Master in Computer Vision Barcelona

Project Module 1

Content based image retrieval

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Week 3

W2 - Homework

Query results evaluation

QST1 (Simple)

Team	Method	map@1	map@5
Team5	method1	0.833	0.833
Team5	method2	0.833	0.833
Team2	method1	0.800	0.836
Team7	method1	0.800	0.828
Team7	method2	0.800	0.833
Team2	method2	0.767	0.809
Team6	method1	0.767	0.811
Team1	method1	0.733	0.775
Team6	method2	0.733	0.772
Team3	method2	0.667	0.667
Team3	method1	0.633	0.633
Team4	method1	0.600	0.600
Team4	method2	0.600	0.600
Team8	method1	0.000	0.000

W2 - Homework

Text boxes evaluation
(window based)

QST1 (Simple)

Team	Method	TB Precision	TP Recall	TB F1	TB mIoU (TPs)
Team4	method1	0.97	0.97	0.97	0.80
Team4	method2	0.97	0.97	0.97	0.80
Team3	method1	0.90	0.90	0.90	0.69
Team3	method2	0.90	0.90	0.90	0.69
Team7	method1	0.83	0.83	0.83	0.76
Team7	method2	0.83	0.83	0.83	0.76
Team2	method1	0.80	0.80	0.80	0.76
Team2	method2	0.80	0.80	0.80	0.76
Team1	method1	0.70	0.70	0.70	0.87
Team6	method1	0.70	0.70	0.70	0.79
Team6	method2	0.70	0.70	0.70	0.79
Team8	method1	0.43	0.43	0.43	0.70
Team5	method1	0.00	0.00	0.00	0.00
Team5	method2	0.00	0.00	0.00	0.00

W2 - Homework

Query results evaluation

QST2 (Complex)

Team	Method	map@1	map@5
Team3	method1	0.590	0.598
Team7	method2	0.590	0.611
Team7	method1	0.538	0.571
Team3	method2	0.513	0.585
Team4	method1	0.462	0.462
Team6	method1	0.462	0.491
Team6	method2	0.462	0.500
Team5	method1	0.385	0.425
Team2	method1	0.359	0.405
Team1	method1	0.333	0.405
Team2	method2	0.256	0.328
Team4	method2	0.205	0.205
Team8	method21	0.026	--

W2 - Homework

Background removal evaluation (pixel based)

Team	Method	Mask Precision	Mask Recall	Mask F1
Team1	method1	0.97	0.99	0.98
Team2	method1	0.95	0.98	0.97
Team2	method2	0.95	0.98	0.97
Team5	method1	0.96	0.99	0.97
Team3	method1	0.93	0.99	0.96
Team3	method2	0.93	0.99	0.96
Team6	method1	0.92	0.99	0.95
Team6	method2	0.92	0.99	0.95
Team7	method1	0.96	0.93	0.94
Team7	method2	0.96	0.93	0.94
Team4	method1	0.96	0.74	0.84
Team4	method2	0.96	0.74	0.84
Team8	method2	0.79	1.00	0.88

QST2 (Complex)

W2 - Homework

Text boxes evaluation
(window based)

QST2 (Complex)

Team	Method	TB Precision	TP Recall	TB F1	TB mIoU
Team7	method1	0.70	0.67	0.68	0.73
Team7	method2	0.70	0.67	0.68	0.73
Team4	method1	0.77	0.59	0.67	0.77
Team4	method2	0.77	0.59	0.67	0.77
Team2	method1	0.48	0.51	0.49	0.75
Team2	method2	0.48	0.51	0.49	0.75
Team6	method1	0.27	0.21	0.23	0.83
Team6	method2	0.27	0.21	0.23	0.83
Team1	method1	0.00	0.00	0.00	0.00
Team3	method1	0.00	0.00	0.00	0.00
Team3	method2	0.00	0.00	0.00	0.00
Team8	method2	0.33	0.51	0.40	0.72

Week3 Datasets

Museum datasets

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

  original and paintings with
  - superimposed text on a **semitransparent** box (painter name, different fonts, sizes and positions)
  - noise (random samples)
  - color changes (random samples, random Hue changes)

Query datasets (development with GT and test without GT)

- QSD1-W3 (30) / QST1-W3 (50) cropped pictures with overlapping text (name of painter), one painting per image, some paintings with noise, some paintings with changes in color

- QSD2-W3 (30) / QST2-W3 (30) pictures with background and text and in some cases more than one picture per image, some paintings with noise, some paintings with changes in color

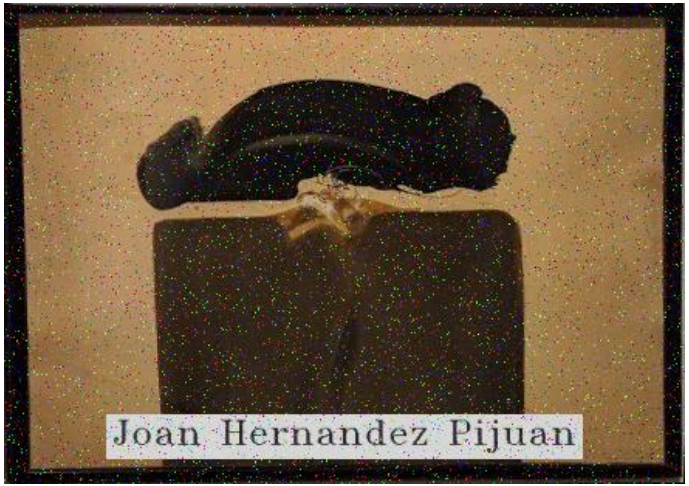
Week3 Datasets

Examples of W3 query set images:

Example of color change:

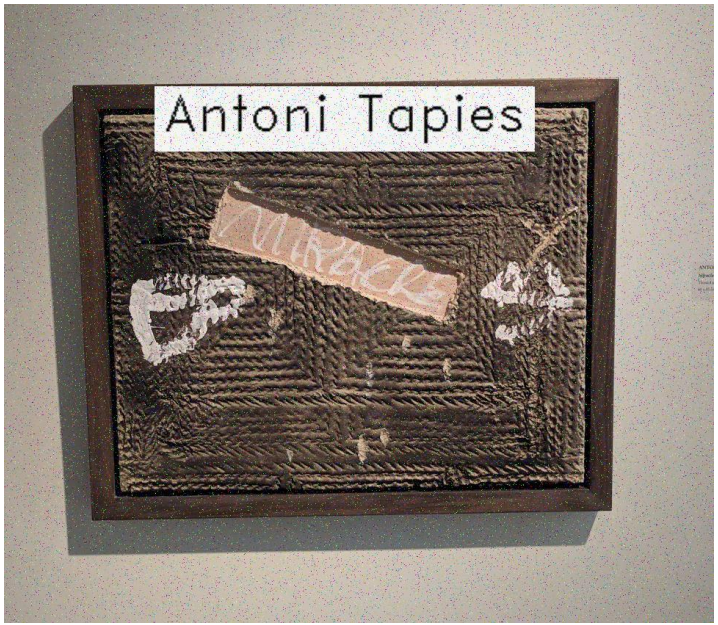
Original Changed

Example of image with noise:



W3 - Task1

- Filter noise with linear or non-linear filters
  - unknown noise model
  - only some images are noisy



W3 - Task2

- On denoised images, detect box with overlapping text, (binarize) and apply OCR to get the text

```
import pytesseract
extractedInformation = pytesseract.image_to_string(ima)
```

- Test query system using QSD1-W2 **using only text** and a similarity metric to compare text (ambiguity: several paintings by the same painter)
  - Text comparison metrics: (Levenshtein, others) https://www.kdnuggets.com/2019/01/comparison-text-distance-metrics.html
    https://pypi.org/project/textdistance/

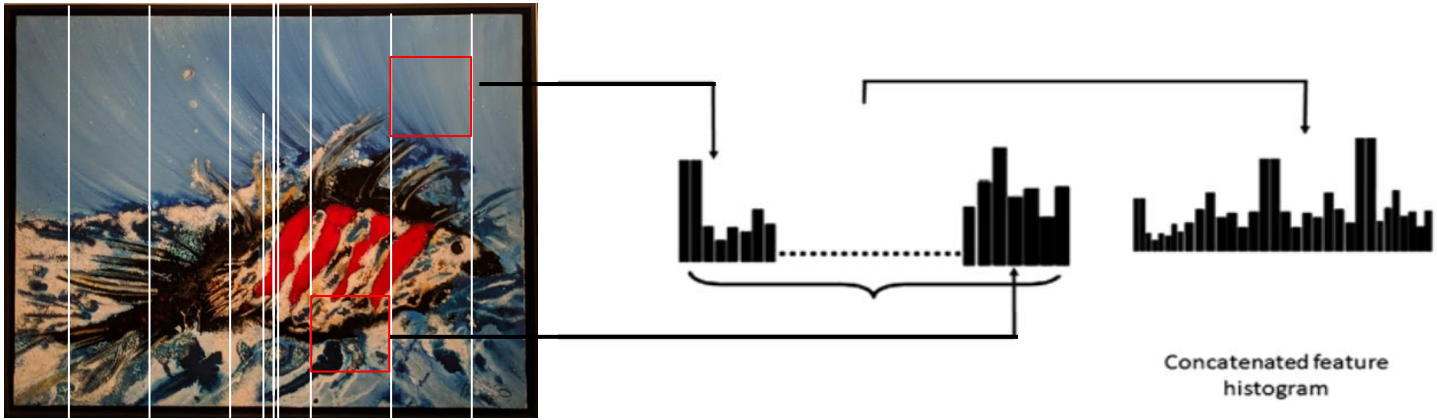
- Test retrieval **using only color** descriptors (**best** from week2)

W3 - Task3

- Implement texture descriptors (LBP, DCT, wavelet-based, etc.)
- Test query system using QSD1-W2 **using only texture** descriptors

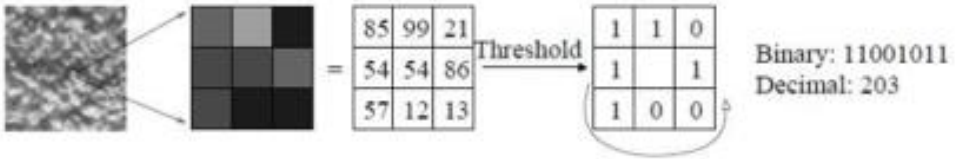
W3 - Task3

- Texture descriptor: Histo-LBP, DCT2D, others (HOG, etc.)

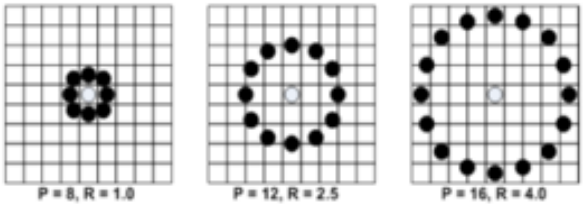


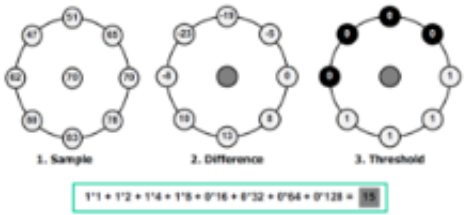
W3 - Task3

- LBP (Local Binary Pattern) descriptor
  - Divide image into blocks, for each pixel in the block compare to its 8 neighbors



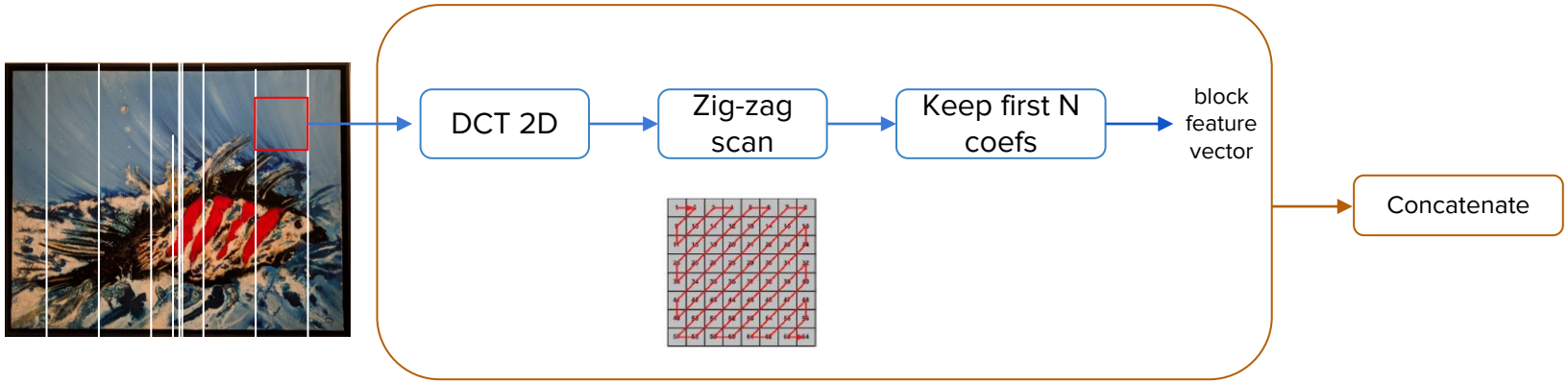
  - If the center pixel's value is greater than the neighbor's value, write 0, otherwise, write 1. The result is a 8-digit binary number. Compute histogram, over the block, of the frequency of each number
  - **Multiscale LBP:** different local neighborhoods. Bilineal interpolation is performed for points which are not centered on pixel





W3 - Task3

DCT descriptor:



W3 - Task4

- Combine descriptors
  - Test retrieval on QSD1-W3 using **all combinations** of descriptors (text + color, text + texture, texture + color, text + color + texture), you can try different contributions of each

- Include **in report slides** results for QSD1-W3:
  - using only text, only color, only texture (just one descriptor), best combination of two or three descriptors [4 methods]

W3 - Task5

- Repeat the previous analysis for QSD2-W2: ~~remove noise~~, remove background, find 1 or 2 paintings per image, return correspondences for each painting. **Only retrieval is evaluated**
  - use combinations of text, texture and color descriptors

- Include **in report slides** results for QSD2-W2:
  - using the best combination of two or three

W3 - Submissions

- For each query test (QST1-W3 (50), QST2-W3 (30)) a list of the K best results (K=10).
  - Only best method (only one for each test set)!
- For each query image, a text file with the text transcription (one line for each painting)

Note: Delive pkl files to:
/home/dlcv0X/m1-results/week3/QST1/**method1**/result.pkl
/home/dlcv0X/m1-results/week3/QST1/**method1**/text_boxes.pkl
/home/dlcv0X/m1-results/week3/QST1/**method1**/*.txt
...
/home/dlcv0X/m1-results/week3/QST2/**method1**/result.pkl
/home/dlcv0X/m1-results/week3/QST2/**method1**/text_boxes.pkl
/home/dlcv0X/m1-results/week3/QST2/**method1**/*.txt

- Tests sets delivered on Monday 01 Nov 2021 at 10h
- Submit progress slides
  - Deadline slides: Monday 01 Nov 2021 at 14:00
  - Deadline results: Monday 01 Nov 2021 14:00
  - Deadline questions to teams: Tuesday 02 Nov 2021 at 14:00