**MIRCV questions:**

13.01.2021

**Gennaro:**

- vector space model
- text surrogate

**Falchi:**

- local detectors: an introduction, harris, does harris compute the eigenvalues?
- features matching (every step to match 2 images)( filtering for binary and not binary descriptors, ransac for transformation, evaluation metrics. example of the shampoo logo seen at lesson)
- semantic segmentation, object detection
- Tell me about the detectors of features….
- o Cascade classifier for face recognition
- ▪ False positives and false negatives (do you have several? Why?)
- • Deep learning in general, when we need it and when only
- Representation learning? (seen in class!)
- o The features in which learning algorithm are classified?
- o The use of features extracted from a level of machine learning, at which level
- are they classified? (also seen in class → I think it was the last level)
- o Algorithm to be used for the aggregation of local features
- ▪ Where do the features come from? What is that algorithm called?
- • Convolutional network in deep learning, what is convolution? the filters inside it
- layer (relative to a single window?) How big are they?
- •
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**Amato:**

- PP index
- MI file
- M tree
- M tree knn search

29.01.2021

**Amato:**

- object-pivot
- pivot-filtering
- AESA
- LSH
- PSR

**Falchi:**

- Segmentation vs Object Detection, Deep learning methods to implement them
- Transfer Learning

**Gennaro:**

- Precision, Recall, Accuracy, MAP, Average Precision
- How to use Lucene with Permutations

# ORAL: 3 questions, one to the teacher

## Amato - What is the index used in the project for - How can you do clustering? k-means - How many pivots do you use in the project - The Mi FIle optimizations - D-Indexing - PP index - Metric inverted file (MI-file), optimization - Fat Factor ---------- ---------- ---------- ---------- 10: 10 We have seen various indexes, one of the last was "metrix inverted file index": can you tell me about it? Is the posting list sorted by ..? That is, on the basis of what do we access the objects? (based on the position of the pivots) This "metrix inverted file index" is an approximate index, with performance close to 30%: there is a trick to improve, what is it? (they reach more than 90%) 10:20 "permutation prefix index" (PPI): how does it work? Building the Tree Can you explain the sorting part of the dataset 10:45 M-Tree? split algorithm kNN search 11:12 Approximate similarity search applied to M-trees:

-LSH index made on main or secondary memory? (Project) -Vantage Point -Vantage Point Forest

-LSH index: Buckets stored on disk? (Project) -How would create an LSH index -What involves the variation of the parameters g or h

-LSH: how are buckets implemented? (Project) -What structure would you use to make the buckets? - What other hashing-based indices have we seen? -D-Index

-LSH: how are buckets made? where to store them? RAM or disk? (Project) -ESA / EASA indices

-D-Index and hashing-based indexes -Cost (in terms of disk accesses) of an index insert (D-Index) -Index search algorithm (D-Index)

-PP-Index: how the search algorithm was created (Project) -PP-Index index construction - PP-Index optimization -Similarities / Differences with respect to hashing-based indices

-LSH: How did you perform the index search (Project) -PP-Index -Vantage Point Tree

## Falchi - Local features detector what are they for - Feature matching, what can I do with the features already extracted? We need a distance metric. - Geometric transformation (Hamming distance, Euclidean distance, cos). In the sift we use 2 NN, because how is it done? - RANSAC - Inlier outlier what is meant - Transformations: Homography, roto-translation, affine - Methods of aggregation of local features BOW, VLAD, F.V. - Number of words used for VLAD is comparable with BOW (used numbers that k uses kmeans = 1000 with BOW with VLAD less) - Table feature same not same VLAD BOW F.V. - Generative Models, variational autoencoders, what part is important works well between the discriminator and the generative block - Convolutional Neural Network ---------- ---------- ---------- ---------- 1) local features, matching between local features and various distances 2) convolutional NN (pooling, conv-layer, stride) 3) detection and segmentation, object detection (RNN, fastRNN, fasterRNN) 4) transfer learning, domain adaptation 5) detection of local features (blob, corner and a third)

6) features matching, overlapping 7) aggregation of local features (Bag of words, vlad, and a third)

1. Detection and segmentation - approach that doesn't work - fully convolutional NN - transpose convolution - RCNN, fastRCNN, ... 2. How to detect local features - types of regions (flat, corner, ...) - Harris and the index R to not calculate the eigenvalues - Surf and sift 3. How to match the local features after the extraction phase - hamming distance to compute the distance - binary descriptor & NON binary descriptor

## Gennaro - Elastic search SRT - Evaluation of a classifier through confusion matrix - Audio Retrieval (done to a complete oral (without project)) - Boolean Retrieval, merge algorithm for and retrieval - How do you evaluate information retrieval system? ---------- ---------- ---------- ---------- 1) boolean retrieval: what is the merge algorithm, what is it for -> AND between two far terms
and contextualization, what is it for in general, what is the goal of this algorithm we imagine that they are sets: what kind of set operation are we doing? -> INTERSECTION if the lists are not ordered what complexity do we have? What algorithm should I apply (stupid) -> POLYNOMIAL complexity; I order the docId and I have complexity N (linear) 2) When we talked about the cosine similarity with vector model (tf-idf ..), we saw two algorithms: the merge alg. remember one of the two, which one? And what about the other one? 3) What are positional indexes and what are they for 4) Precision and recall 5) approximate search neighbors: starting from permutations, how do you get to this approach? types of index? pp-index, inverted-file surrogate (text representation), what is the goal? Compared to the mi-file technique, what have I optimized (big practical advantage)? 6) Do you remember anything about the audio retrieval? 7) Permutations for the approximate search neighbors How the mi-file works 8) Technique used by Shazam for the audio retrieval 9) Difference between boolean retrieval & vector space model 10) What is document frequency and the inverse doc.freq.