Master in
Computer Vision
Barcelona

Project
Module 1

Content based image retrieval

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Week 5

W4 Homework

Query results evaluation

QSD1

QSD1 W4 - Keypoint descriptors

Team	Method	map@1	Brief method description
Team6	method1	0,83	AKAZE + L1
Team4	method1	0,81	ORB + Hamming Norm
Team5	method1	0,77	ORB + Hamming Norm + RANSAC
Team2	method1	0,71	ORB + Hamming norm
Team3	method1	0,70	ORB descriptor + Flann matching
Team7	method1	0,69	ORB
Team1	method1	0,55	SIFT
Team8	method1	0,38	SIFT+Hog

QSD1 W4 - Previous week best method

Team	Method	map@1	Brief method description
Team6	method1	0,47	Daisy YCrCb, L1
Team4	method1	0,44	3D HSV + LBP + text
Team5	method1	0,58	3D lab Histogram + DCT
Team2	method1	0,31	3D Histogram + LBP
Team3	method1	0,37	LAB 3d + DTC
Team7	method1	0,38	3D Hist. + Text
Team1	method1	0,39	3D HSV + text + HOG
Team8	method1	0,18	HoG+Multi3D Histogram

W4 Homework

Query results evaluation

QST1

Team	method1	map@1
Team4	method1	0.803
Team2	method1	0.689
Team5	method1	0.656
Team7	method1	0.656
Team6	method1	0.607
Team8	method1	0.377
Team3	method1	0.164
Team1	method1	0.000

W4 Homework

Query results evaluation

QST1

None

Team	method1	map@1
Team4	method1	0.792
Team5	Method1	0.750
Team2	method1	0.708
Team6	method1	0.667
Team7	method1	0.625
Team8	method1	0.500
Team3	method1	0.208
Team1	method1	0.000

Noise

Team	method1	map@1
Team2	method1	0.846
Team4	method1	0.846
Team6	method1	0.846
Team5	Method1	0.538
Team7	method1	0.538
Team8	method1	0.308
Team3	method1	0.077
Team1	method1	0.000

Color changes

Team	method1	map@1
Team4	method1	0.792
Team7	method1	0.750
Team5	Method1	0.625
Team2	method1	0.583
Team6	method1	0.417
Team8	method1	0.292
Team3	method1	0.167
Team1	method1	0.000

W4 Homework

Query results evaluation

QST1

Text evaluation

Team	method1	Average dist	Total queries	Valid queries
Team1	method1	54,92	61	61
Team2	method1	11,07	61	60
Team3	method1	4,85	61	61
Team4	method1	4,65	61	60
Team5	Method1	9,81	61	59
Team6	method1	12,92	61	50
Team7	method1	8,63	61	60
Team8	method1	16,68	61	59

W5 Datasets

Museum datasets

- [Can Framis Museum]
- [Figueres 120 years expo]
- [Kode Bergen]

Query dataset (development with GT and test without GT)

- Original and paintings with
  - superimposed text on a semitransparent box (painter name, different fonts, sizes and positions)
  - noise (some random samples)
  - color changes (some random samples, random Hue changes)
  - the query set can contain images not in the database
  - **multiple queries (1, 2 or 3 paintings, horizontal or vertical)**
  - **paintings may be rotated**

- QSD1-W3 (30) / QST1-W5 (30)

W5 - Tasks

- Given the museum and the query dataset. For each image in the query dataset, retrieve the K most similar images in the Museum dataset, ordered by score

Task 1: remove background (optional), detect lines and crop images, rotate images if necessary

Task 2: For each query image, retrieve the k most similar images in the museum dataset ordered by score. Find correspondences using your best descriptors from previous weeks

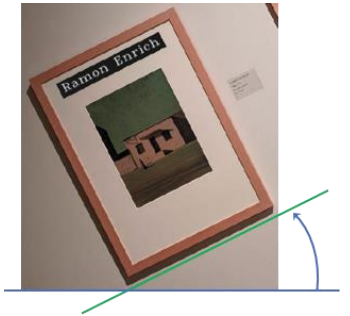
Task 3: Evaluate the system on QSD1-W5, map@k (k=1, k=5)

Task 4: Organize an exhibition of museum paintings: distribute paintings in rooms

W5 - Task 1

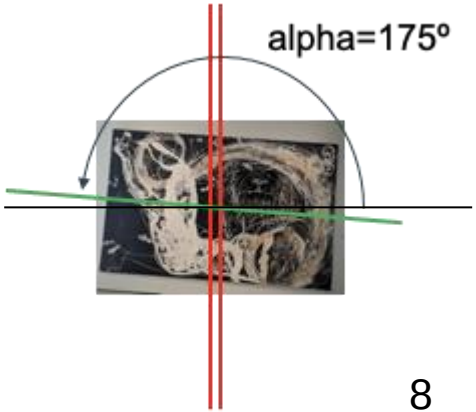
- Image crop and rotation
  - Detect painting frame (lines, Hough...)
  - Compute painting orientation. Rotate image if necessary
  - Compute bounding box of detected (and rotated) painting
  - Crop painting

- Estimated bbox coordinates and angle will be evaluated



alpha = 26º

Computing angle: take two lower corners of the rectangle, determine line between them, compute angle in degrees in the interval [0,180]



W5 - Task 2

- For each query image, retrieve the k most similar images in the museum dataset ordered by score.
- You can use any of the descriptors from previous weeks (keypoints and local descriptors, descriptors based in color, texture or text, or any combination)
- There may be query paintings without corresponding paintings in the museum dataset

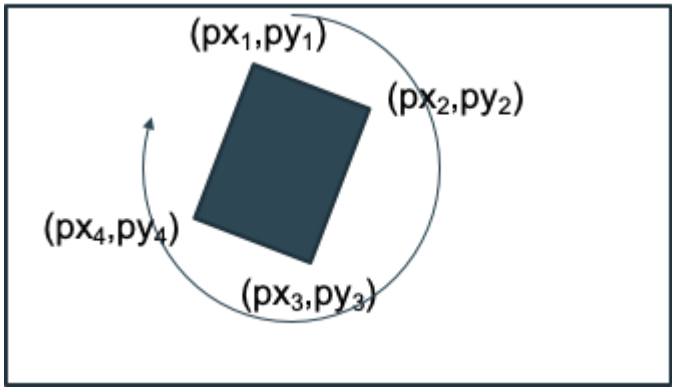
W5 - Task 3

Evaluate system on QSD1-W5:

- Return the top k images (highest score, lowest distance)
  - Evaluation with MAP@k (Mean Average precision at K)

- Return angle and coordinates of the frame bounding box for all the images in the query dataset
  - Evaluation: Mean IoU, Mean angular error
- $[[[alpha_1, [(px_1, py_1), (px_2, py_2), (px_3, py_3), (px_4, py_4)]_1], \ldots, [alpha_N, [(px_1, py_1), (px_2, py_2), (px_3, py_3), (px_4, py_4)]_N]], [[...], \ldots, [...]]]$ -> frames.pkl

The choice of the starting point is not important



W5 - Task 4

- You are the museum curator and you want to organize an exhibition with all pictures from the museum collection. There are 10 rooms.
- You need to cluster pictures (criterion to be defined) into 10 clusters, and select the 5 most representative pictures from each cluster. You can use **any procedure**.
- Criteria might be: dominant color, brightness, mood (sad / happy / crazy / zen pictures), ...
- **Subjective evaluation by classmates and teachers.**

W5 - Submissions

- For each query, a list of the K best results (K=10).
  - **[-1] if ima not in dataset**
  - Only best method!
- Return a list where, for each query image there is a list of lists with the angle and bbox of each painting in the query.

[[[$alpha_1$, [(px_1, py_1), (px_2, py_2), (px_3, py_3), (px_4, py_4)]$_1$], …, [$alpha_N$, [(px_1, py_1), (px_2, py_2), (px_3, py_3), (px_4, py_4)]$_N$]], [[...], …, [...]]]

Note: Deliver files to:
/home/dlcv0X/m1-results/week5/QST1/**method1**/result.pkl
/home/dlcv0X/m1-results/week5/QST1/**method1**/frames.pkl
/home/dlcv0X/m1-results/week5/QST1/**method1**/*.txt

- Clustering results presented in the week slides. Show the 5 most representative paintings for each room
- Tests sets will be delivered on Sunday 14 Nov 2021 at 10h
- Submit presentation slides
  - Deadline results: **Sunday** 14 Nov 2021 at 16:00
  - Deadline slides: **Sunday** 14 Nov 2021 at 18:00

W5 - Written report

- Deadline: 19/11/2021
- Templates:
  - Overleaf latex template for the report

    https://www.overleaf.com/latex/templates/preparation-of-papers-for-ieee-sponsored-conferences-and-symposia/zfnqfzzzxghk

- The paper should be between four and five pages (2 columns) including tables, images and references, and should summarize the work and results of your project

- You are free to decide how to organize and structure the document (week by week or in any other order). Please, remember to include also a discussion of results, findings, and conclusions.

W5 - Oral presentation guidelines

- 10 minutes to present (all team members must participate)
- 5 minutes for Q&A (from any team and professors)

- Prepare effective display:
  - include team ID and members' names to help assessment
  - keep it simple / readable / don't fill up the slide / number pages

- Presentation:
  - adapt the speech to the audience (they know the problem)
  - look at the audience
  - speak slowly, clearly and loudly
  - time your talk: do not rush
  - **practice, practice, practice**
  - prepare possible questions

W5 Homework

W5 Query results evaluation

Team	Method1	map@1	MAE	mIoU	MTD
Team4	method1	**0.859**	2.376	0.813	3,42
Team7	method1	0.734	2.298	0.900	5,66
Team2	method1	0.578	3.541	0.586	
Team1	method1	0.562	2.584	0.852	7,41
Team6	method1	0.531	**2.262**	0.588	9,26
Team8	method1	0.531	84.147	0.398	6,84
Team5	method1	0.516	49.264	**0.907**	6,79
Team3	method1	0.344	4.886	0.853	**3,31**

MAE = Mean Angular Error
mIoU = Mean IoU
MTD: Mean Text Distance