

## *PIV - Image and Video Processing*

Lab sessions

Prog. – 1

Content Based Image Retrieval (CBIR)

*Image and Video Processing Group*



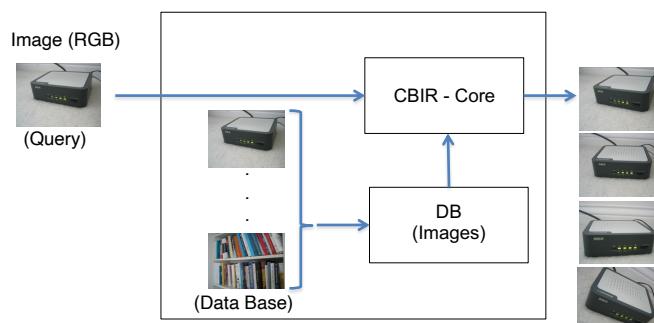
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## System

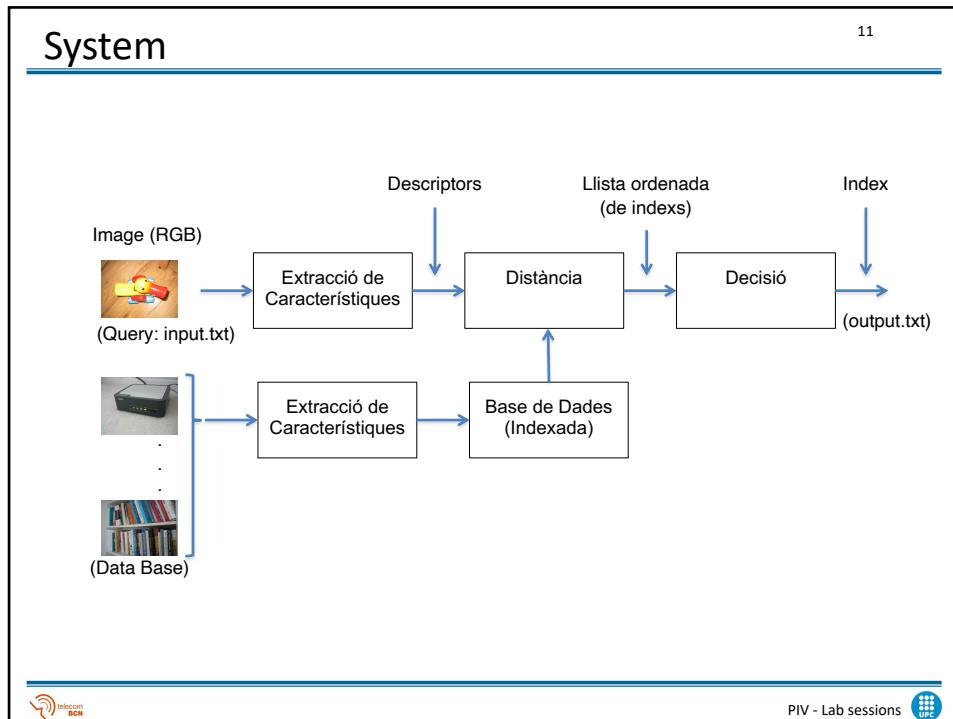
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CBIR (Content Based Image Retrieval) - System



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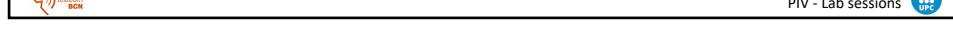
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## Prog 1 & 2 - Content Based Image Retrieval (CBIR)

- Target: to retrieve images from a database (DB) similar to a given image (*query*)
- “Similar”
  - Similarity based on visual features: color, shape...
  - Take for example “color”
    - How to characterize “color”?
    - How to measure “color similarity”?
- CBIR steps:
  - Indexing the DB: generate descriptors (e.g. histograms) for all images (this can be done offline)
  - QUERY → Extract features from *query* (compute histogram)
  - RETRIEVAL → Compute distances from *query* features to each DB image, and then order DB images by computed distance



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## Example

### U.Kentucky DB

- 2000 images, 500 objects/scenes x 4views each

Objects



Scenes



### Evaluation metrics:

- Precision → how many “hits” in  $N$  retrieved images
- Recall → how many “hits” of all possible (ground truth labeling)



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## Precision-Recall

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Query



Images (1-4):



Images (5-8):



Images (9-10):



N	1	2	3	4	5	6	7	8	9	10
Aciertos	1	2	2	3	3	3	3	3	3	3
Precision	1	1	0,67	0,75	0,6	0,5	0,43	0,38	0,33	0,3

Aciertos/N

N	1	2	3	4	5	6	7	8	9	10
Aciertos	1	2	2	3	3	3	3	3	3	3
Recall	0,25	0,5	0,5	0,75	0,75	0,75	0,75	0,75	0,75	0,75

Aciertos/4



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## Results

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Query 1	1	2	3	4	5	6	7	8	9	10
Precision	1	1	0,67	0,75	0,6	0,5	0,43	0,38	0,33	0,3
Recall	0,25	0,5	0,5	0,75	0,75	0,75	0,75	0,75	0,75	0,75

Query 2	1	2	3	4	5	6	7	8	9	10
Precision	1	0,5	0,33	0,25	0,2	0,33	0,29	0,25	0,22	0,2
Recall	0,25	0,25	0,25	0,25	0,75	0,75	0,75	0,75	0,75	0,75

●  
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Mitjana	1	2	3	4	5	6	7	8	9	10
Precision	1	0,69	0,54	0,44	0,37	0,32	0,29	0,27	0,23	0,21
Recall	0,25	0,34	0,40	0,44	0,46	0,49	0,51	0,51	0,52	0,53

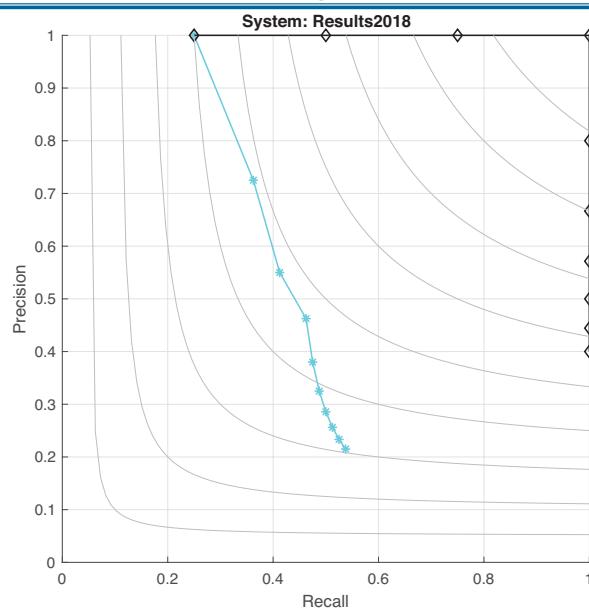


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## Results evaluation - Prog1

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