

Indexing big colored image bank : Texture 3.0

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

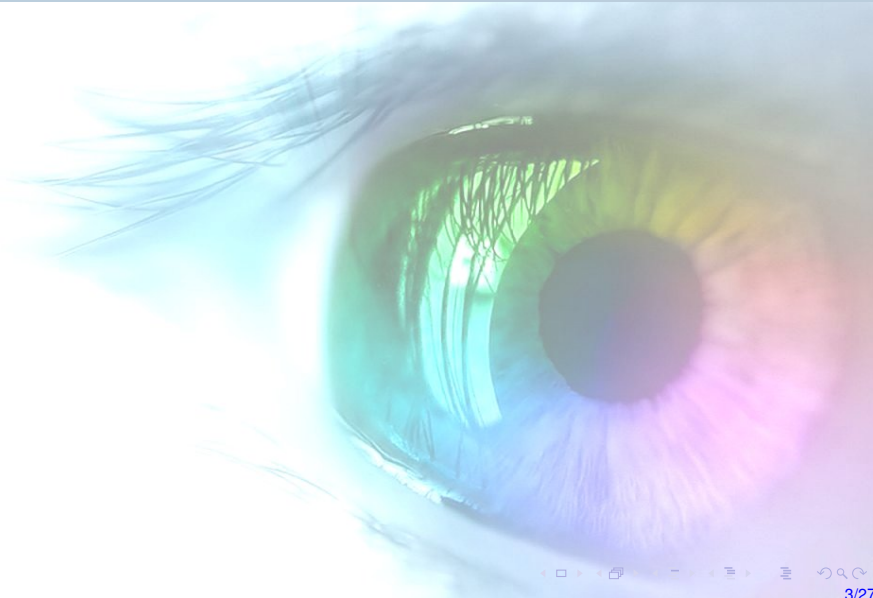
XLIM-SIC Laboratory UMR CNRS 7252, Poitiers, France



Outline

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement
 - 5 Results and Discussion
 - 6 Project Management
 - 7 Conclusion

Context and environment



Outline

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement
 - 5 Results and Discussion
 - 6 Project Management
 - 7 Conclusion

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

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement**
 - 4 Work achievement
 - 5 Results and Discussion
 - 6 Project Management
 - 7 Conclusion

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

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement**
 - 5 Results and Discussion
 - 6 Project Management
 - 7 Conclusion

SIFT(Scale-Invariant Feature Transform)

Key-points detection (x,y,σ)

- Scale-space extrema detection
Find the best locations which characterize well the image
- Key-point location
Improve the position of the keypoints detected
- Orientation assignment
Assign orientations to the key-points
- key-point descriptor
Describe the key-point with with a vector of 128 dimension

SIFT(Scale-Invariant Feature Transform)

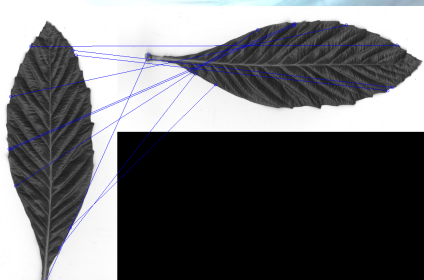


FIGURE: SIFT test1

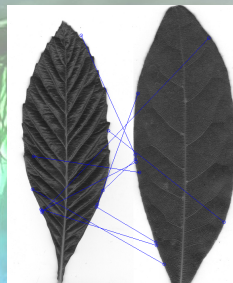


FIGURE: SIFT test2

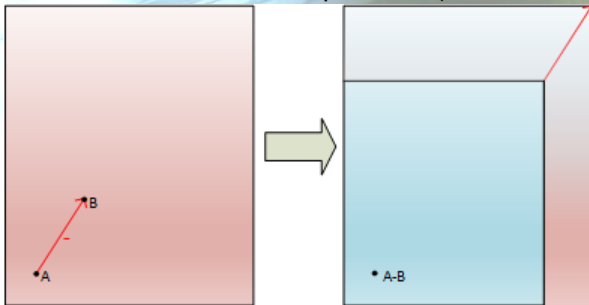
C2O(1/3)

- The C₂O matrix
 - Conversion to $L^*a^*b^*$ space
 - C₂O matrix calculation.
 - C₂O signature extraction.

C2O(2/3)

- The C₂O matrix

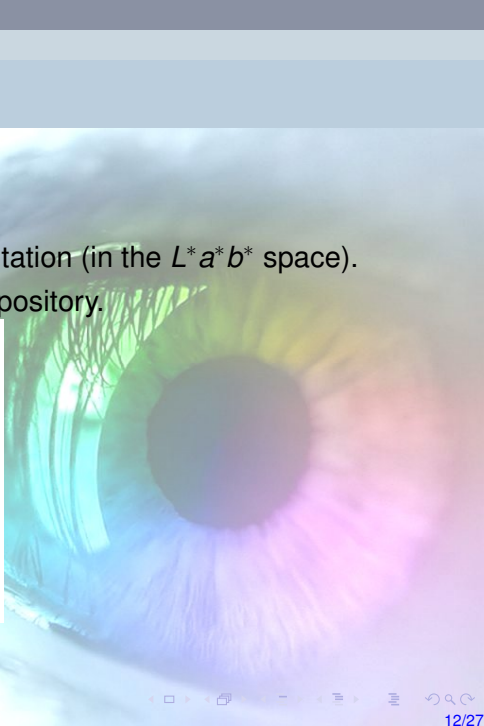
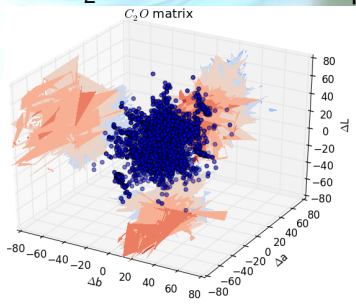
- The color difference computation (in the $L^*a^*b^*$ space).



C2O(2/3)

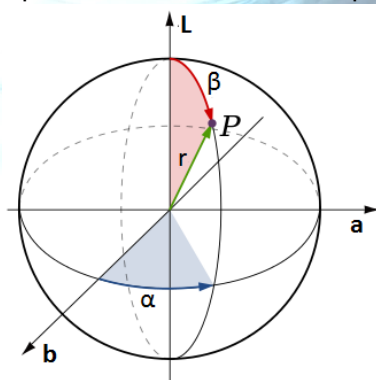
- The C₂O matrix

- The color difference computation (in the $L^*a^*b^*$ space).
- The C₂O matrix in a 3-D repository.



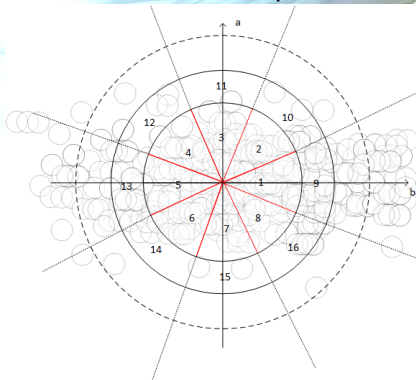
C2O(3/3)

- The C₂O feature extraction
 - Spherical from cartesian repository.



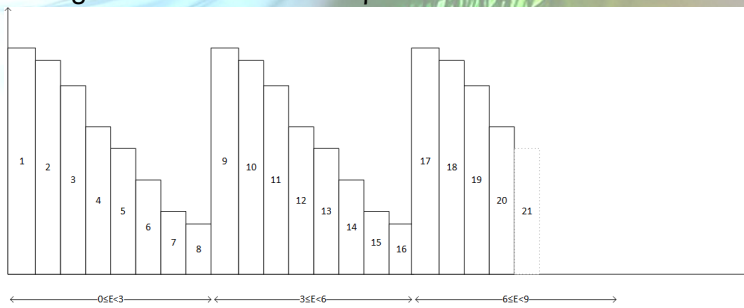
C2O(3/3)

- The C₂O feature extraction
 - Spherical from cartesian repository.
 - Quantization for one β interval.



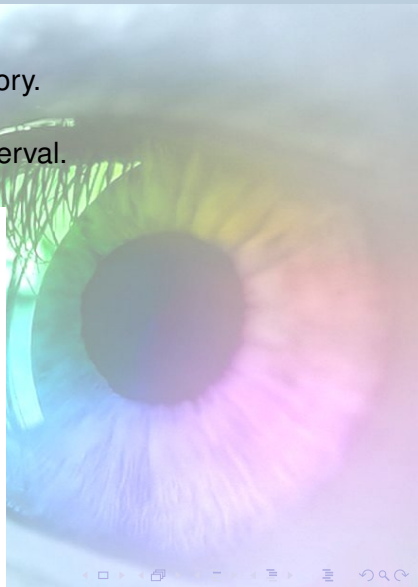
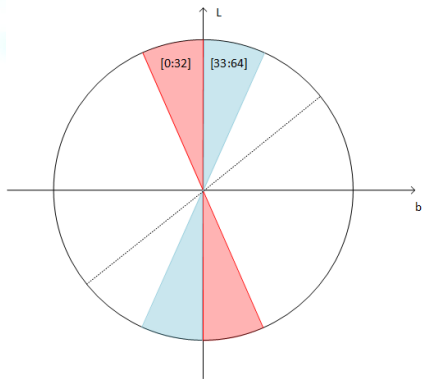
C2O(3/3)

- The C₂O feature extraction
 - Spherical from cartesian repository.
 - Quantization for one β interval.
 - Histogram obtained for one β interval.



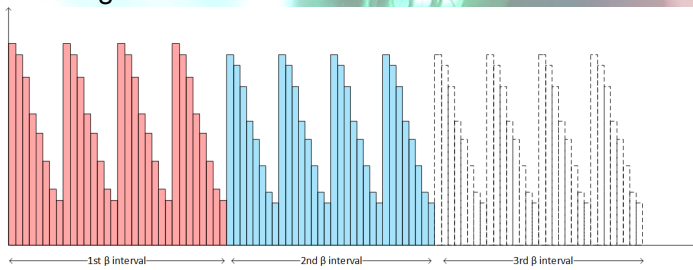
C2O(3/3)

- The C₂O feature extraction
 - Spherical from cartesian repository.
 - Quantization for one β interval.
 - Histogram obtained for one β interval.
 - Quantization for each β interval.



C2O(3/3)

- The C₂O 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.

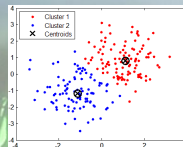


FIGURE: K-means

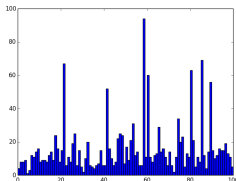


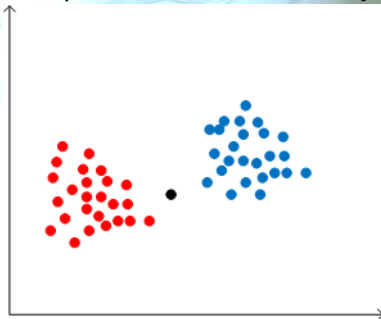
FIGURE: Signature

- Signature

- Design histogram in function of assignment of the vectors.

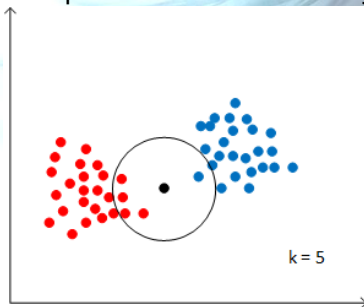
Classification (K-nn(1/2))

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



Classification (K-nn(1/2))

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

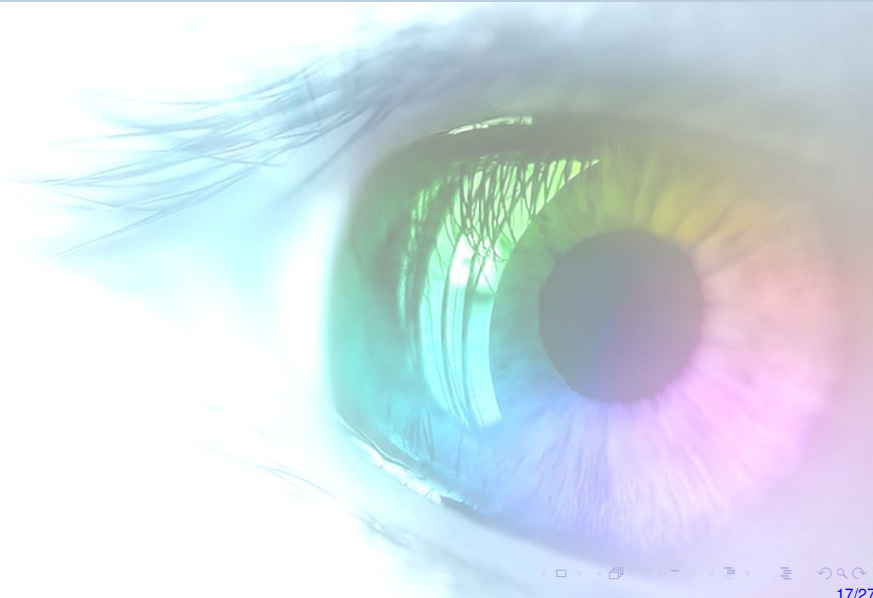


- 4 Occurrences of the 'red' class , - 1 occurrence of the 'blue' class
- x is attributed to the 'red' class

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



Process flow

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

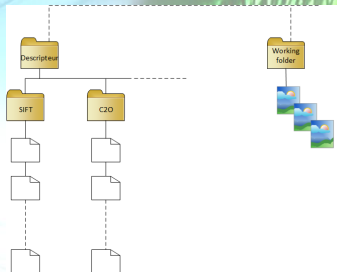


FIGURE: Tree structure

Outline

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement
 - 5 Results and Discussion**
 - 6 Project Management
 - 7 Conclusion

Results

- Reduce data-base of 100 images composed of only 4 species.
- Compare the two descriptors SIFT and C₂O.

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: C₂O 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

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement
 - 5 Results and Discussion
 - 6 Project Management**
 - 7 Conclusion

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.

The screenshot shows a Trello board for 'Projet M1 RTMA Groupe 1 - Presentation'. The board is organized into five columns: 'To do', 'Analyse', 'In progress', 'Validation step', and 'Done'. The 'To do' column contains eight cards with tasks and estimated time in minutes. The other columns are currently empty.

To do	Analyse	In progress	Validation step	Done
Writing the presentation text - 100 - 2	Add a card...	Add a card...	Add a card...	Add a card...
Make the presentation beamer - 95 - 2				
Gathering all diapositives for the final beamer - 85 - 0.5				
Have a first mock presentation with the scientific team - 80 - 0.5				
Make corrections from the advices of the scientific team - 75 - 1				
Have a second mock presentation with the scientific team - 70 - 0.5				
Make the last corrections - 65 - 0.5				
Have the final presentation				
Add a card...				

Project management (2/2)

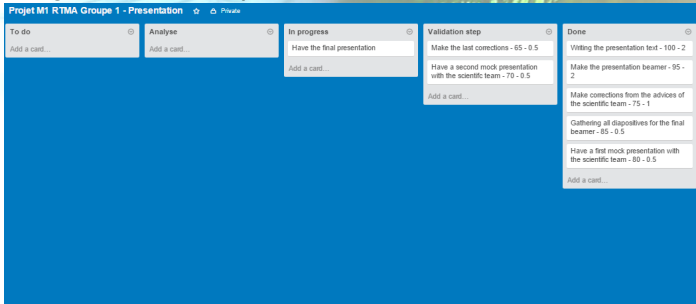
- The sprint backlog : Trello board
 - Progress on one sprint.

The screenshot shows a Trello board for 'Projet M1 RTMA Groupe 1 - Presentation'. The board is organized into five columns representing the stages of a sprint:

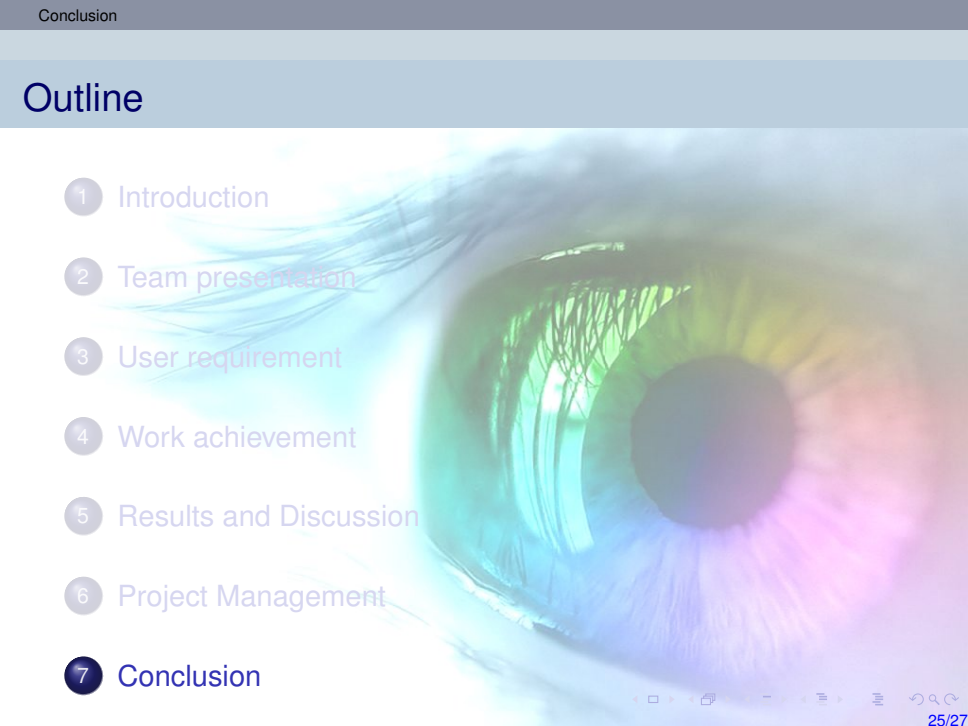
- To do:**
 - Have a first mock presentation with the scientific team - 80 - 0.5
 - Make corrections from the advices of the scientific team - 75 - 1
 - Make the last corrections - 65 - 0.5
 - Have the final presentation
 - Add a card...
- Analyse:**
 - Add a card...
- In progress:**
 - Gathering all diapositives for the final beamer - 85 - 0.5
 - Make the presentation beamer - 95 - 2
 - Writing the presentation text - 100 - 2
 - Add a card...
- Validation step:**
 - Have a second mock presentation with the scientific team - 70 - 0.5
 - Add a card...
- Done:**
 - Add a card...

Project management (2/2)

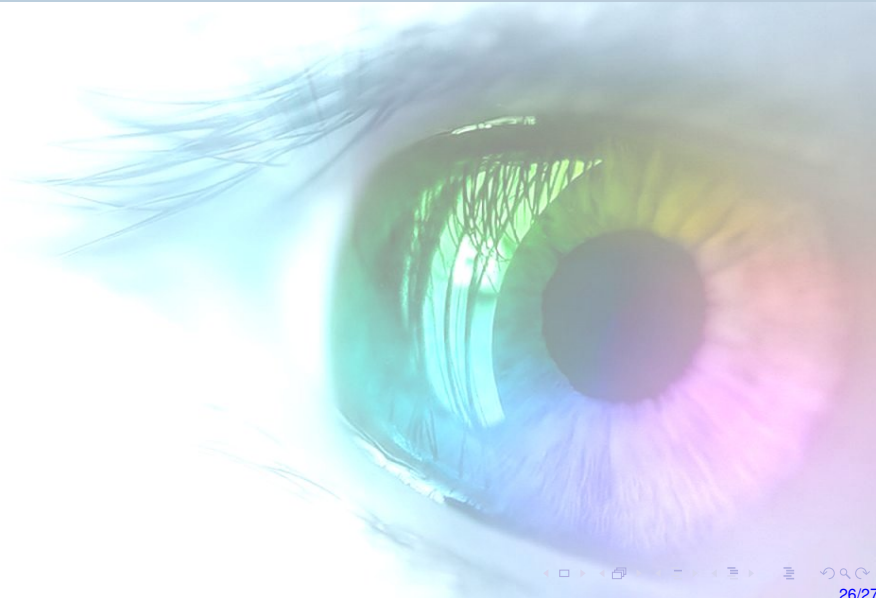
- The sprint backlog : Trello board
 - Progress on one sprint.

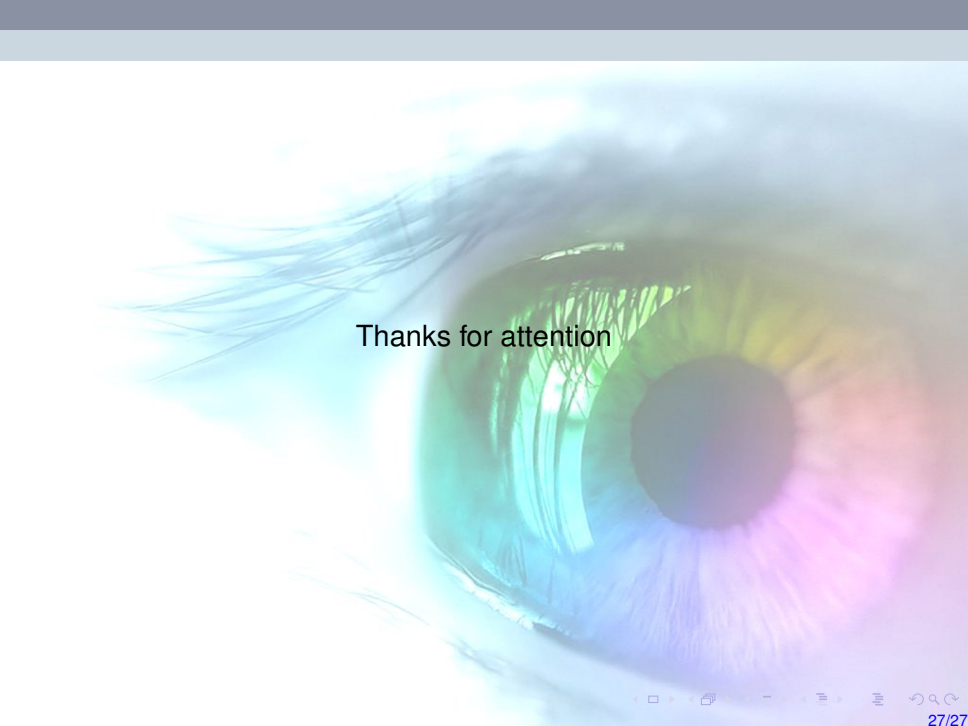


Outline

- 
- 1 Introduction
 - 2 Team presentation
 - 3 User requirement
 - 4 Work achievement
 - 5 Results and Discussion
 - 6 Project Management
 - 7 Conclusion**

Conclusion





Thanks for attention