Homework 1 - Image Retrieval

Due: 2359 Hrs on 23 February 2020

Instructions:

- Instruction plagiarism policy applies.
- You have to implement the assignment in Python.
- You can use libraries for reading and perform image operations. However, the core of retrieval algorithm has to be implemented from scratch. In case of a doubt make sure you confirm with the TA's.
- For any doubts make a comment on google classroom or email TA with Subject like [MCA HW-1] Doubt.
- Submission Instructions:
    - All submission must be inside a zip file named a1_{name}_{rollnumber}.zip containing report.pdf and a folder named src with all your scripts.
    - All the scripts must be uploaded in .py format. Make a separate script for each subquestion. Naming convention example question1_1.py for first subquestion of question 1.
    - Write all the scores and your analysis of it in the report.pdf

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Dataset description

In assignment zip you have two folders 1) Images and 2) train

/images

Contains 5063 JPEG images. These images will be used as queries and extractions for both train and test data.

/train

Data you can use to test your algorithm while development. Test data during the demo will come from the same distribution.

/train/query

Contains all the queries. Each query is a text file of following format:-

oxc1_{image_name} {Dimension of bounding box in format X Y Width Height}

Eg. oxc1_all_souls_000013 136.5 34.1 648.5 955.7

Naming convention of the query files are {prefix}_query.txt

Using a bounding box or not is your choice.

/train/ground_truth

Contains ground truth for all the queries. For each query there are three ground truth files named in format {prefix}_{good/junk/ok}.txt

Each line in the ground truth file contains the name of an image. Total ground truth for a query is all the images mentioned in three ground truth files.

Question 1

Implement the following image retrieval algorithms:-

1. Color Auto Correlogram
2. Scale-Invariant Blob Detection – LoG
3. SURF: Speeded-Up Robust Feature

For each of the methods calculate the maximum, minimum and average precision, recall and F1 score on the training data. Report average time required to perform a retrieval. Also calculate the average percentage of good, junk and ok queries you were able to retrieve.

Note:-

1) Each retrieval method should be implemented in a different python script.
2) Make sure you optimize your system. Calculate and save all the features which you can beforehand so evaluation can be done in real time. Failing to do this will result in a heavy penalty.