MCA Assignment

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1 Color Auto Correlogram

All the colors are quantized to 26 bins (each for r, g, b components) of size 10 each. Distances considered for calculating probability estimation : 1, 2, 5.

Precision

- Mean minimum precision: 0.047
- Mean maximum precision: 0.089
- Mean average precision: 00.073

Recall

- Mean minimum recall: 0.92
- Mean maximum recall: 0.44
- Mean average recall: 0.60

F1 Score

- F1 Score: 0.022

Percentages of correct matches over different categories of images

- Percentage of *good* matches: 37.18
- Percentage of *junk* matches: 34.24
- Percentage of *ok* matches: 28.58

Average Time per query retrieval:

- Average time per query: 303 seconds

Analysis for a sample query:

Figure 1: Sample image retrieval results for the given query image (topmost row). Second row represents correct matches, overlapping with the ground truth. Last row representing a false match as per the spatial color information.

In general, color correlogram does not locate potential interest points in the image, rather focuses on the spatial color information, which is not a robust criteria for image matching, thereby leading to a great scope of error / inefficient retrieval.

2 Scale-Invariant Blob Detection – LoG

Following steps were followed for Scale-Invariant Blob Detection using LoG filter:

- Resized each image to 128x128.
- Converted colored images to gray scale.
- Generated laplacian of gaussian filters for different scales.
- Convolved images with all log filters of different scales.
- Performed non max suppression for obtained maximum extrema locations with scales most robustly representing it.
- Removed overlapping blobs by coparing the area of intersection with a threshold of 0.5.
- The keypoints detected for each image in the database are dumped into a json file.

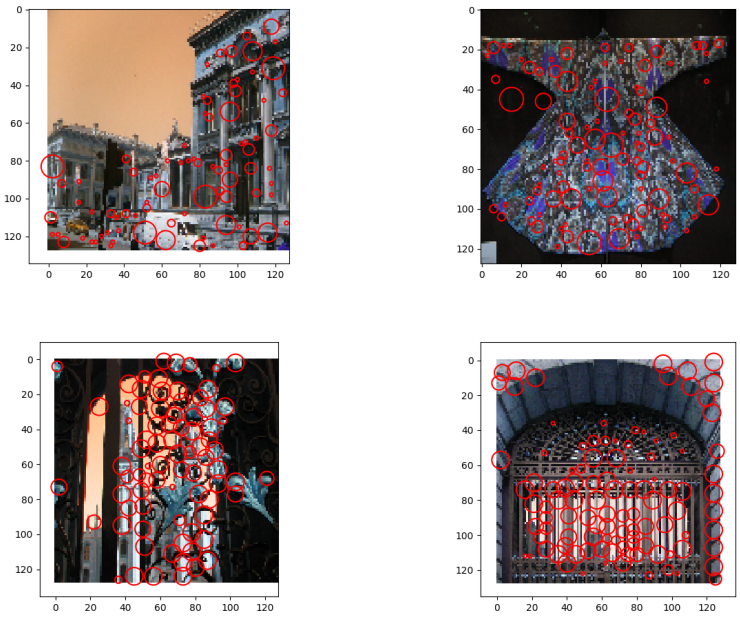

Figure 2: Sample blob illustrations from the detected key points using Scale-Invariant Blob Detection - LoG.

3 SURF: Speeded-Up Robust Feature

Following steps were followed for SURF algorithm:

- Resize image size to 128x128.
- Convert colored images to gray scale.
- Computing the integral of images.
- Computing the hessian of the processed image.
- Computing the determinant of the hessian.
- Performing non maximum suppression to hold onto most robust keypoints detected over the range of scales.
- The keypoints detected for each image in the database are dumped into a json file.

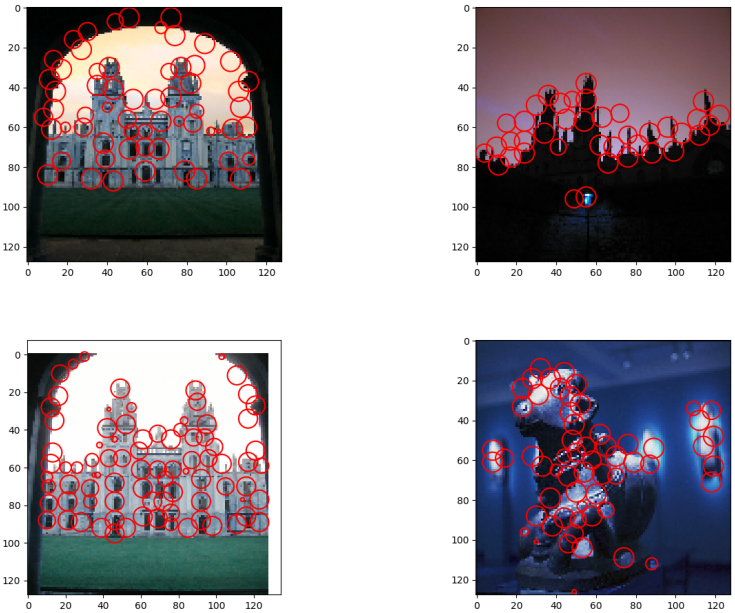

Figure 3: Sample blob illustrations from the detected key points using SURF: Speeded-Up Robust Feature.