MLRF Lecture 05

J. Chazalon, LRDE/EPITA, 2019

Agenda for lecture 5

1. Introduction
2. Image classification overview
3. Some classifiers - part 1
4. Classifier evaluation

Introduction

Lecture 05 part 01

Previously, in MLRF…

Summary of last lecture

Local feature detectors

- Harris-Stephens: local curvature of the intensity surface of the image
- FAST: binary tests
- LoG, DoG, HoG: scale-space
- MSER: stable region over thresholds
- Edge / Corner / Blob detectors

Local feature descriptors

- A signature for an image area
- HoG: gradients
- BRIEF: binary tests
- SIFT and ORB pipelines
- Invariance to rotation, scale, …

Content-based image retrieval

- Two strategies: keep all local descriptors for all images vs 1 descriptor per image
- Bag of Visual Words pipeline
  - Quantization in particular

Evaluation of image retrieval systems

- Precision
- Recall
- F-Measure
- mAP

Debriefing of practice session 4

Content

Bag of Visual Words search engine

1. Sample some descriptors for codebook learning
2. Learn normalisation parameters for descriptors (mean and eigenvectors)
3. Use k-Means to learn a codebook
4. Compute the BoVW vector for each image
5. Setup a nearest neighbors search structure
6. Evaluate our approach using mean average precision
7. Display some results
8. Compute the best results for the test queries
9. Export the results for the test queries (and submit them for grading).

Discussion

- Who completed part 1? 2? …
- Did everyone submitted their results?
  - results.json
  - notebook.ipynb
- Any remarks, comments, questions?
- Things to keep, change, remove?

Practice session 4: Take home messages

BoVW

- Usually requires some **preprocessing** of the descriptors: centering, rotation, dimensionality reduction
- Is based on a **quantization step** (assign descriptors to clusters)
- Is **just a histogram**, like the color histogram of session 2

Best practices

- Test arrays shapes and types as soon as possible
- Make a small change, test, fix, test, validate, repeat

Next practice session

Next practice session

Implement a simple **image classifier.**

Will be graded.

Submission due by Monday, **June 10th** (23:59) on moodle.cri.epita.fr.

Next practice session: based on BoVW

Idea: we (humans) are fooled by

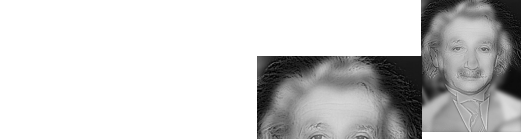
1. The global appearance of each image
2. Mixed image categories

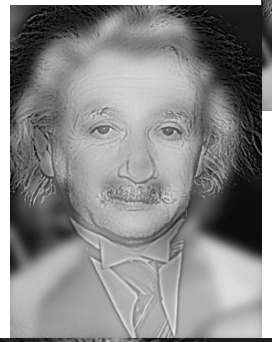
But with a BoVW approach we will:

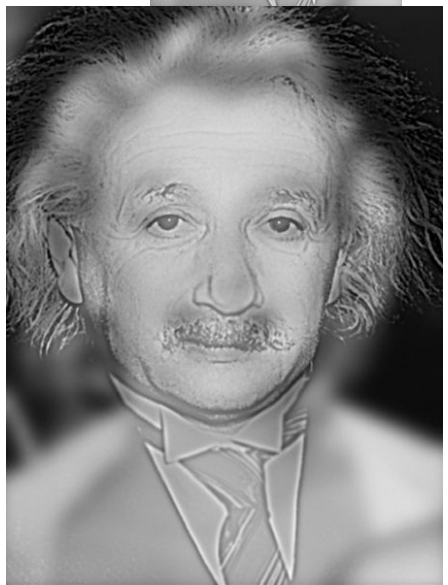
1. Focus on local textures: fur vs batter
2. Analyse each image separately

How?

- Compute descriptors at several scale
- Compute a BoVW for each image
- Train a classifier to identify discriminative features







Next practice session: steps

You already did most of them during last session.

1. **Load resources**
2. **Train a BoVW model**
3. Split the dataset into training and validation sets
4. **Compute the BoVW descriptor for each image**
5. Prepare training structures
6. Train a classifier and evaluate its performance
7. **Display some results**
8. Test on meme images
9. **Compute the results on the test set and export them**

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Training and evaluating a classifier is so easy with scikit-learn!