ASSIGNMENT 1
CS5187 VISION AND IMAGE

INSTANCE SEARCH

You are given a collection of 28,493 images and 50 testing query images. You can download it from this link: google driver link. Each image contains one or two instances (objects). Your task is to implement any two object matching methods that you learn in this course (e.g., AlexNet, VGG, ResNet, YOLO, Fast R-CNN, SIFT, Bag-of-words) for instance search.

A. Given an image with one or multiple bounding boxes as a query, retrieve the ten most similar images containing the same instance(s) from the collection of images. Show the top ten matching images with the bounding box(es) of instance(s) for queries 1-5 in the report. You only need to show result for one of the methods. If your implementations for both methods are correct and one of the methods can locate the instances of retrieved images, you will get all 40% of marks. (40%)

   The similarity between two images can be based on any distance or similarity function, including the followings:

   Euclidean distance between query $Q = [q_1, q_2 \cdots q_n]$ and image $F = [f_1, f_2 \cdots f_n]$:

$$Distance(Q, F) = \sqrt{\sum_{i=1}^{n} (q_i - f_i)^2}$$

   Cosine similarity between query $Q = [q_1, q_2 \cdots q_n]$ and image $F = [f_1, f_2 \cdots f_n]$:

$$Similarity(Q, F) = \frac{\sum_{i=1}^{n} q_i f_i}{\sqrt{\sum_{i=1}^{n} q_i^2} \sqrt{\sum_{i=1}^{n} f_i^2}}$$

B. List the retrieval results (a rank list of 28,493 images in descending order of similarity) for the 50 queries in a text file: rankList.txt (see submission guideline in the next page). You can submit at most two RUNs (two rankLists), each from a different method. The mark will be allocated based on the retrieval performance of your better RUN. (50%)

C. Report should be brief and no more than 5 pages. The report should briefly describe and analyze your methods. (10%)

SUBMISSION

Note: 10 marks will be deducted if (1) the results are not presented properly in the report, (2) rank list is not in the required format, (3) program is difficult to understand.

Please zip the followings and submit to Canvas:

- ✓ *Computer program*: Python3 (recommended).
- ✓ *Report*
- ✓ *Rank list*: A text file showing the descending order of the images. Sample text file:

```
Q1: 7 12 214 350 …
Q2: 301 501 1990 2 …
Q3: 288 345 389 1290 …
Q4: 248 293 1098 2000 …
Q5: 380 287 392 478 222 …
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Remark: 50 rows only. Each row should list the names of the 28,493 images (named in number) in descending order of their similarities to a query.

DEADLINE

The submission should be done before 15-Mar, 11:59pm.

Penalty on late submission: 20% of marks will be deducted per day. No submission will be allowed after five days from the deadline. *Do NOT copy code from the internet and do not borrow other people's code. Remember that PLAGIARISM is a serious offense for which you may fail the class or even be expelled from the university.*

CONTACT PERSON

Please email Teaching Assistant Bin Zhu (Email: binzhu4-c@my.cityu.edu.hk) for technical questions.