

Digital Content Retrieval – 6 credits (a.y. 23-24)

1) In a database of a professional photographer there are 11,000 digital photos. They are partitioned into the following classes:

Pictures of Interior: 2000 images

Natural landscape photos: 2500 images

Portraits and faces: 1500 images

Animals: 4500

Pictures of cars: 500



You make a query-by-example search submitting to the search engine the picture on the left:

The query returns the following photos: a “Ferrari” car, a dog, a cat, a mouse, a picture of the river Ticino, 10 passport photos, 5 photos of interiors. Calculate Precision and Recall of the query in question.

If the output of the query should be:

a “Ferrari” car, a dog, a cat, a mouse, a picture of the river Ticino, 10 passport photos, 4 photos of interiors, a photo of a cat on a sofa near the Christmas tree. Is it possible to compute Precision and Recall in this case? If so, make the computation, otherwise motivate the answer.

2) List the advantages of using wavelet transform with respect to the cosine transform in compression of still images of a multimedia repository of images.

Mark the exact answers (one or more than one is possible)

3) The standard JPEG 2000 is based:

- On predictive coding
- On the Wavelet transform
- The cosine transform
- On encryption

4) In the biometric recognition of the iris the Hamming distance is used to:

- Pull out the position of the pupil
- Calculate the difference between features extracted from the iris
- Take only the comparison inter-class
- Take only the intra-class comparison

5) In the compression of still images, the entropy of the image is:

- the minimum number of bits / pixel reachable by a lossy compression algorithm
- the maximum number of bits / pixel reachable by a lossy compression algorithm
- the minimum number of bits / pixel reachable by a lossless compression algorithm

- the maximum number of bits / pixel reachable by a lossless compression algorithm

6) Please, list at least 3 names of metrics for image quality evaluation

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7) JPEG2000 is not useful for:

- Compression of naturalistic images
- Compression of videos
- Compression of images of faces
- None of the previous ones

8) Which are the three paradigms of search by content in a multimedia database? List them with a brief explanation:

9) In a watermarking scheme for copyright protection in an image database:

- The watermark is always the same for all the images
- The watermark is provided by the user in run time during a query
- The watermark is a public key
- None of the previous ones

10) Draw the scheme of a one level Wavelet decomposition as filter banks.

11) Which is the difference between the orthogonal and the biorthogonal Wavelets