Indexing big colored image bank : Texture 3.0

Etienne CAILLAUD, Thomas LE BRIS, Ibrahima GUEYE, Gaetan ADIER

XLIM-SIC Laboratory UMR CNRS 7252, Poitiers, France

Outline

Image Indexing

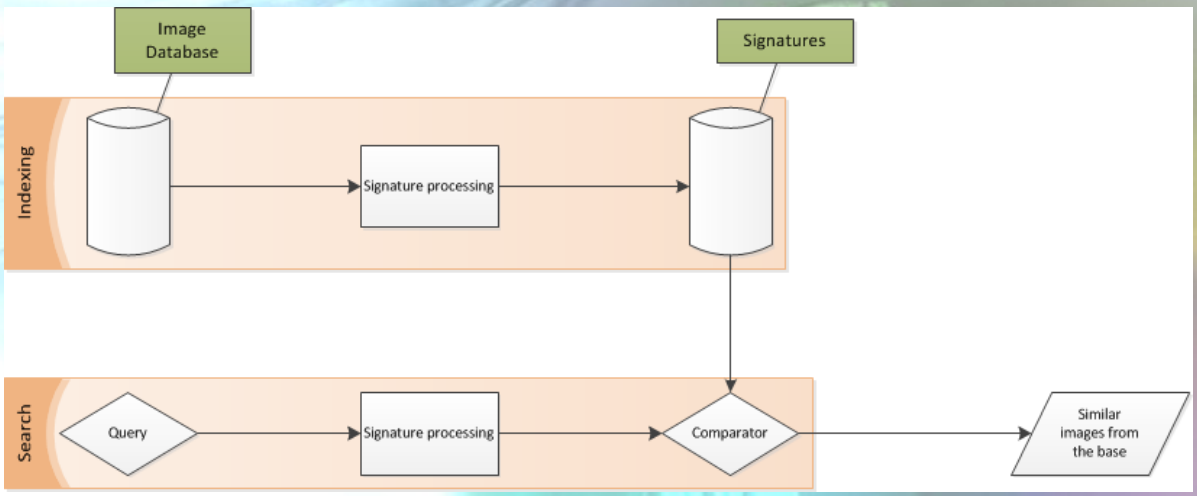


FIGURE: Online image indexing

Descriptor

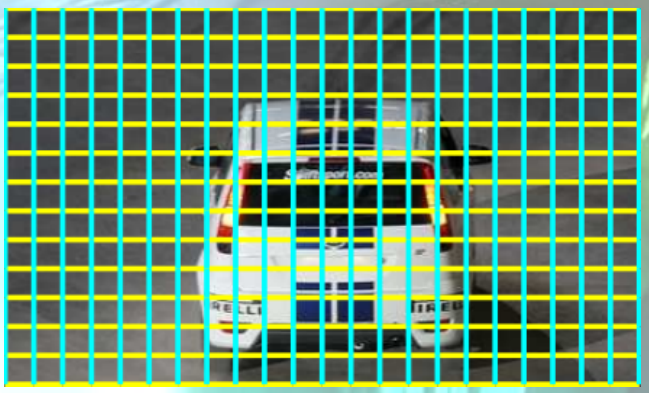


FIGURE: Dense grid keypoints

Descriptor

FIGURE: Points of interest keypoints

Outline

Deadlines

XLIM-SIC Laboratory of University of Poitiers

- Noel Richard (Researcher in Color images) : Supervisor
- David Helbert (Researcher in Signal-Image-Communications) : Supervisor
- Thierry Urruty (Researcher in Color images) : Customer

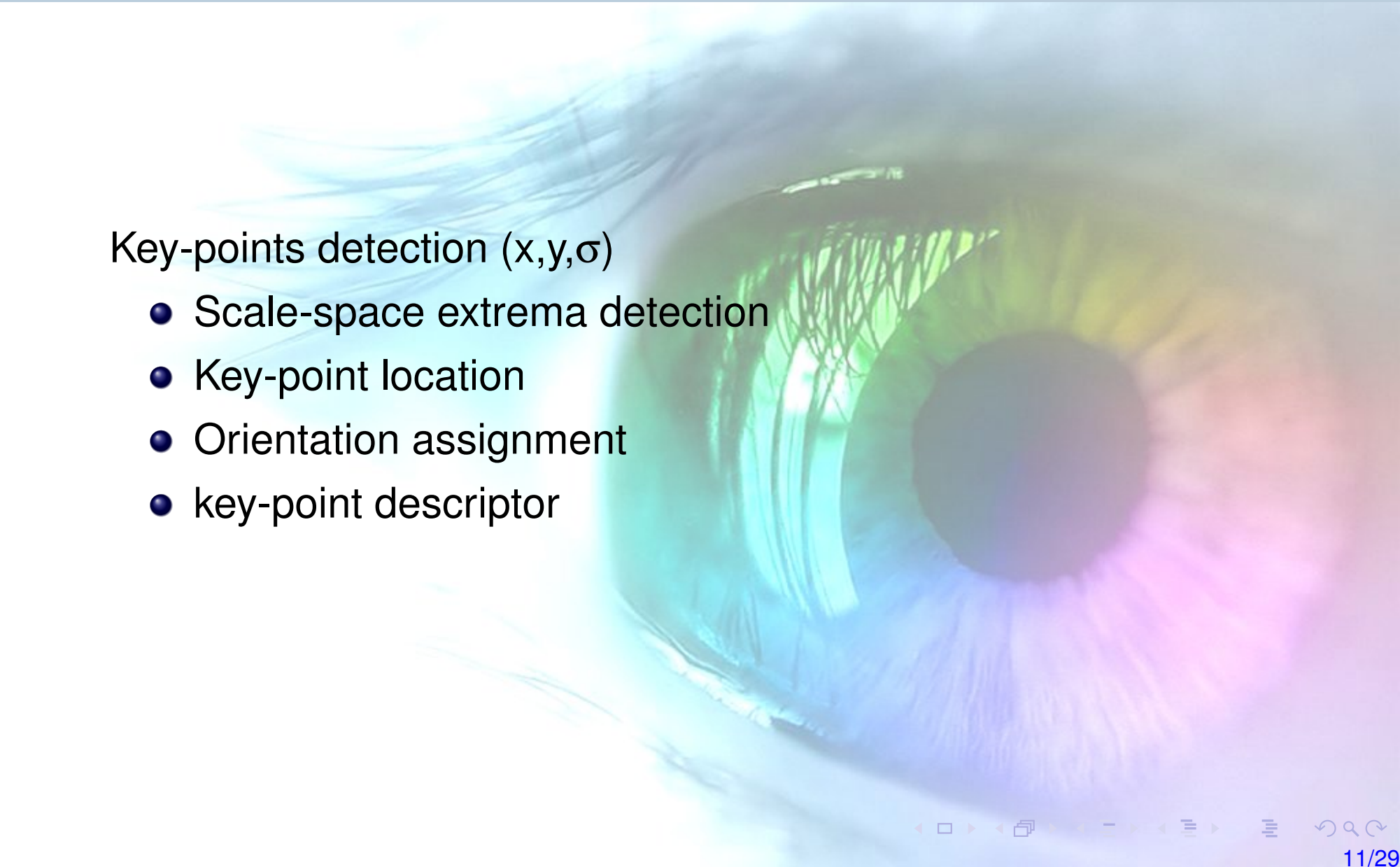
Outline

Software

- Design software programs :
  indexation of images database,calculate descriptor according to nature images
- Adapt the last up to date designed color and texture attributes to the current image classification
- Compare our results (using CLEF challenge metrics)
- Provide an abstract of the comparisons and a technical report

Outline

SIFT(Scale-Invariant Feature Transform)



Key-points detection (x,y,σ)

- Scale-space extrema detection
- Key-point location
- Orientation assignment
- key-point descriptor

SIFT(Scale-Invariant Feature Transform)

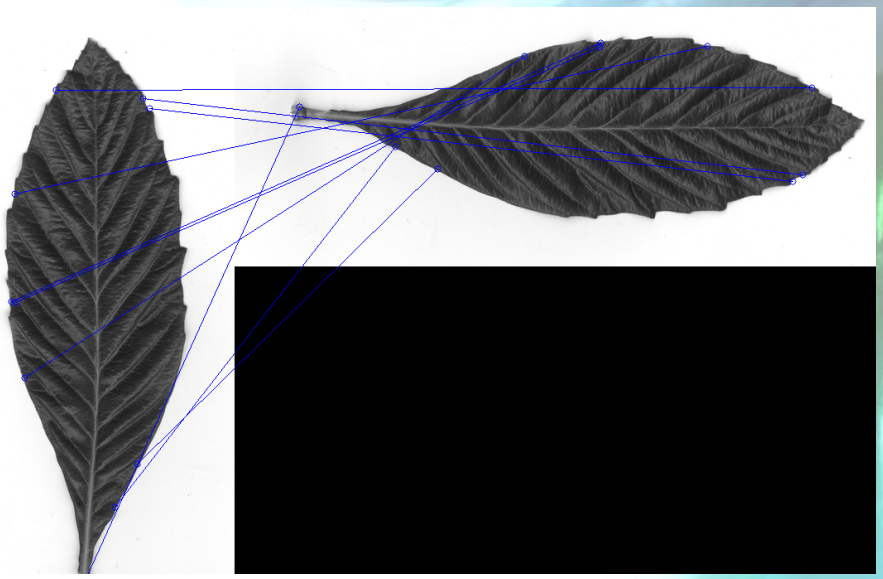


FIGURE: SIFT test1

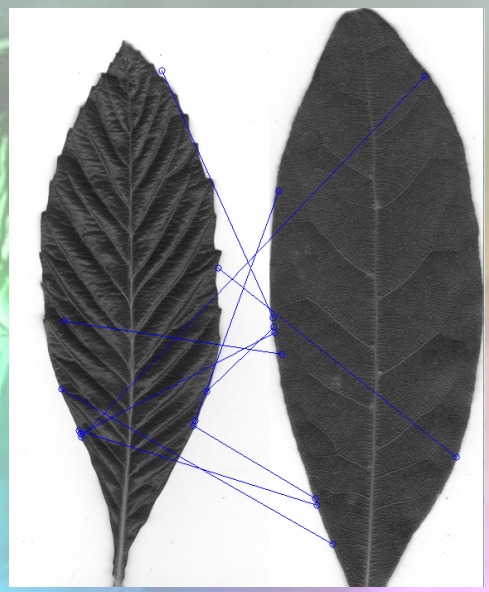


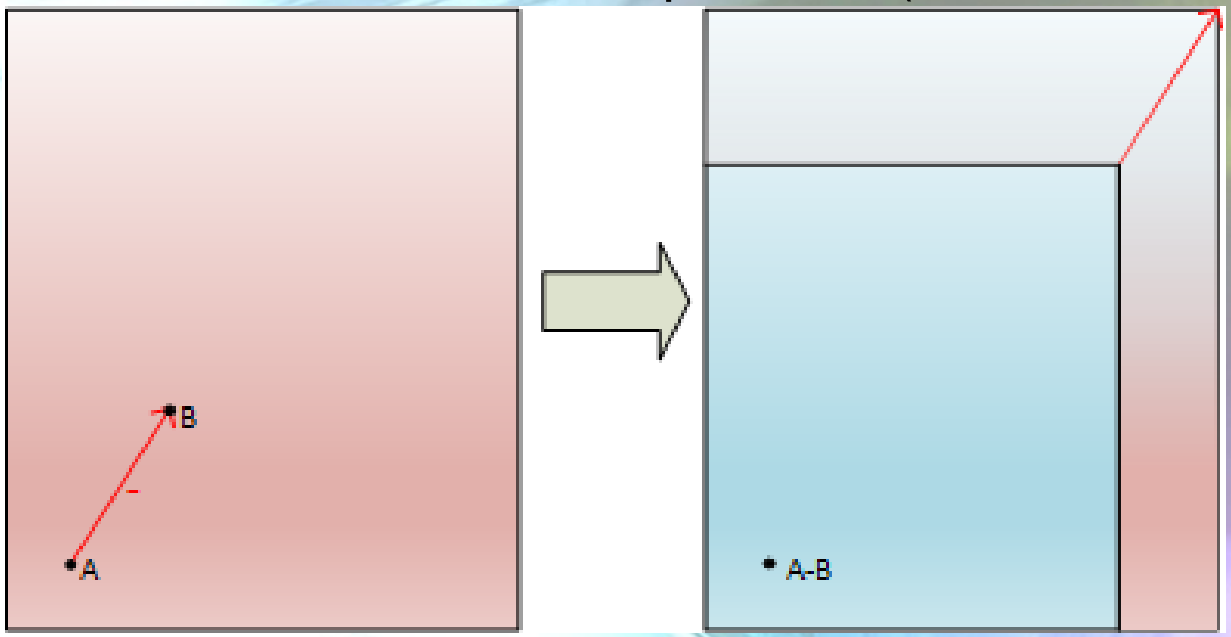
FIGURE: SIFT test2

C_2O(1/3)

- The C_2O matrix
  - Conversion to $L^*a^*b^*$ space
  - C_2O matrix calculation.
  - C_2O signature extraction.

$C_2O(2/3)$

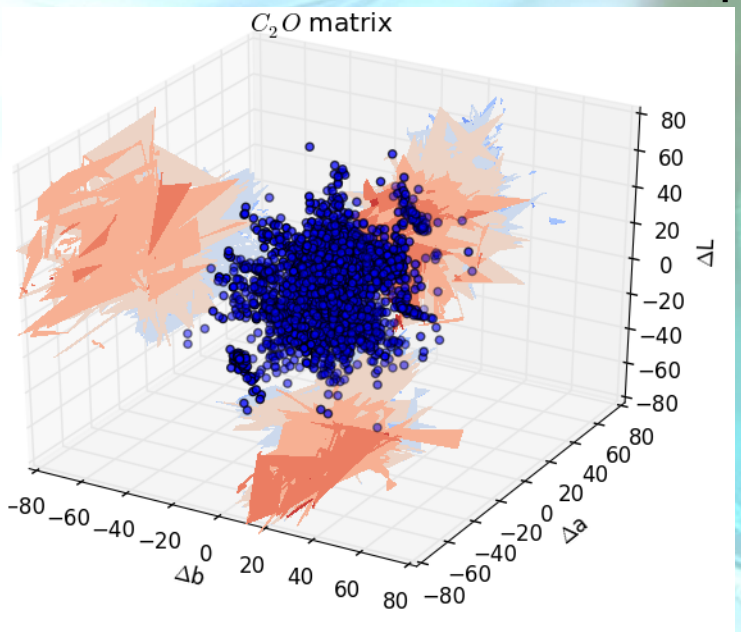
- The C_2O matrix
  - The color difference computation (in the $L^*a^*b^*$ space).



C_2O(2/3)

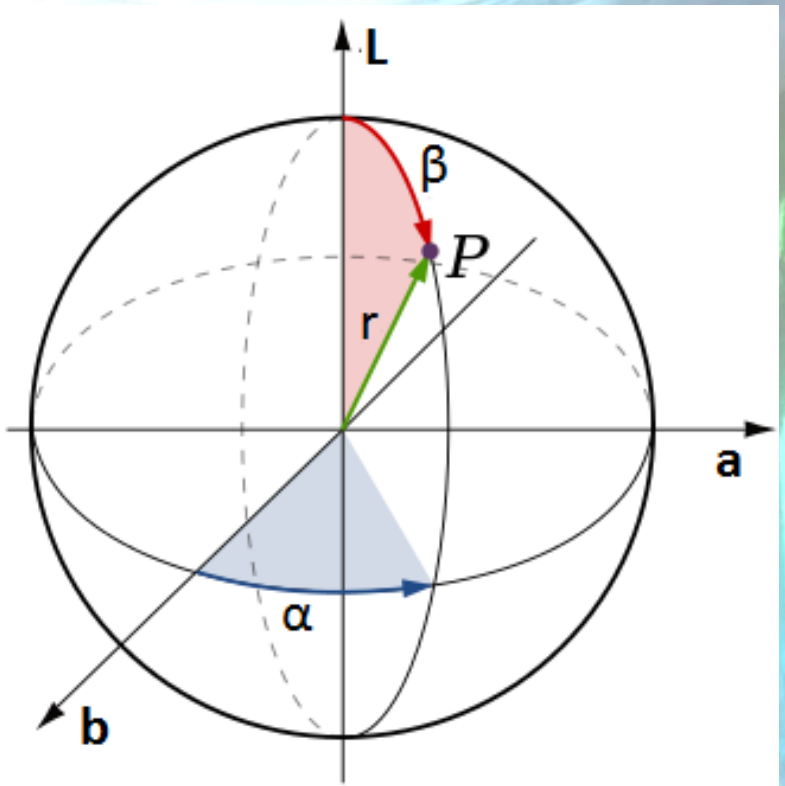
- The C_2O matrix

  - The color difference computation (in the $L^*a^*b^*$ space).
  - The C_2O matrix in a 3-D repository.



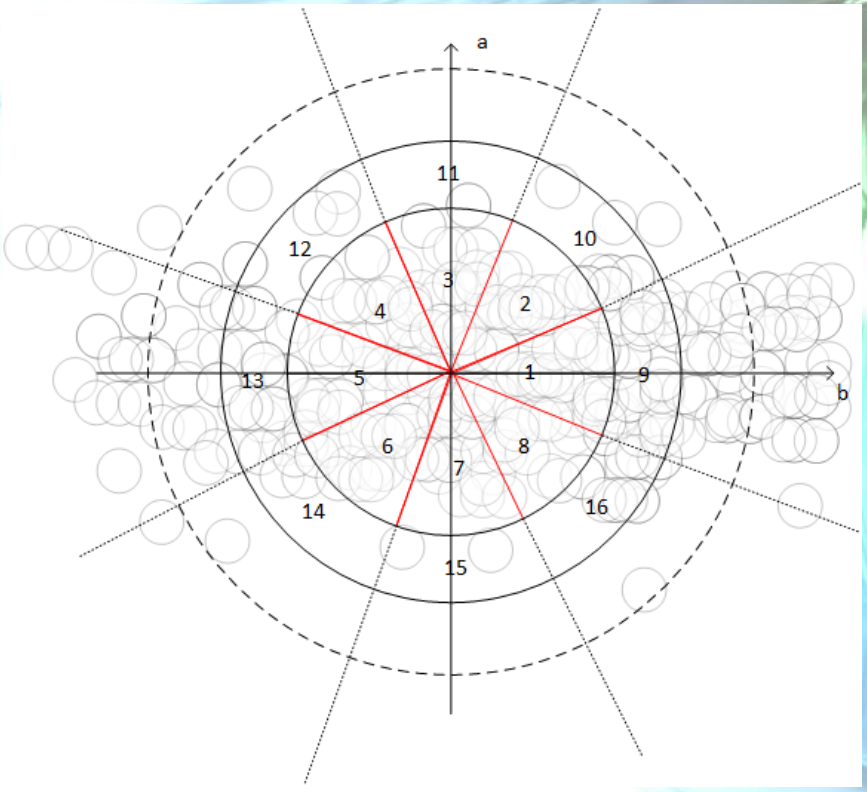
$C_2O(3/3)$

- The C_2O feature extraction
  - Spherical from cartesian repository.



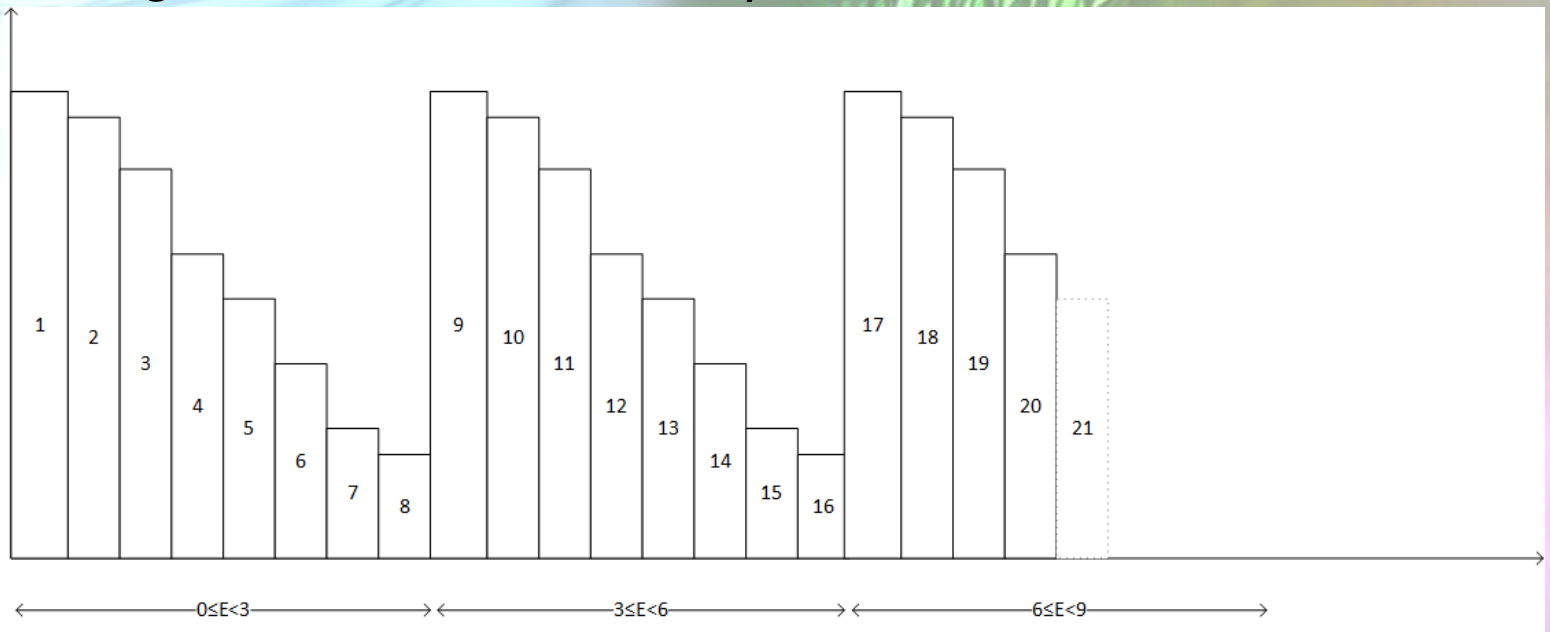
C_2O(3/3)

- The C_2O feature extraction
  - Spherical from cartesian repository.
  - Quantization for one β interval.



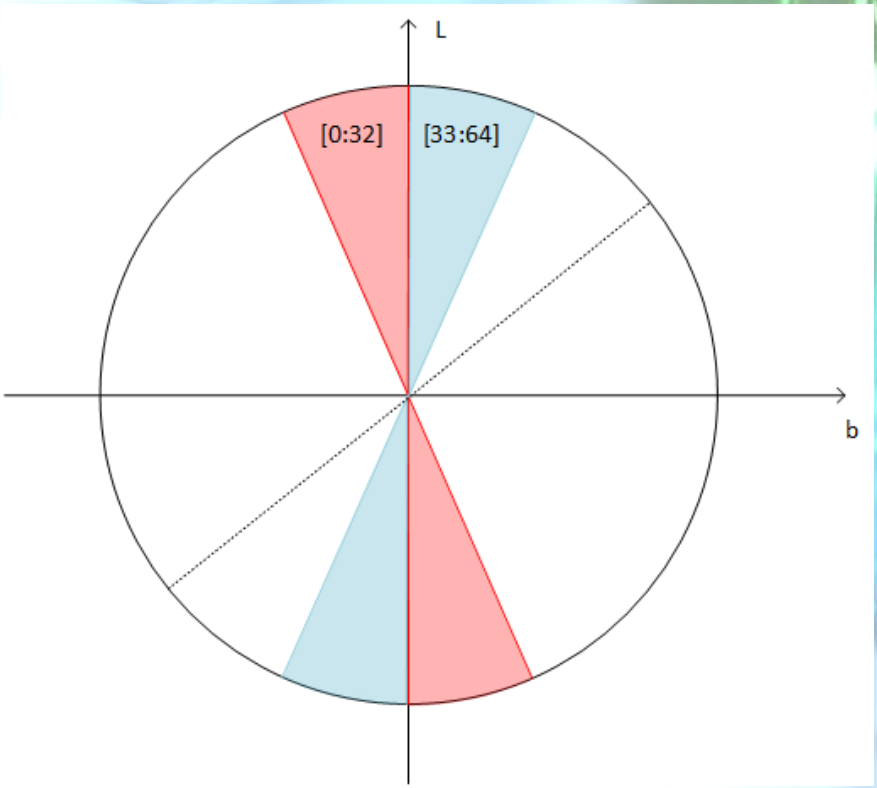
$C_2O(3/3)$

- The C_2O feature extraction
  - Spherical from cartesian repository.
  - Quantization for one β interval.
  - Histogram obtained for one β interval.



C_2O(3/3)

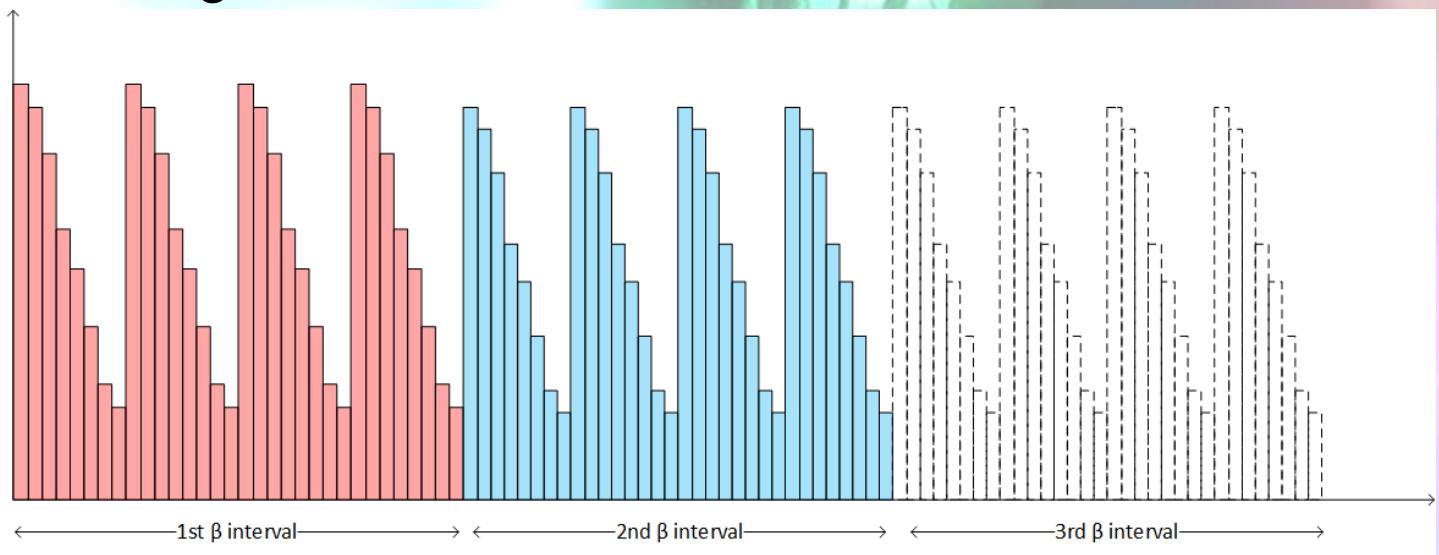
- The C_2O feature extraction
  - Spherical from cartesian repository.
  - Quantization for one β interval.
  - Histogram obtained for one β interval.
  - Quantization for each β interval.



$C_2O(3/3)$

- The C_2O feature extraction

  - Spherical from cartesian repository.
  - Quantization for one β interval.
  - Histogram obtained for one β interval.
  - Quantization for each β interval.
  - Final signature obtained.



Classification (Bag of words)

Reducing the number of points.

- K-means
  - Attribute the vectors to centroid vectors.

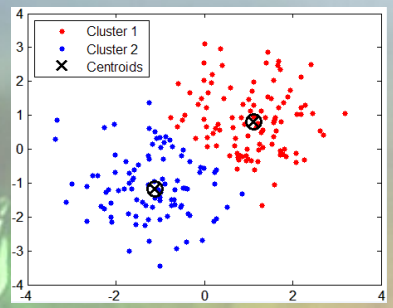


FIGURE: K-means

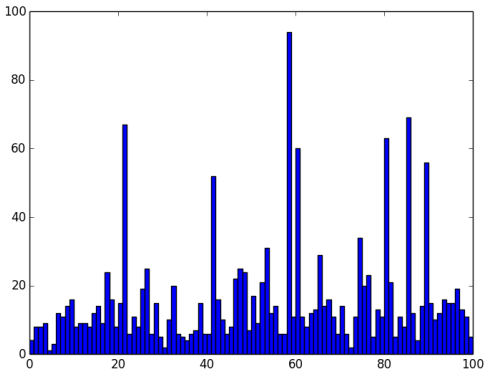
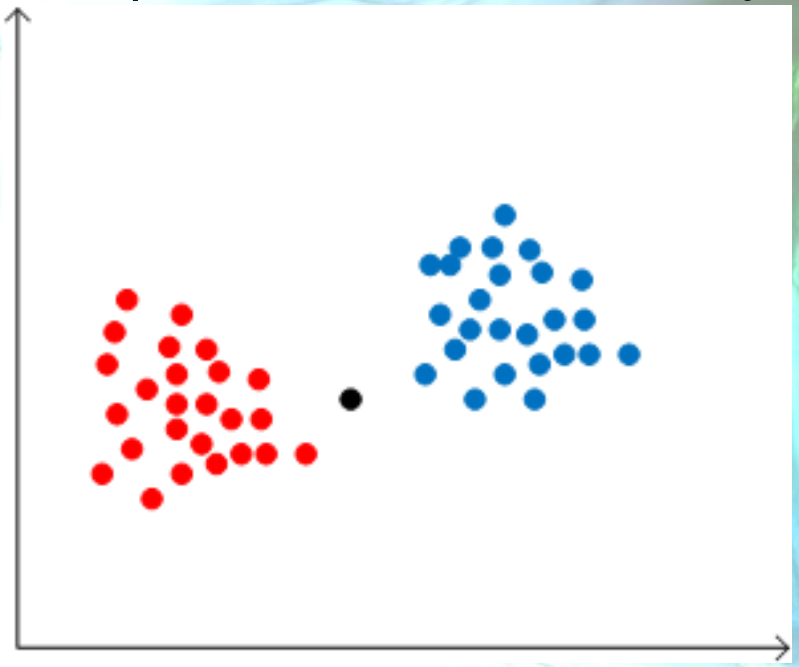


FIGURE: Signature

- Signature
  - Design histogram in function of assignment of the vectors.

Classification (K-nn(1/2))

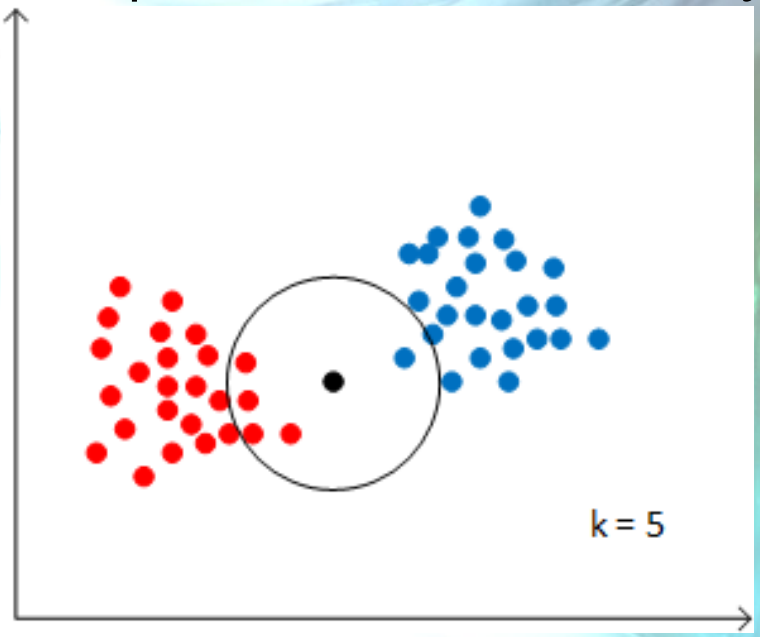
- The k nearest neighbor method
  - Comparison to the dictionary .



Classification (K-nn(1/2))

- The k nearest neighbor method

  - Comparison to the dictionary .



- 4 Occurrences of the ’red’ class , - 1 occurrence of the ’blue’ class
- The new point is attributed to the ’red’ class

Classification (K-nn(1/2))

- Application for image classification
  - More complex data.
  - Distances on signature vectors extracted from the K-mean method.
  - One most adapted distance type for each descriptor .

CLEF

- What is CLEF ?
- What did we gained from enrolling ?

FIGURE: Points of interest keypoints

- benchmark

Process flow

- Main function which control all the process
  - Create the tree structure.
  - Allows the choice of descriptors.

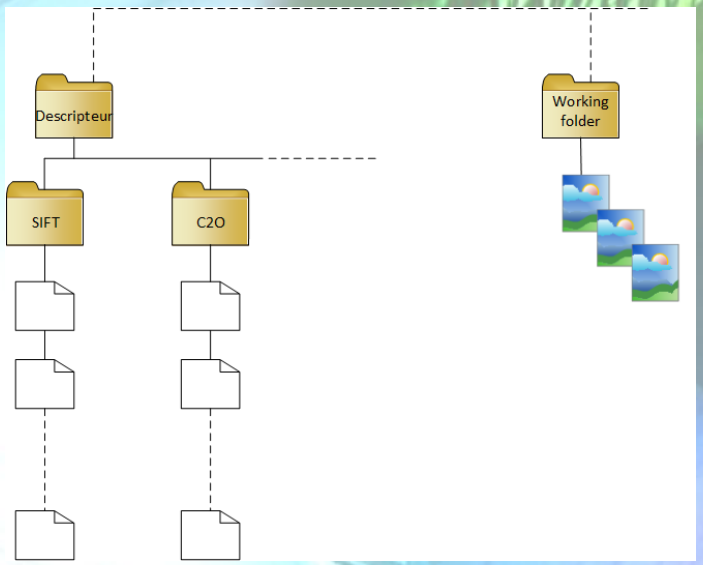


FIGURE: Tree structure

Outline

Results

- Reduce data-base of 100 images composed of only 4 species.
- Compare the two descriptors SIFT and C_2O.

TABLE: SIFT result

ID	Training Base	Test Base	Correct	Accuracy
173	17	8	4	50%
1102	22	3	1	33%
1889	16	9	1	11%
2717	15	10	7	70%
Total	70	30	9	/

TABLE: C_2O result

ID	Training Base	Test Base	Correct	Accuracy
173	17	8	1	12.5%
1102	22	3	1	33%
1889	16	9	0	0%
2717	15	10	7	70%
Total	70	30	9	/

Discussion

- Classification
  - To much reducing on the K-means (100 words).
  - Euclidean distance not the most efficient or adapt.
- C_2O
  - The concatenation way is not optimal.

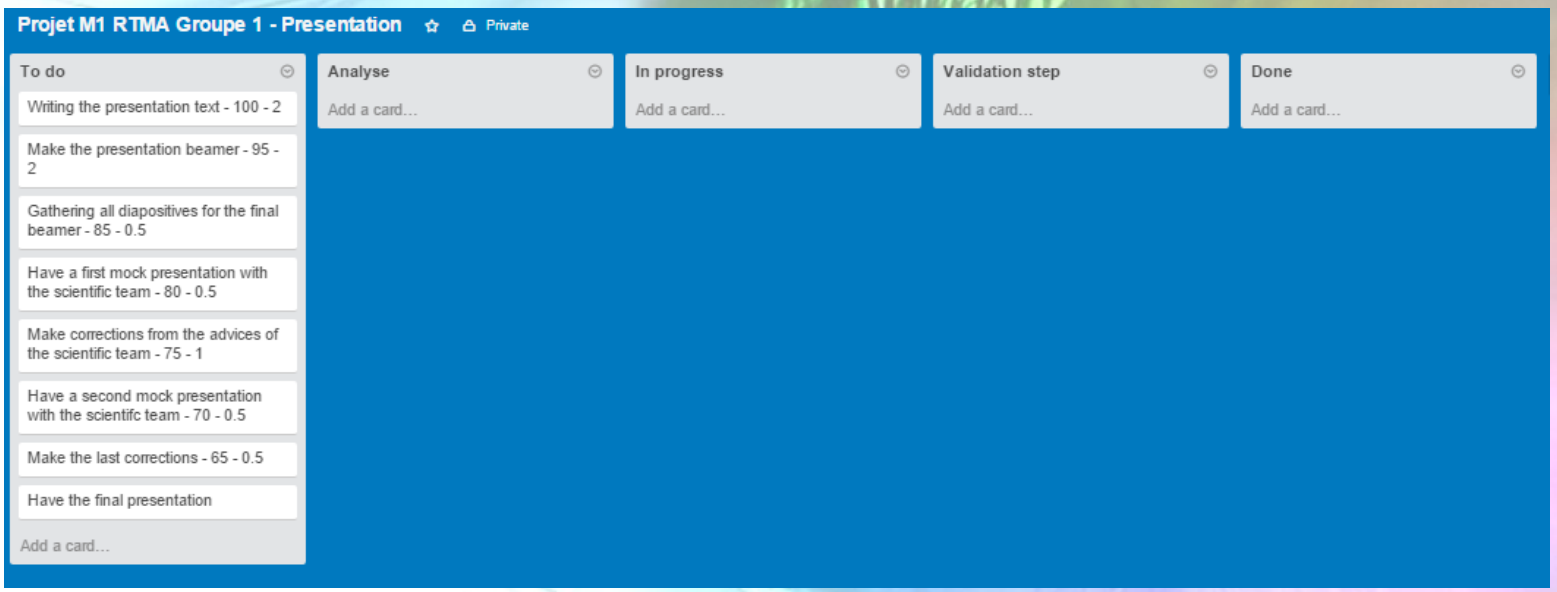
Outline

Project management (1/2)

- The scrum methodology
  - One sprint per week.
  - Daily scrum meeting.
  - Complete time repartition on the product backlog.

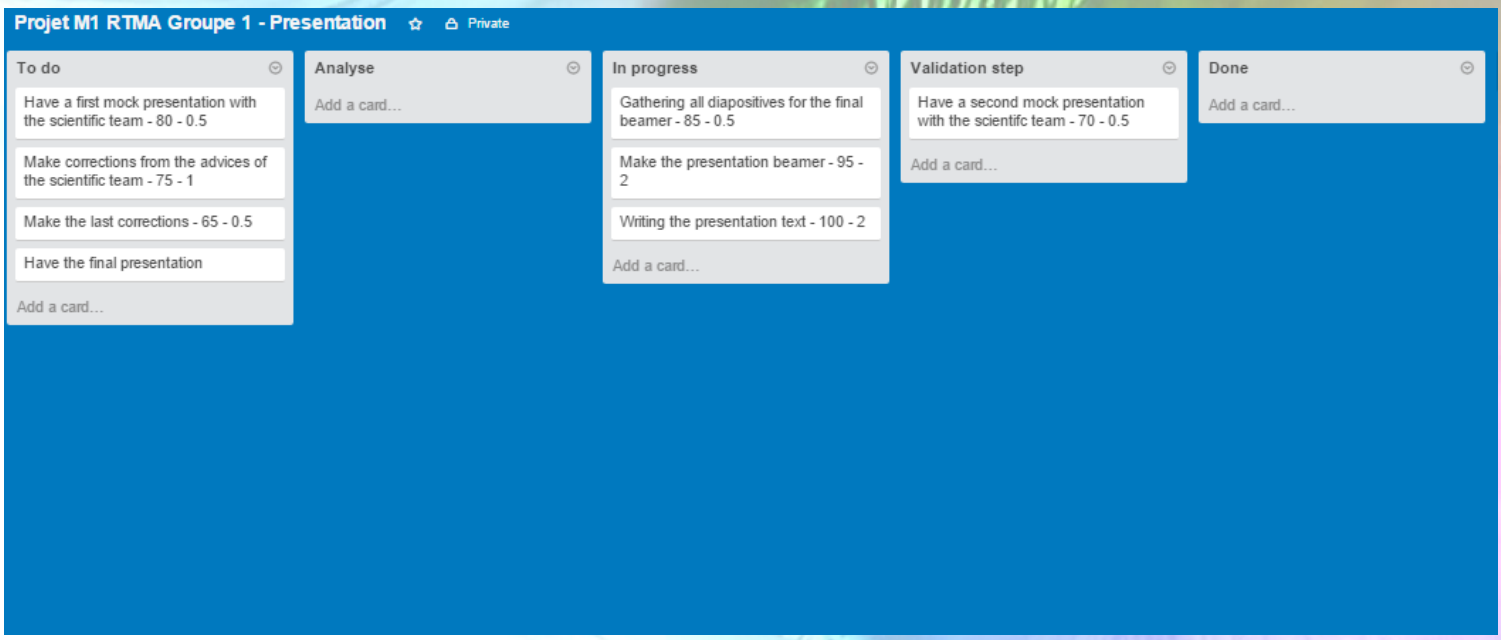
Project management (2/2)

- The sprint backlog : Trello board
  - Progress on one sprint.



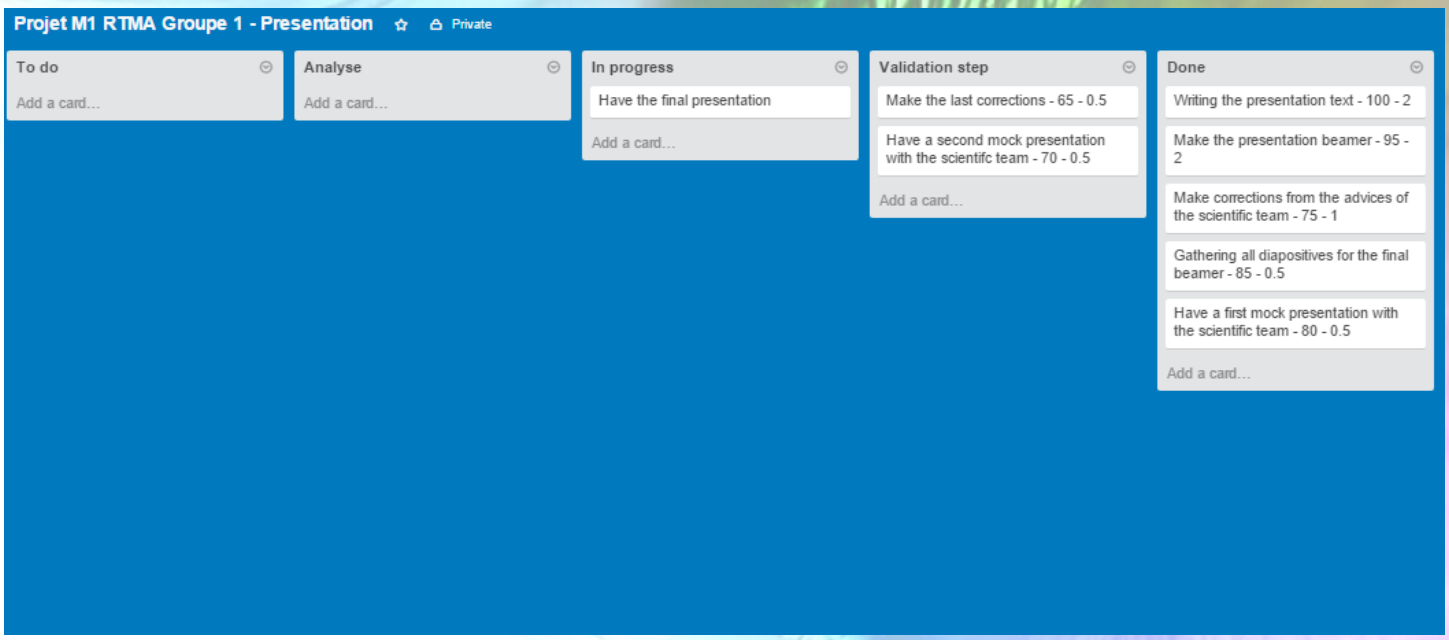
Project management (2/2)

- The sprint backlog : Trello board
  - Progress on one sprint.



Project management (2/2)

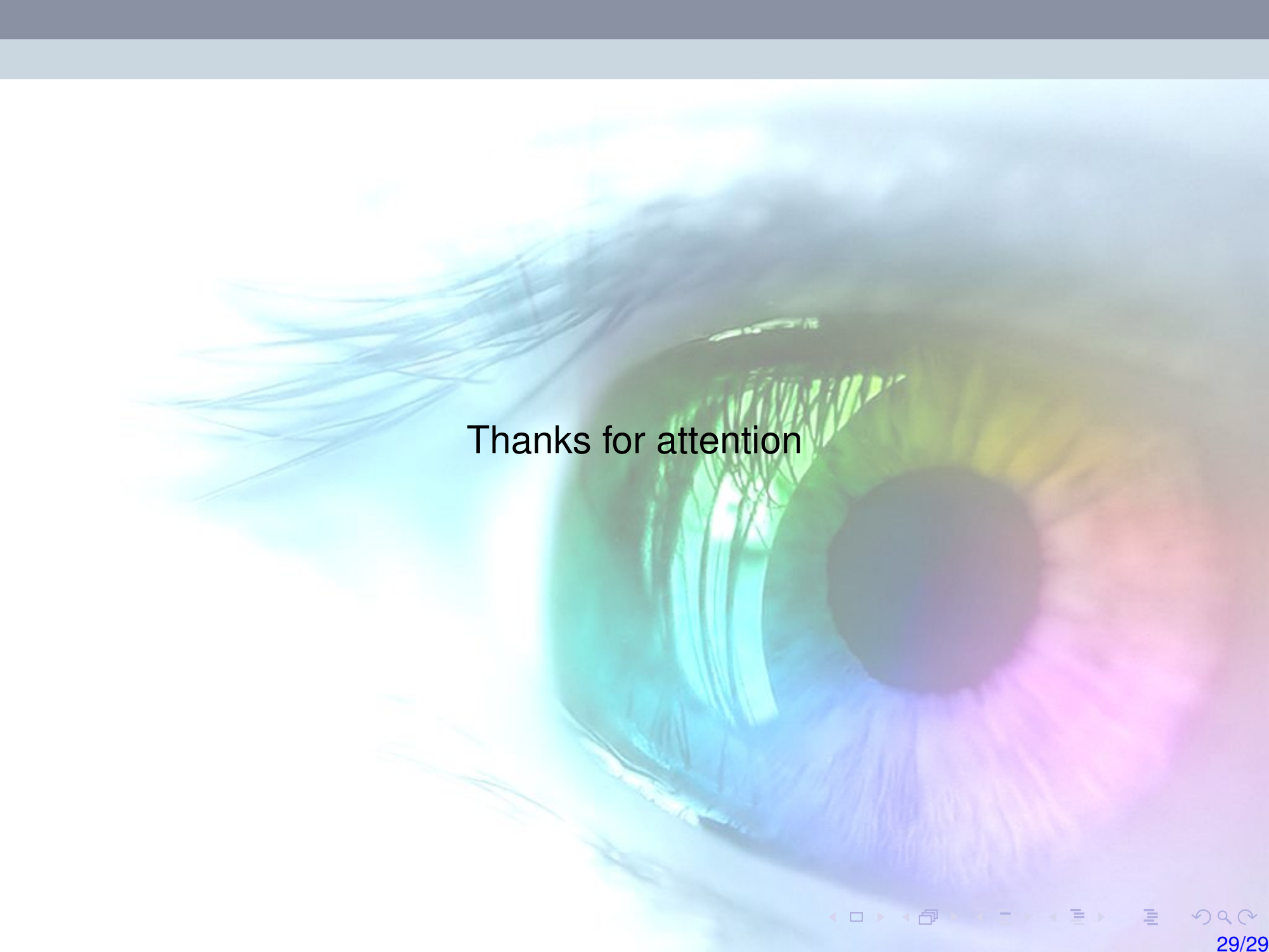
- The sprint backlog : Trello board
  - Progress on one sprint.



Outline

Conclusion

- Things we learned
- Errors/Perspectives


Thanks for attention