

Image Retrieval

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Color Auto-correlogram

- Images were resized to 10% of the original size
- Precision, Recall and F1 are calculated @ k = 5, 10, 50, 100, 200 and 400.
- mAP (mean average precision) is also reported.
- Average number of good, ok and junk images retrieved are also reported.
- Feature Generation takes around 5 hours for all 5063 images

Various ranges have been considered due to the varying length of ground truth positive images (maximum was 348, and minimum was 8).

Mean Average Precision (mAP): 0.0752

Average Retrievals (k): 4620.424

Average Time (s): 7.655292135296446

Avg Good imgs retrieved@[5, 10, 50, 100, 200, 400]: [1.030, 1.181, 2.24, 3.212, 4.69, 6.60]

Avg Ok imgs retrieved@[5, 10, 50, 100, 200, 400]: [0.30, 0.33, 1.06, 1.63, 2.42, 4.12]

Avg Junk imgs retrieved@[5, 10, 50, 100, 200, 400]: [0.0, 0.030, 0.33, 0.51, 1.33, 2.60]

Avg Precision@[5, 10, 50, 100, 200, 400]: [0.266, 0.154, 0.072, 0.053, 0.042, 0.033]

Avg Recall@[5, 10, 50, 100, 200, 400]: [0.047, 0.050, 0.086, 0.11, 0.153, 0.209]

Avg F1@[5, 10, 50, 100, 200, 400]: [0.071, 0.063, 0.056, 0.052, 0.051, 0.0481]

Max Precision@[5, 10, 50, 100, 200, 400]: [0.8, 0.6, 0.26, 0.19, 0.17, 0.135]

Max Recall@[5, 10, 50, 100, 200, 400]: [0.153, 0.153, 0.153, 0.230, 0.230, 0.38]

Max F1@[5, 10, 50, 100, 200, 400]: [0.22, 0.173, 0.06, 0.05, 0.028, 0.024]

Min Precision@[5, 10, 50, 100, 200, 400]: [0.2, 0.1, 0.02, 0.01, 0.005, 0.0025]

Min Recall@[5, 10, 50, 100, 200, 400]: [0.0028, 0.0028, 0.014, 0.022, 0.0373, 0.0775]

Min F1@[5, 10, 50, 100, 200, 400]: [0.005, 0.005, 0.025, 0.035, 0.047, 0.072]

Files - question1_1.py (python3 assumed)

To generate features for train images,

python question1_1.py train <image dir> <feature dir> <cluster file>

cluster file is simply the name of a file to save/retrieve the cluster centres of an rgb cube that has been quantized to 64 colors.

To test on queries,

```
python question1_1.py test <image dir> <feature dir> <cluster file> --query_folder  
<query folder> --ground_truth <ground truth folder>
```

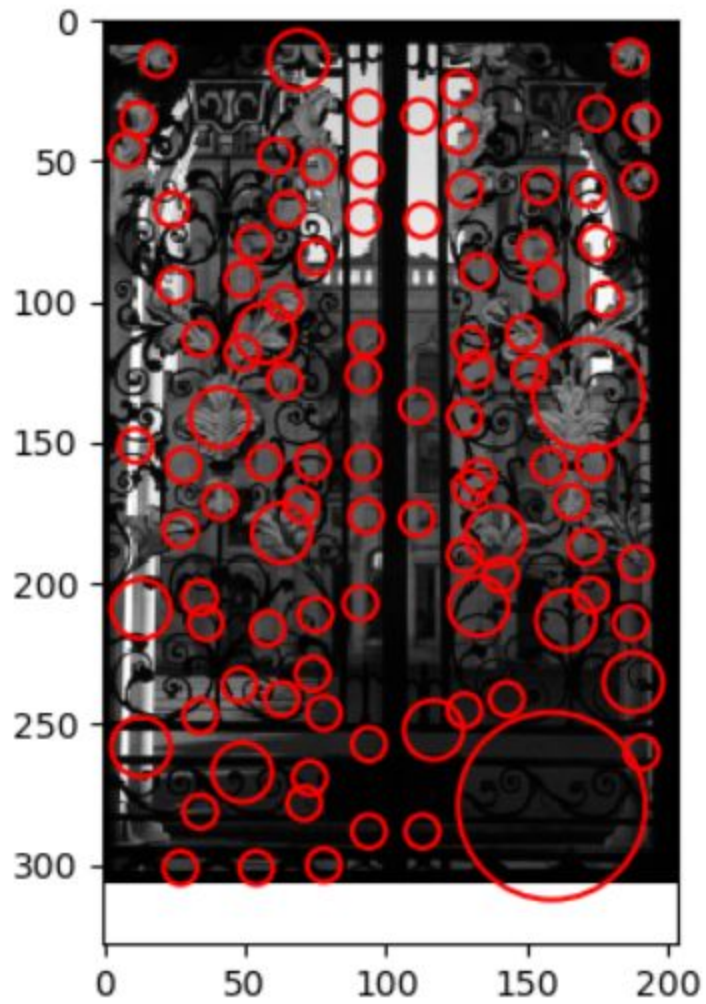
The ground truth folder is required to generate statistics on the retrieval

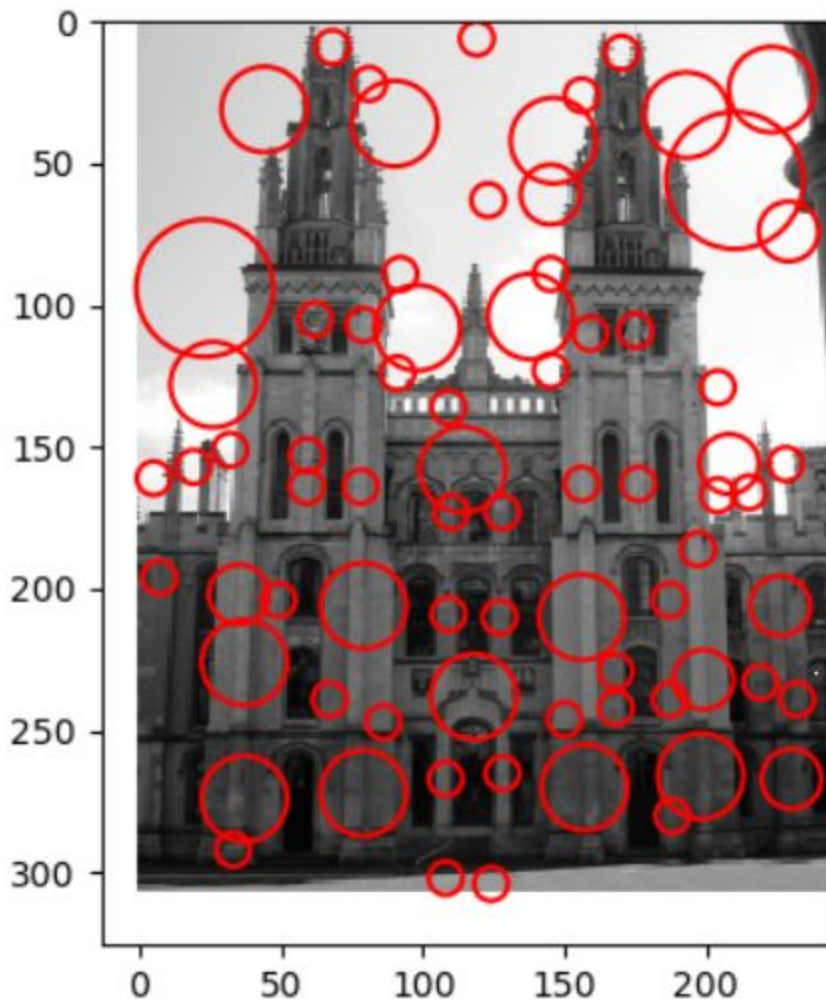
Using larger image sizes requires more computation time. A dynamic programming based approximation algorithm was implemented as well, and images scaled to 15% were used here.

- Feature generation took around 3 hours

Laplace of Gaussian

Sample blobs detected





To test this implementation,
`python question1_2.py test <image folder> --query_folder <queries with images>`

Detection time ranged from 1.2 seconds to 14 seconds

On average, 75 blobs were detected per image after pruning (based on overlap).

The maximum blobs were 190, in the image shown below



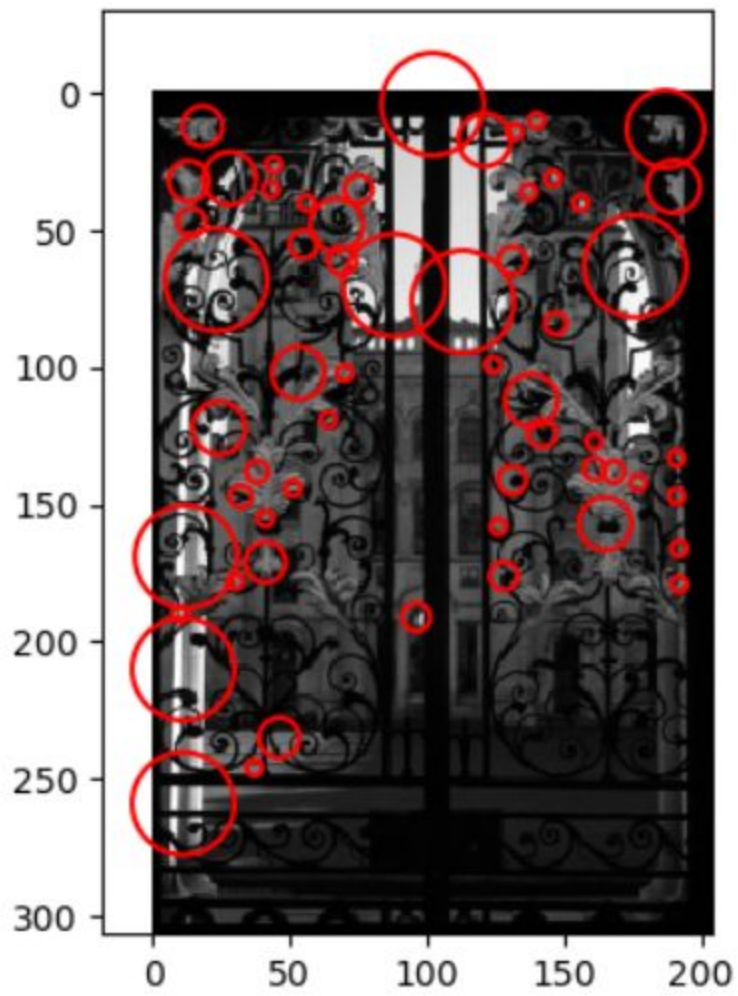
The minimum blobs detected was 3, in the image show below

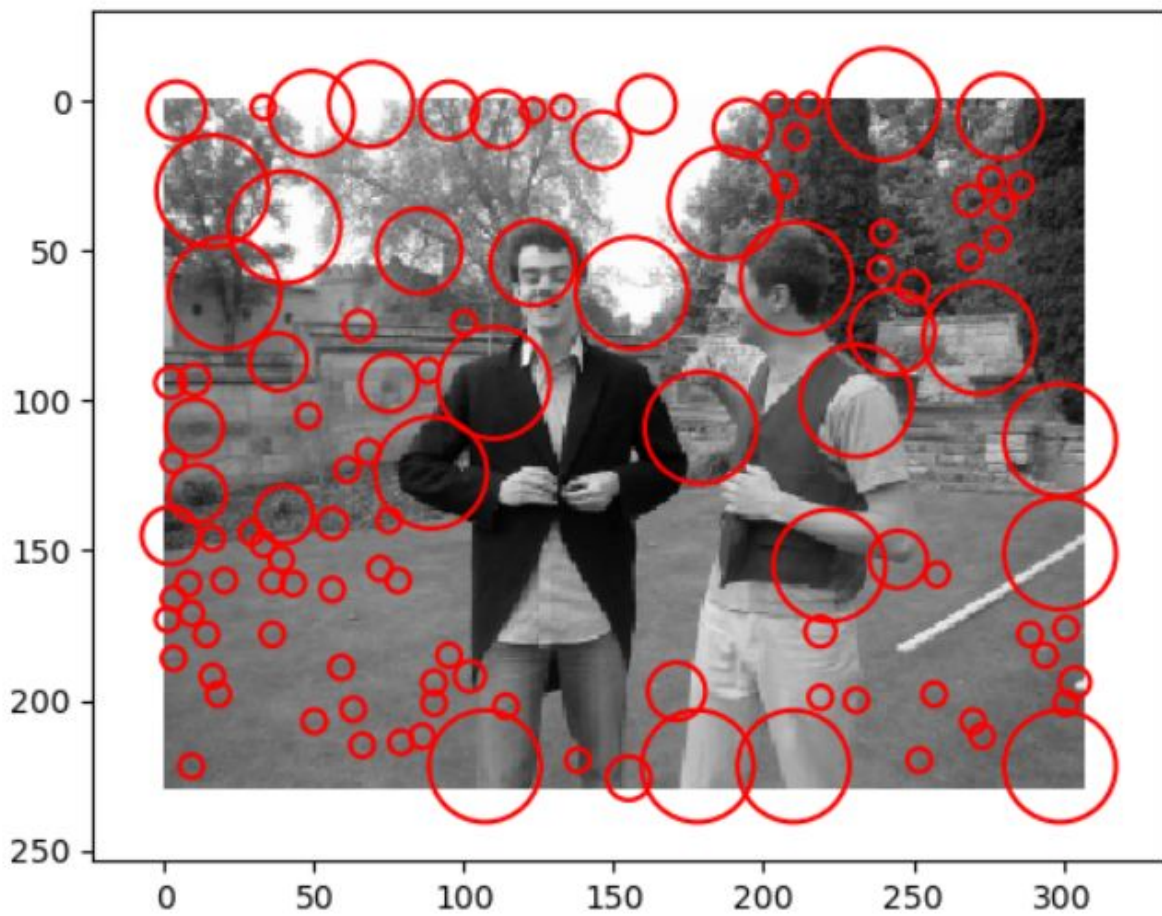


From the image, it is quite obvious that there would not be much feature points due to the -

- Lack of edges, and hence, lack of features on an LoG -> lack of extrema

Surf





To test this implementation, run

```
python question1_3.py test <image folder> --query_folder <query folder>
```

Detection time ranged from 1 second to 20 seconds for some images

An Average of 11.79 blobs were detected.

Maximum blobs detected was 52



Minimum blobs detected was 1