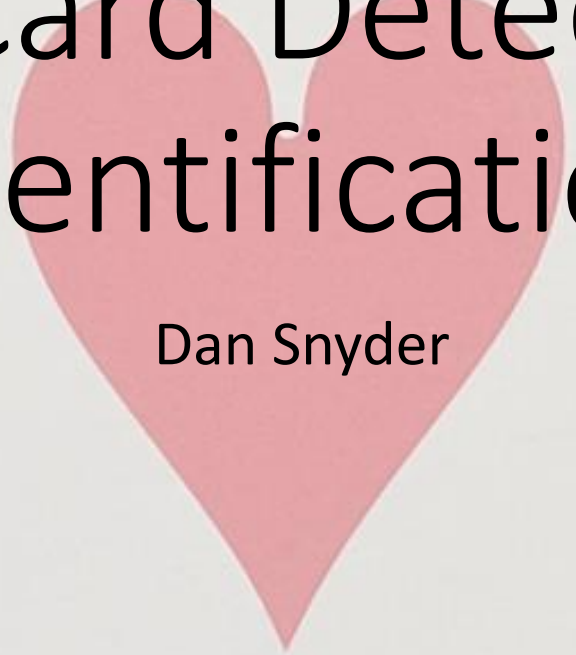
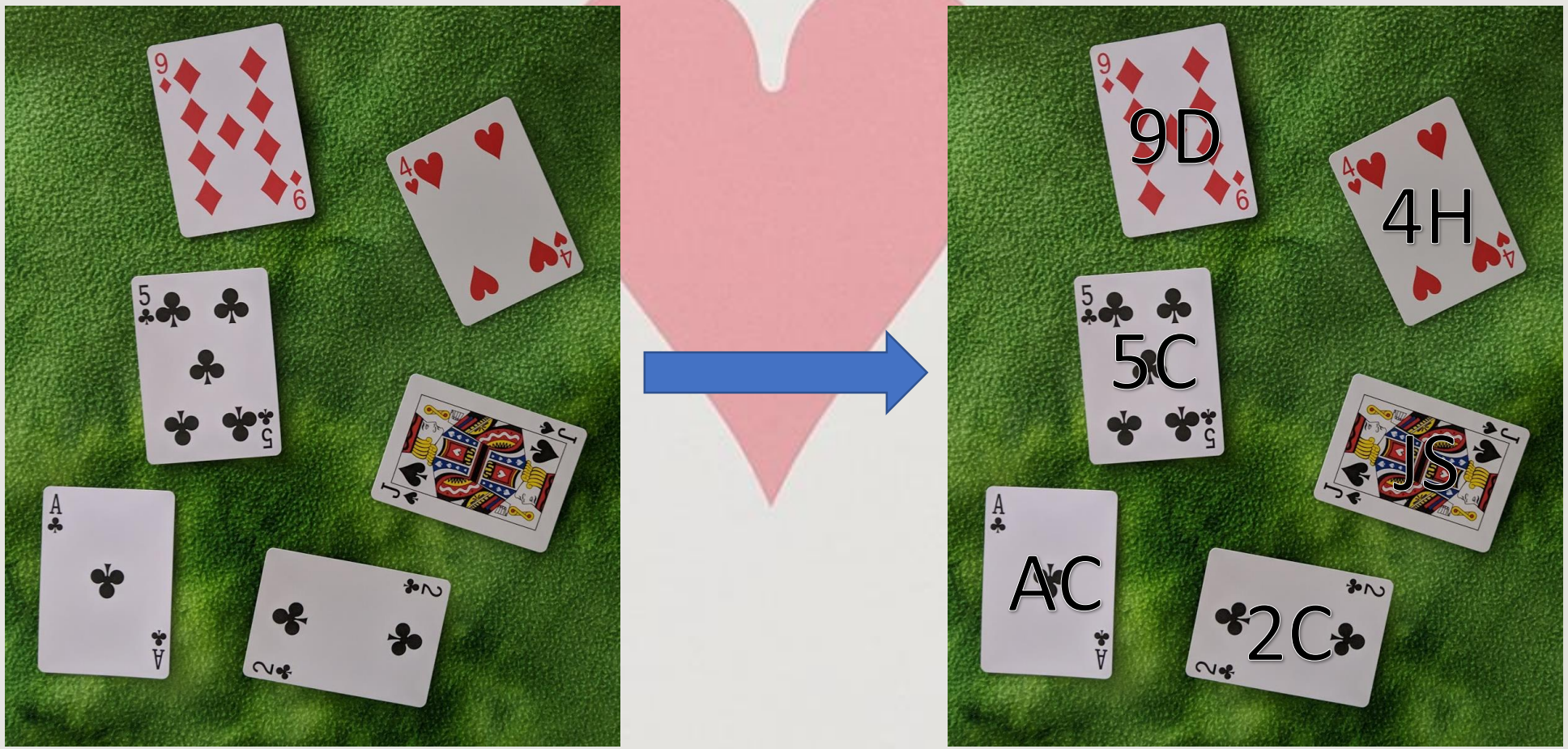


Goal

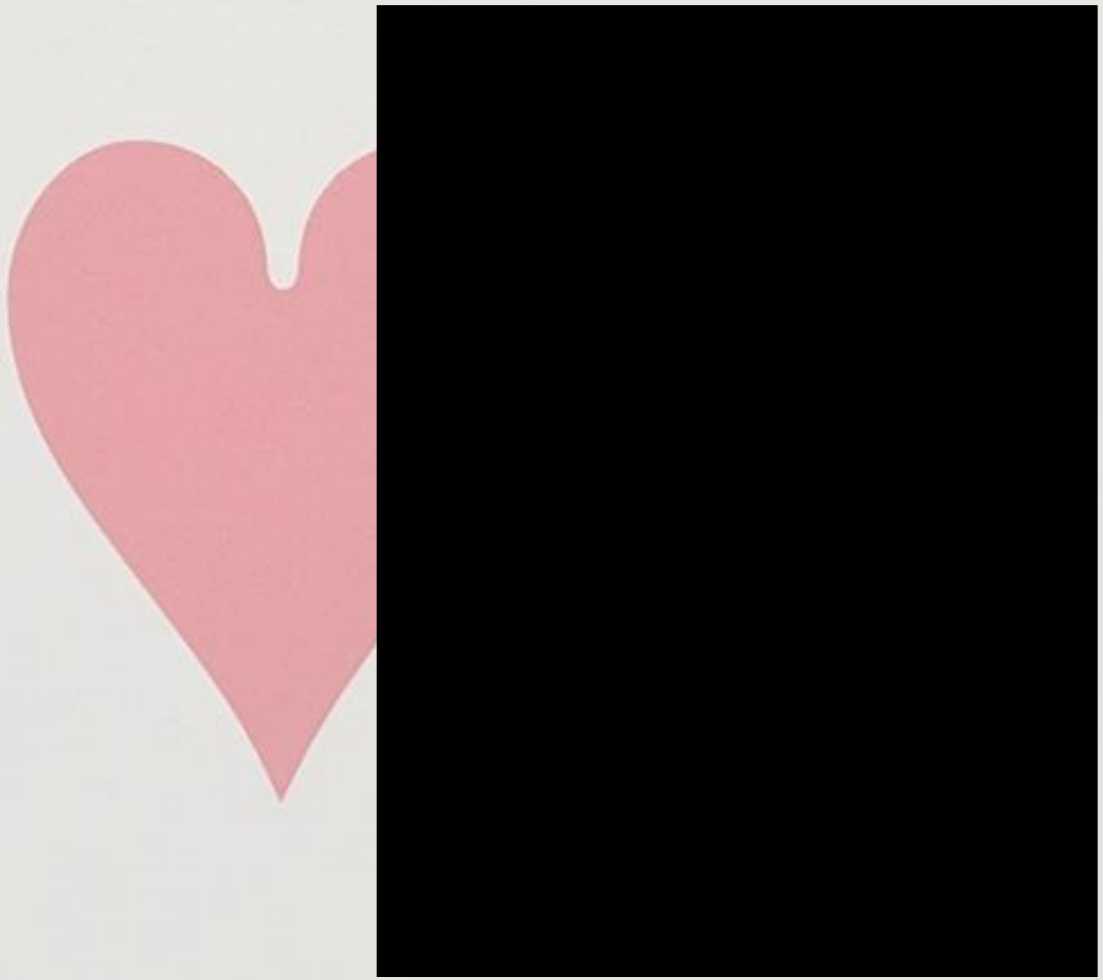
- Detect and Identify all playing cards in an image



Let’s Use Sift

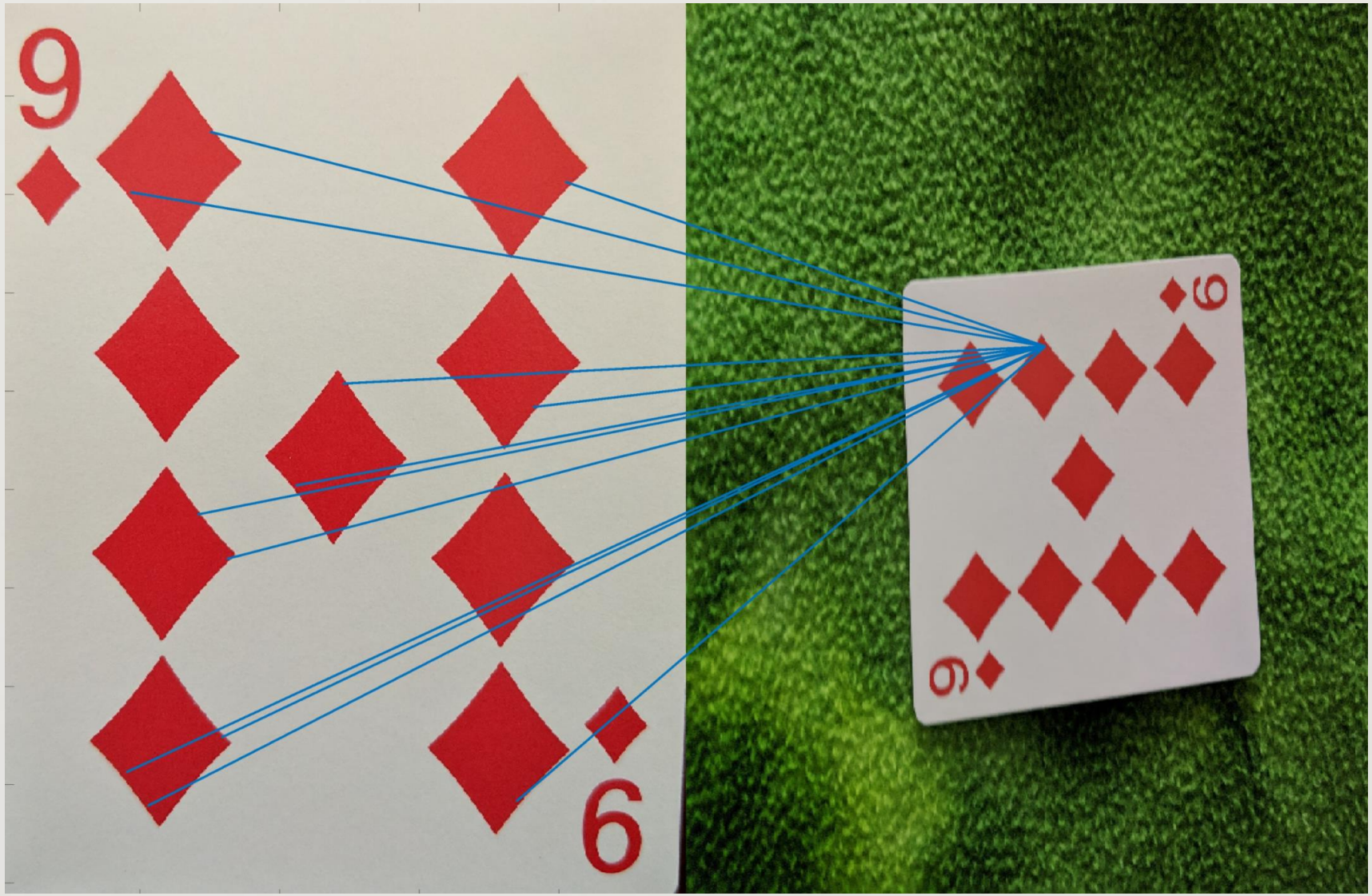
Why Sift

- Rotation invariance
- Scale invariance
- Robust to lighting



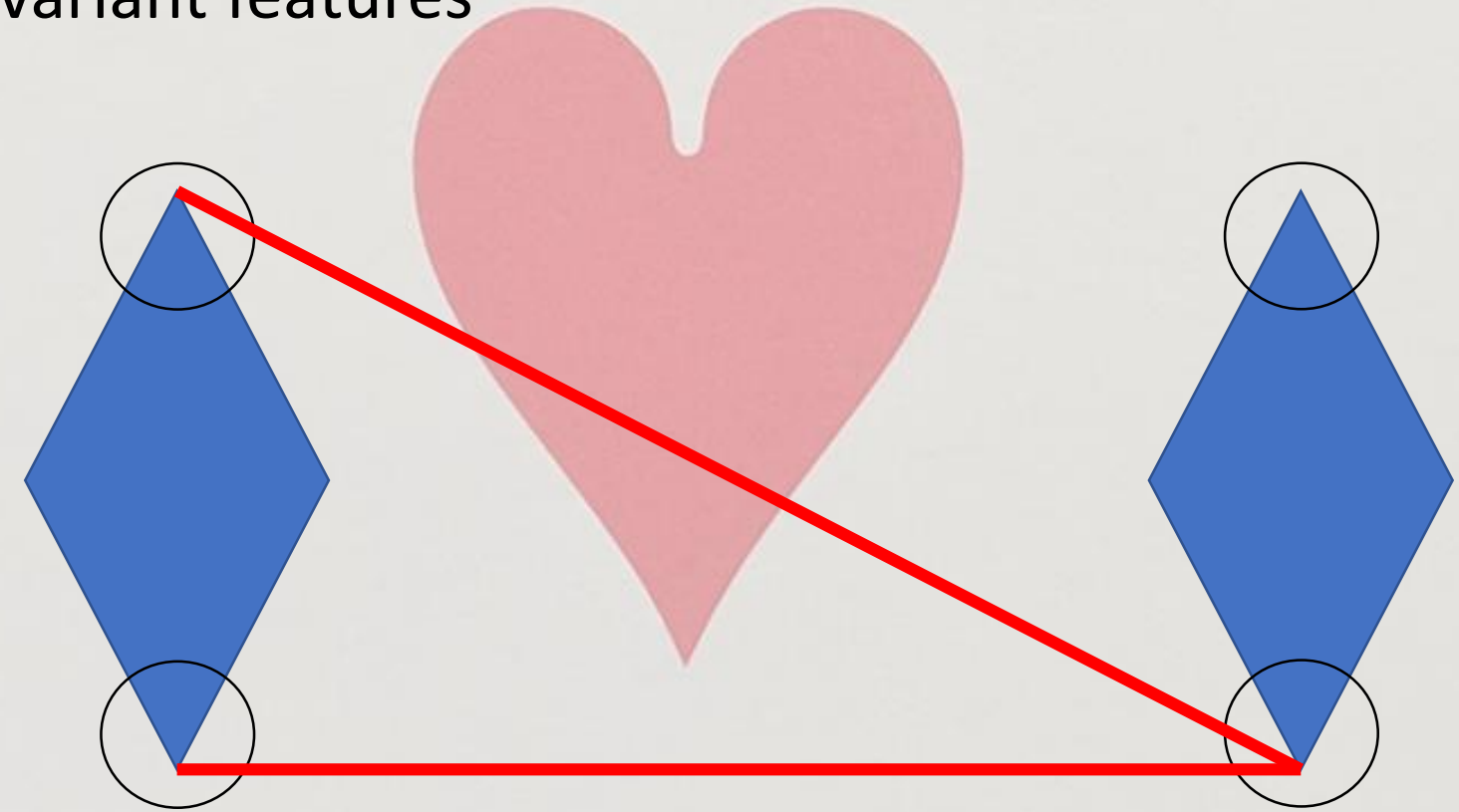
Results:

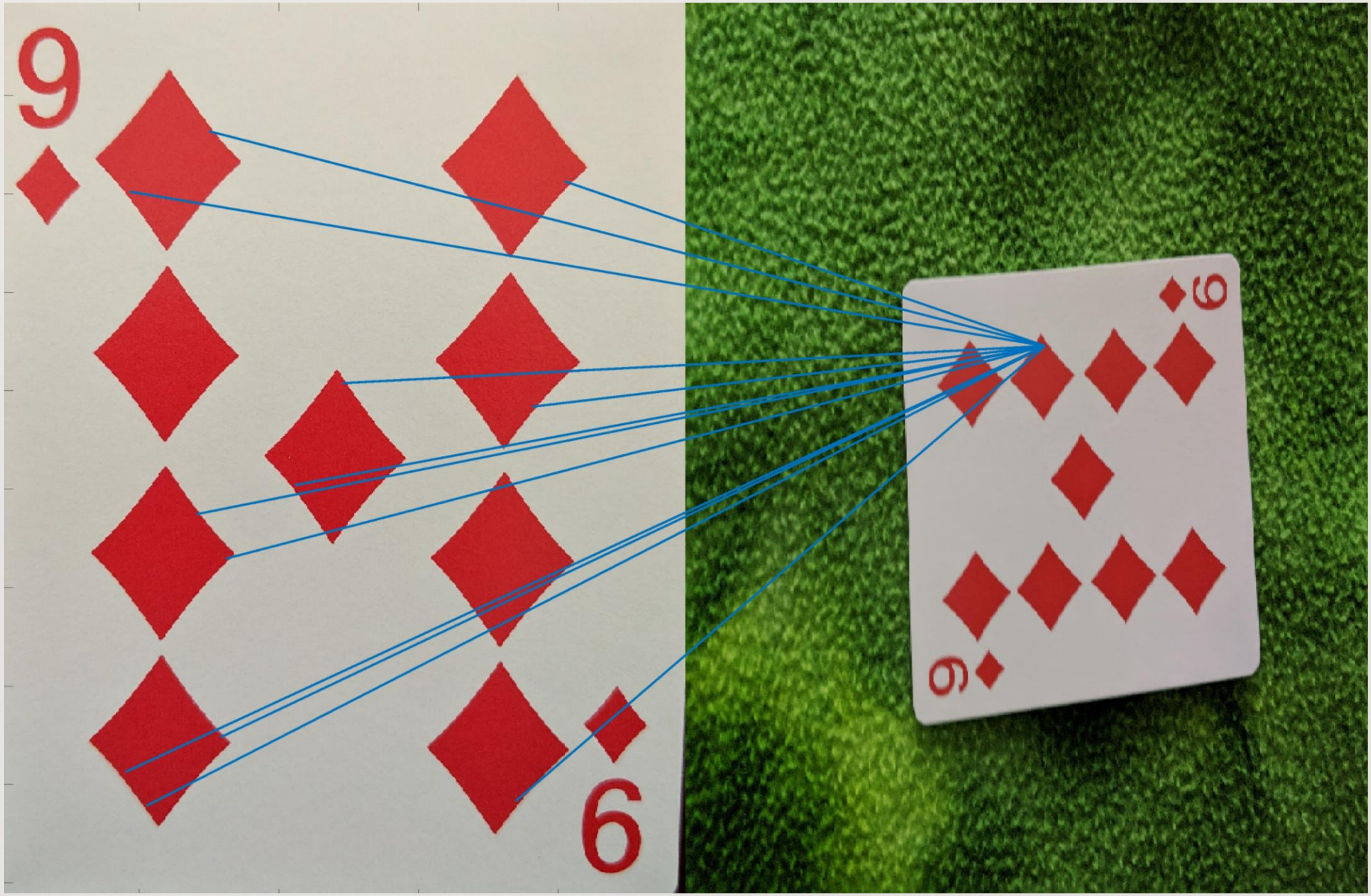
- Not good



Why Sift Failed

- Rotation invariant features

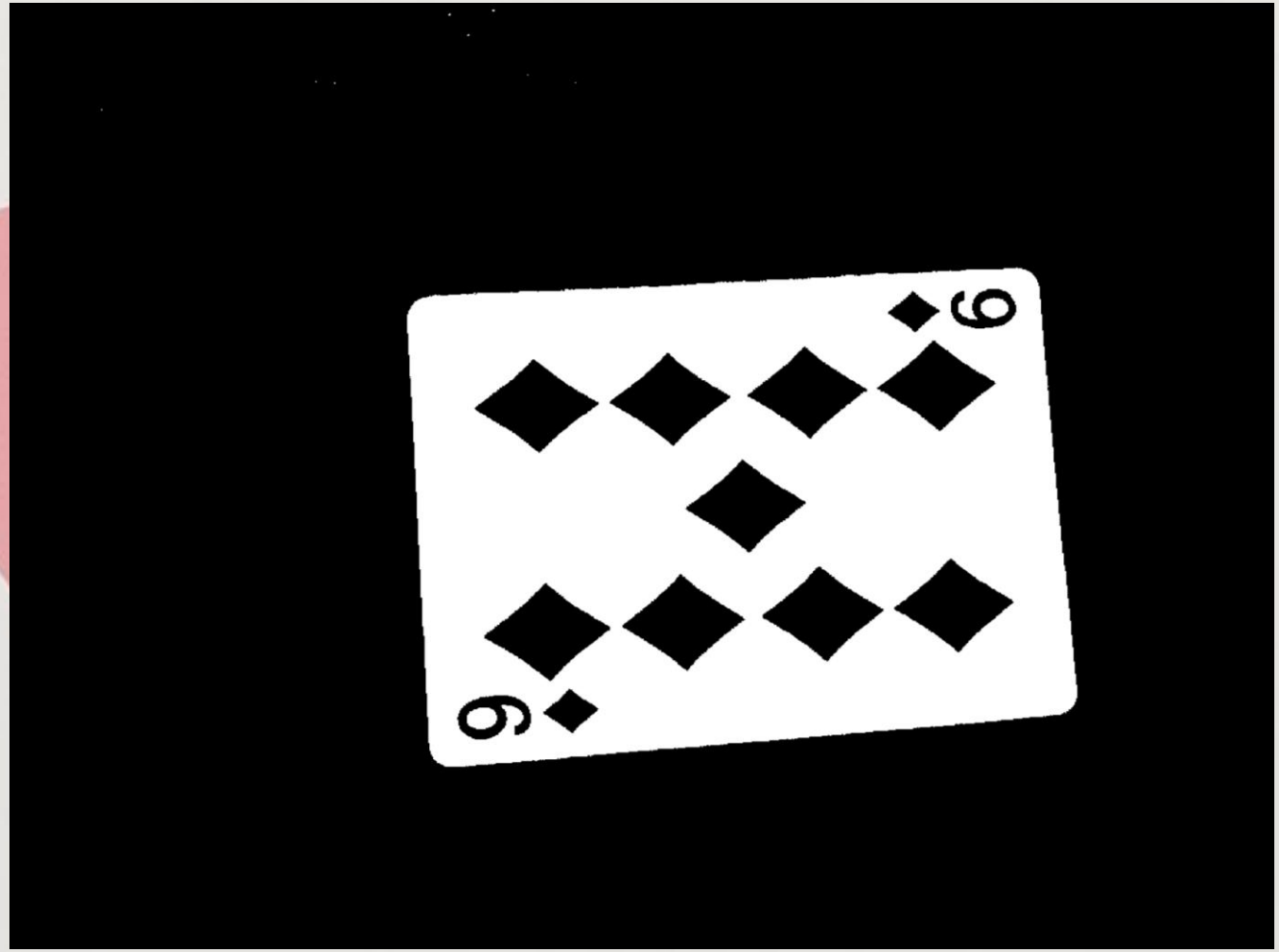



9
6
9
6

Approach #2

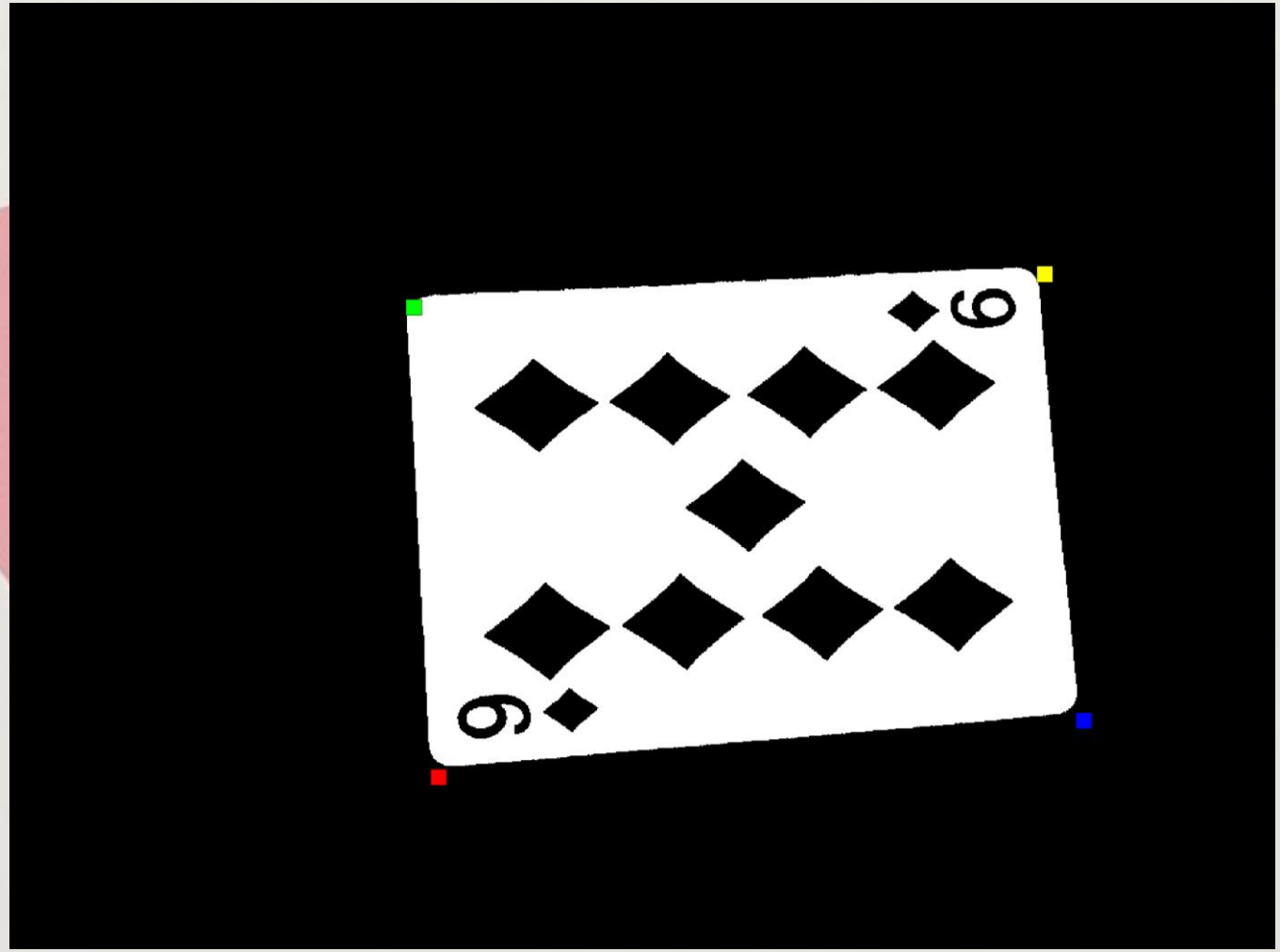
Approach #2

- Threshold



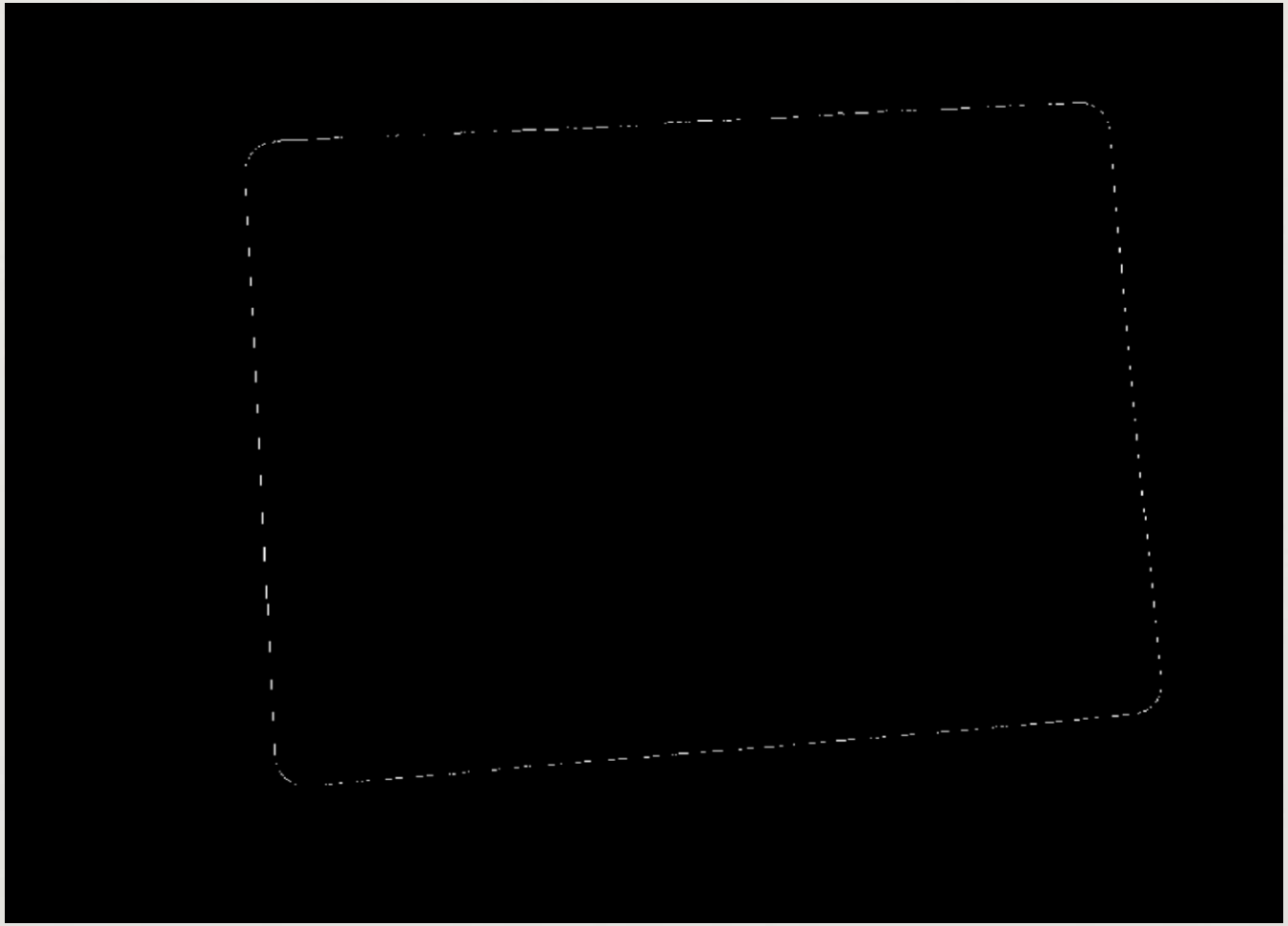
Approach #2

- Threshold
- Find & Arrange Corners



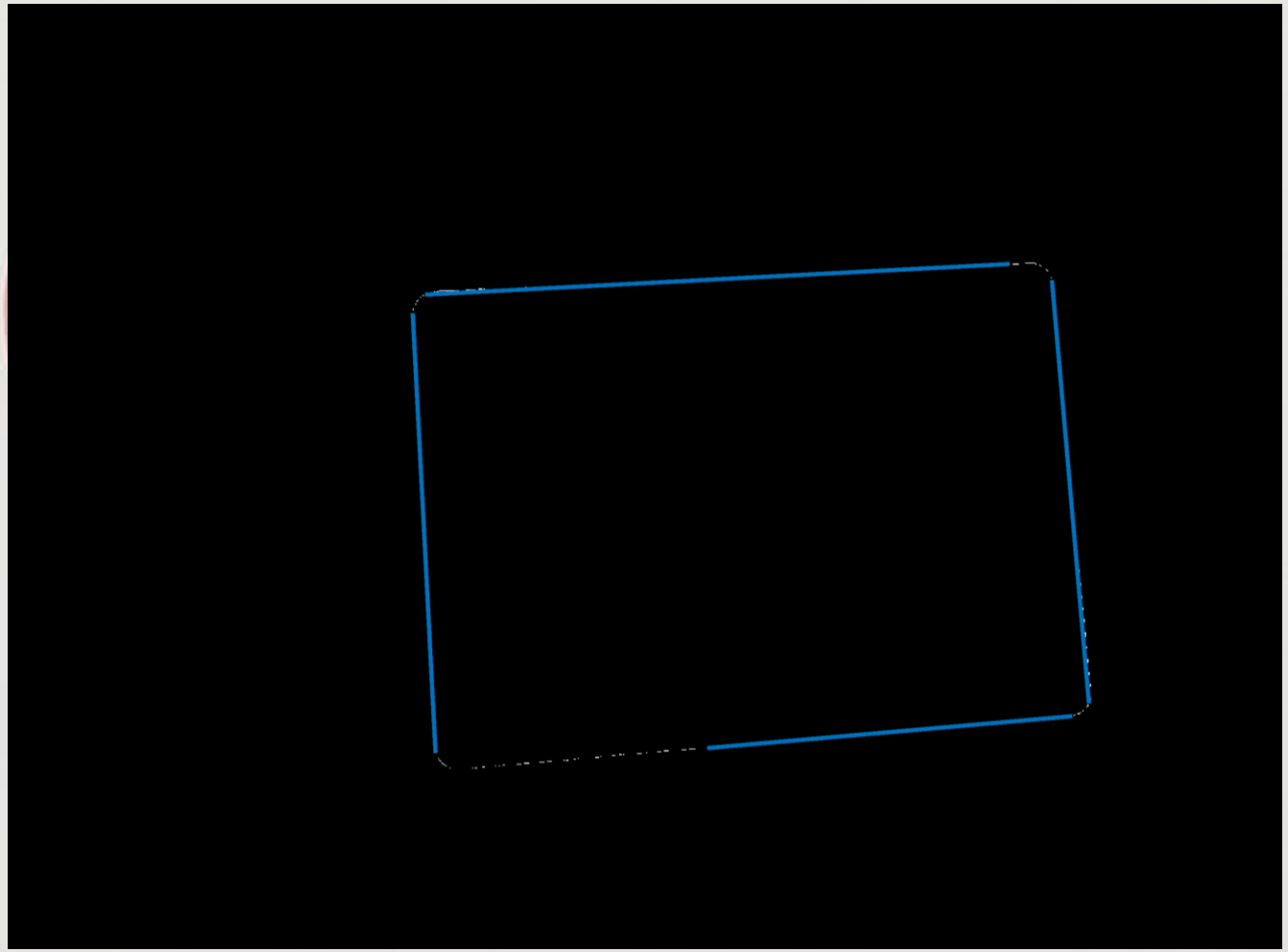
Find and Arrange Corners

- Find edges



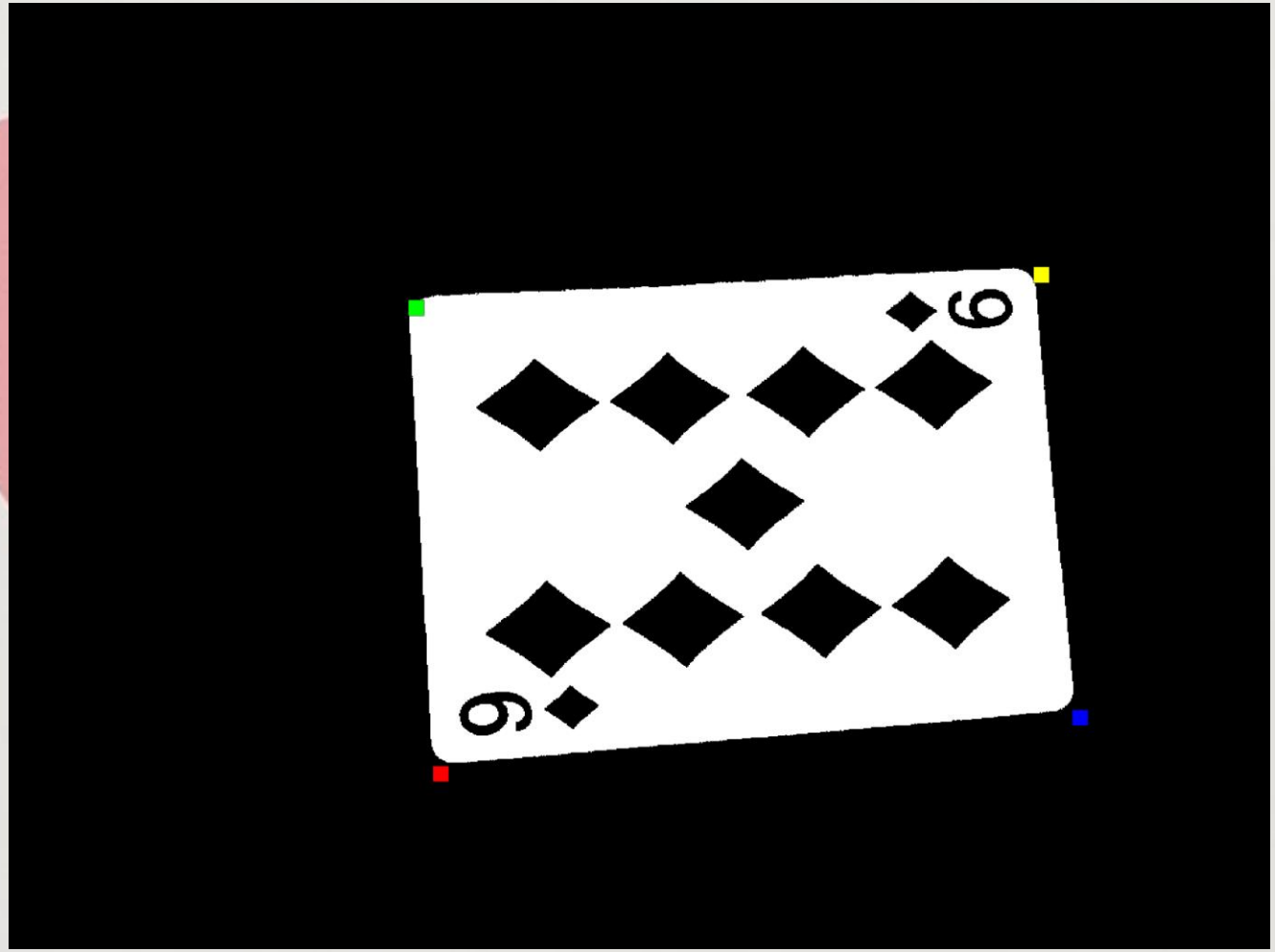
Find and Arrange Corners

- Apply Hough Transform



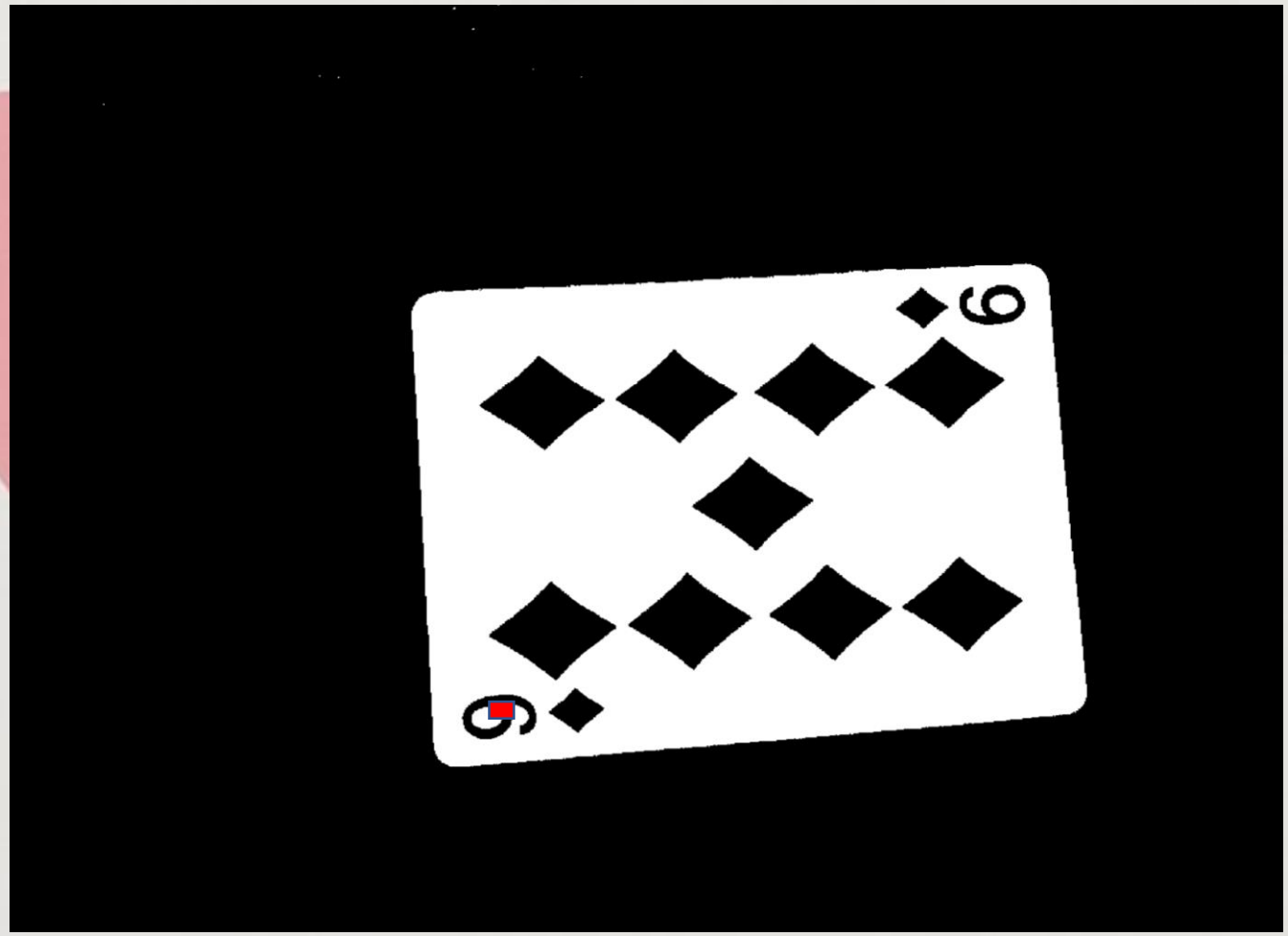
Find and Arrange Corners

- Intersections of lines are corners



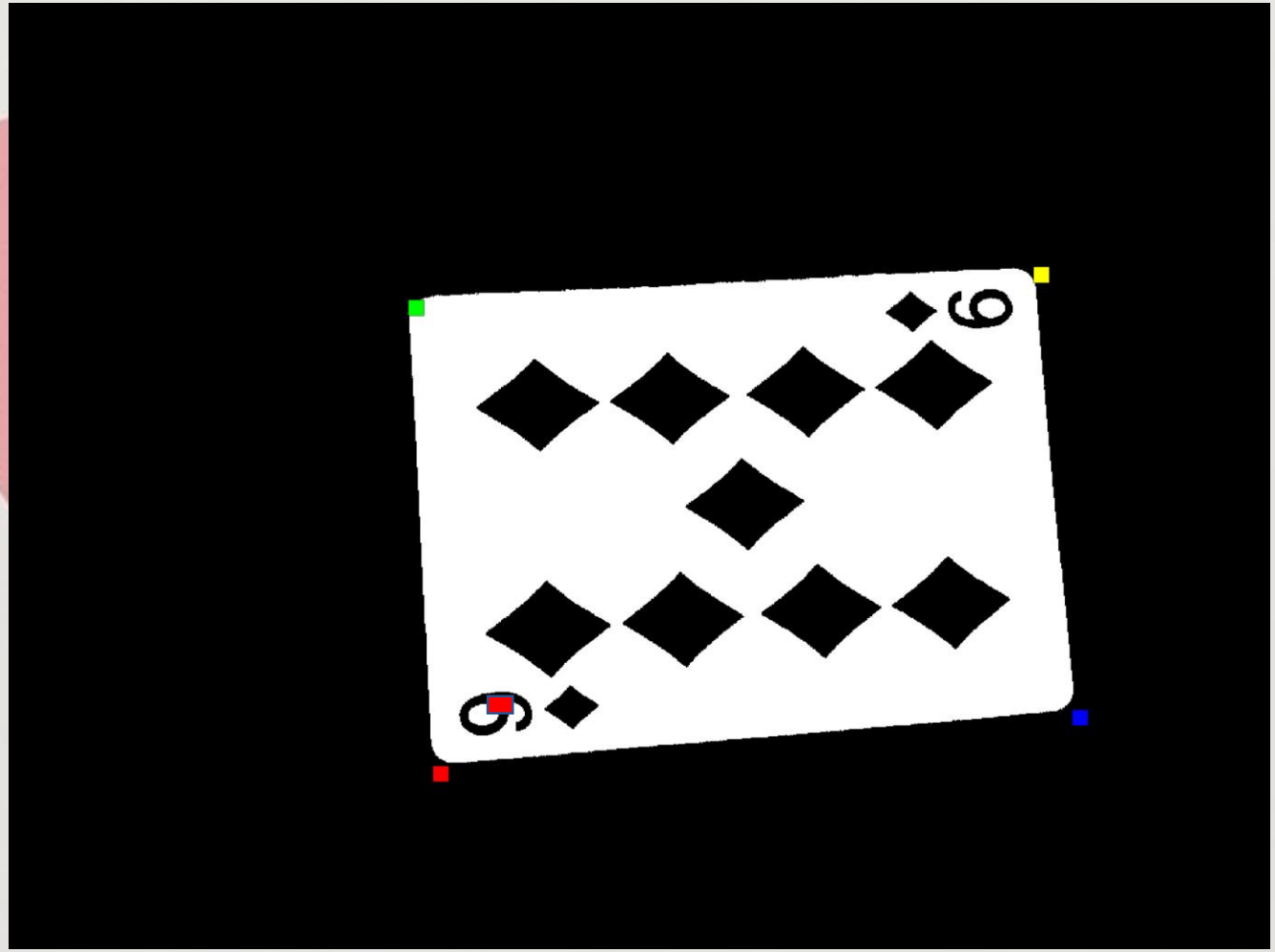
Find and Arrange Corners

- Identify dark region closest to a corner



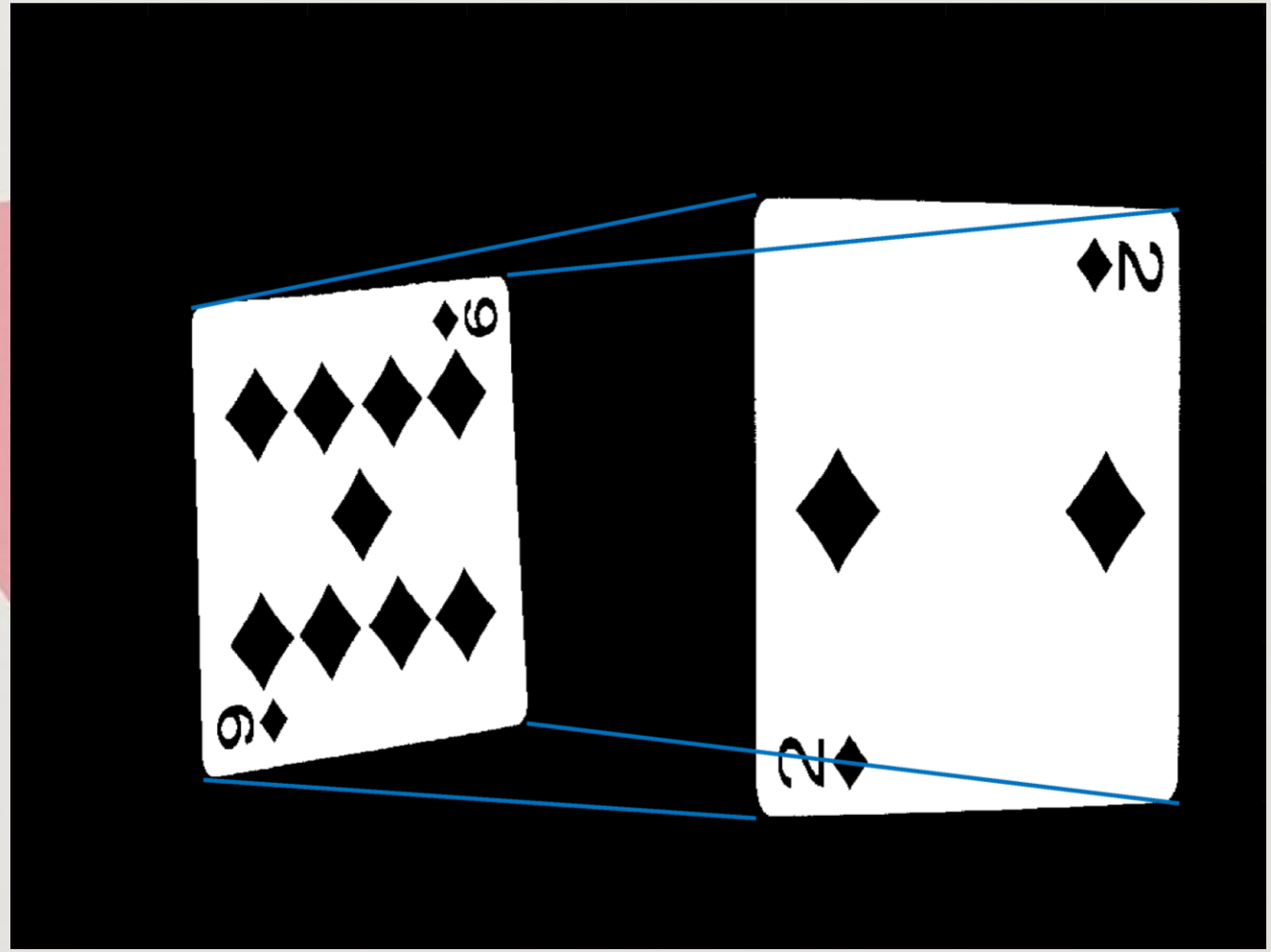
Find and Arrange Corners

- Mark closest corner as first corner
- Go around from there



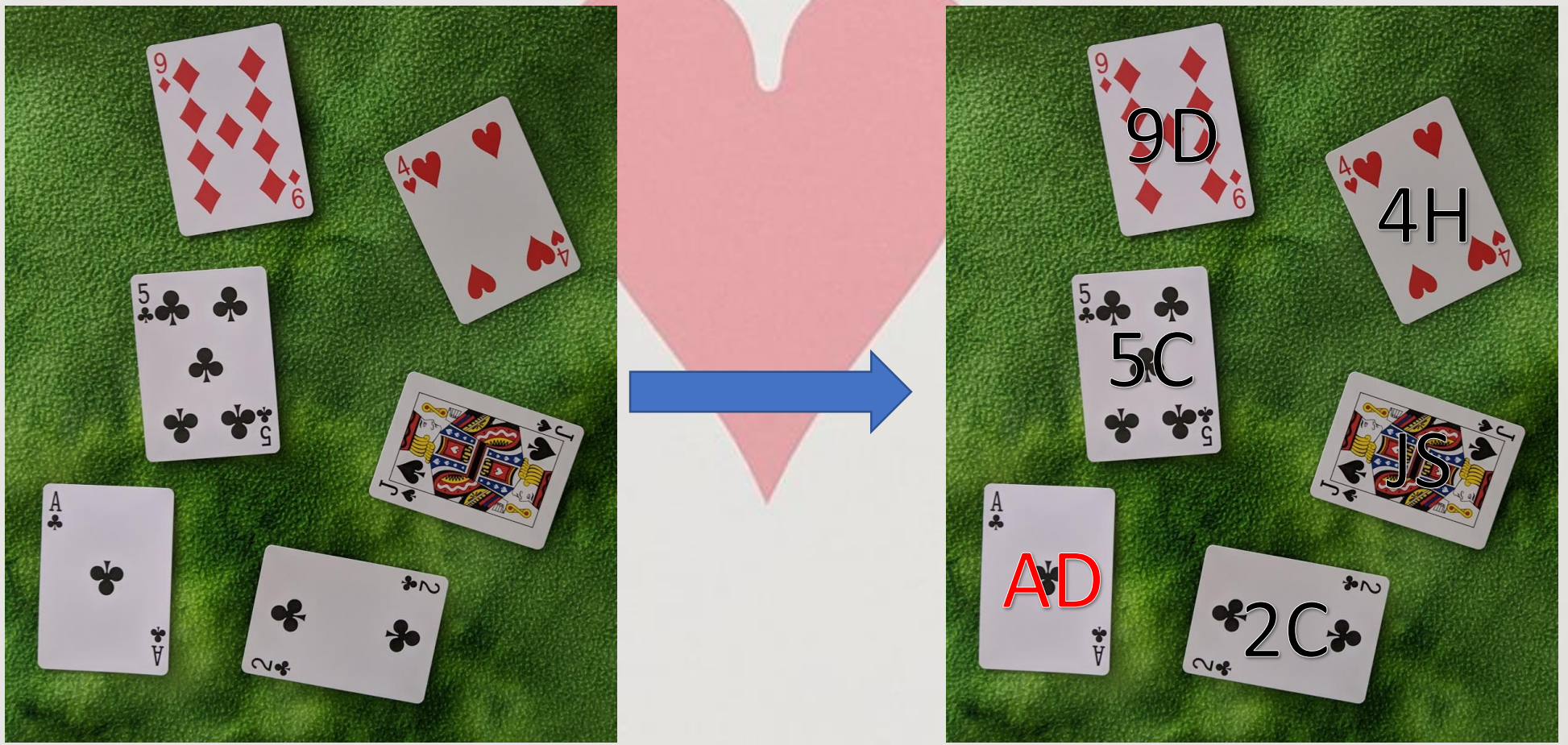
Approach #2

- Threshold
- Find & Arrange Corners
- Create Transform
- SSD between templates



Results

- 5/6 correctly identified



Next Step

- Test on extreme perspective
- Tune for better performance