

Image Matcher

Computer Vision

Group 12

Qianxiang Hao

Zain Mirza

Junjie Ren

Introduction

- Set out to create an image search model
 - Image as input, closest matches as output
- Applications:
 - Identify and compare similar images to choose the best one/remove duplicates
 - Help identify objects/locations from the description/metadata of search results
 - Find different angles of the same location/object
 - Searching for the complete version of a partial image



Problems

- Accuracy : What's the degree of similarity it needs to be?
- Aspects: Color, Texture, Shape...
- Range: What kind of images.

Use-Cases

Research:

- Find images similar to specimen or sample.

Retail:

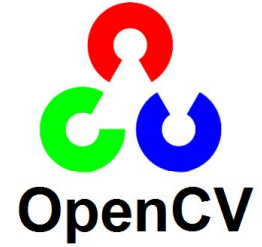
- Find items from store's database.

Photo Managing:

- Identify duplicate pictures.
- Search similar landscapes or objects.

AI Algorithm and Model

- Histogram Calculation
- Feature Matching
- Shape Matching



Histogram Calculation

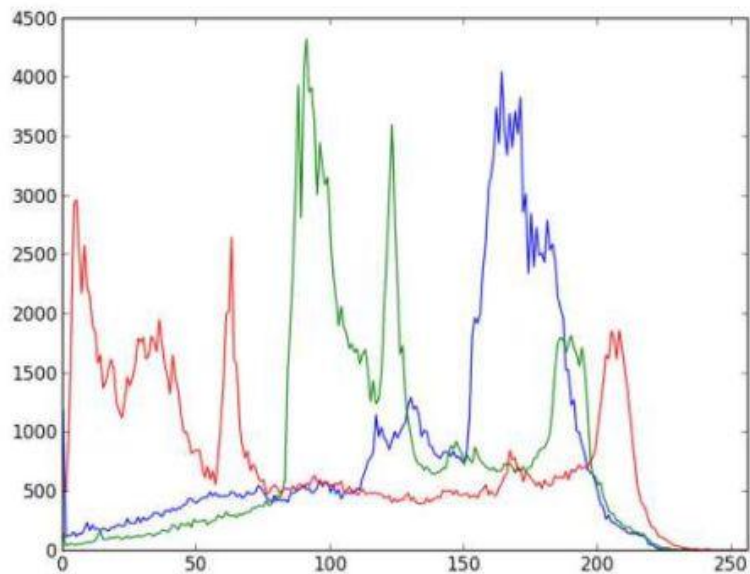


Image Histogram

Correlation (cv::HISTCMP_CORREL)

$$d(H_1, H_2) = \frac{\sum_I (H_1(I) - \bar{H}_1)(H_2(I) - \bar{H}_2)}{\sqrt{\sum_I (H_1(I) - \bar{H}_1)^2 \sum_I (H_2(I) - \bar{H}_2)^2}}$$

where

$$\bar{H}_k = \frac{1}{N} \sum_J H_k(J)$$

and N is the total number of histogram bins.

Histogram Compare

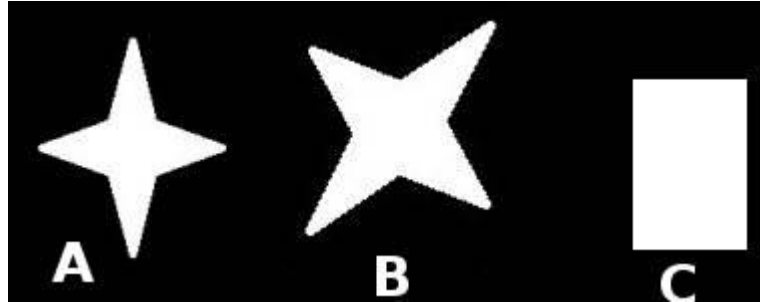
Feature Matching

1. Detecte Feature (Oriented FAST and Rotated BRIEF)
2. Feature Matching (Brute-Force matcher)



Shape Matching

1. Contour Extraction
2. Computing Moments (area, centroid, orientation)
3. Hu Moments (scale, rotation, and translation)
4. Compare Shapes (difference between their corresponding Hu Moments)



Results and Demonstration



Lesson Learned

- Choosing Algorithms
- Performance Balancing
- Testing and Data



Questions?

