# Report of the meeting with the monitoring committee

LE Van Linh

Bordeaux, 15 July 2017

# Subject

Supervisor: Marie **BEURTON-AIMAR**

***"Extraction automatique de caractéristiques morphologiques des espèces pour la classification d'insectes: application aux ravageurs de culture et espèces invasives"***

# Motivation

**Classification**

- An important task in biological
- Manually based on environment: temperature, rainfall…
- Automatically based on the features of insects: edges, **points of interest**, …

**Landmark**

- A kind of *points of interest* defined by biologist
- Measure methods:
  - Directly on the body of the insect: width, length,…
  - Via the pictures with **image processing** techniques
  - Deep learning

# State of the arts

- Automatic extraction the landmarks *on wing morphometry*[1,2]
- Analysis the cephalometry in human orthodontics[3,4]
- Facial point detection[5,6]

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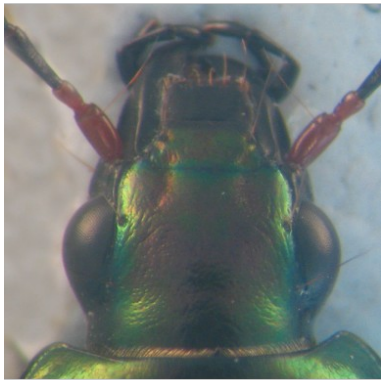
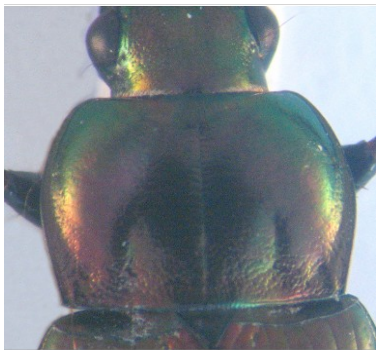
1. Palaniswamy, Sasirekha, Neil A. Thacker, and Christian Peter Klingenberg. "*Automatic identification of landmarks in digital images.*" IET Computer Vision 4.4 (2010): 247-260.
2. J Goczał, R Rossa, J Sweeney, and A Tofilski. "*Citizen monitoring of invasive species : wing morphometry as a tool for detection of alien tetropium species*". Journal of Applied Entomology, 2016
3. Md Mesbahul Hoque, Shamim Ara, Shahanaz Begum, AHM Mostafa Kamal, and Sharmina Sayeed. "*Morphometric analysis of dry adult human mandibular ramus*". Bangladesh Journal of Anatomy, 12(1) :14–16, 2015
4. José Maria Becerra and Antonio G Valdecasas. "*Landmark superimposition for taxonomic identification*". Biological Journal of the Linnean Society,, 81:page 267–274, 2004
5. M. Dantone, J. Gall, G. Fanelli, and L. J. V. Gool. "*Real-time facial feature detection using conditional regression forests*". In Proc. CVPR, 2012
6. Sun, Y., Wang, X., Tang, X.: "*Deep convolutional network cascade for facial point detection*". In: CVPR, pp. 3476–3483 (2013)

# Objective of the thesis

Dataset

- Color images (**2D**) of 293 insects (beetles)
- Five images by animal: head, pronotum, wing, left and right mandibles.



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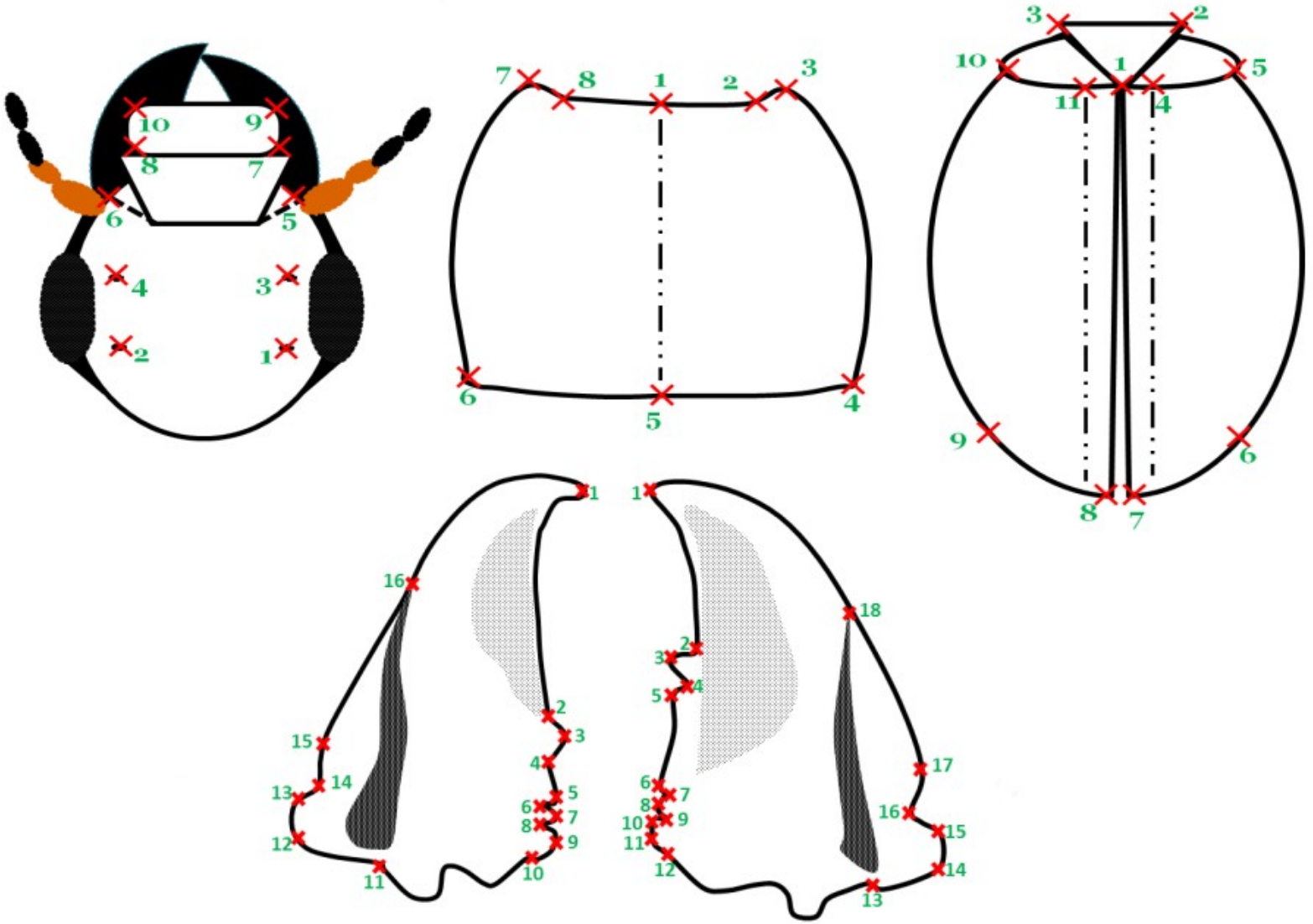
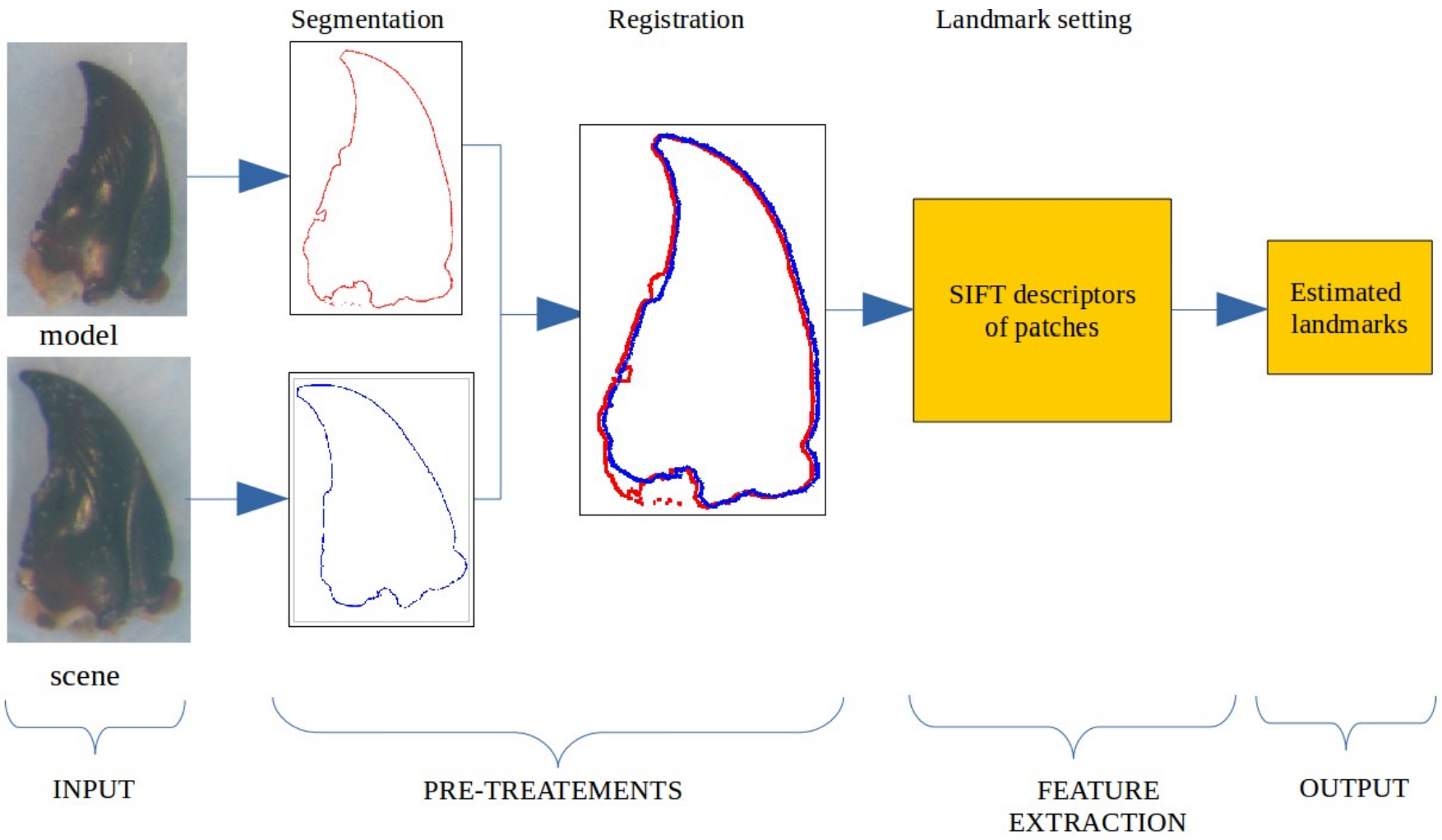


# Status of the thesis

Focus on left and right mandibles

# Status of the thesis



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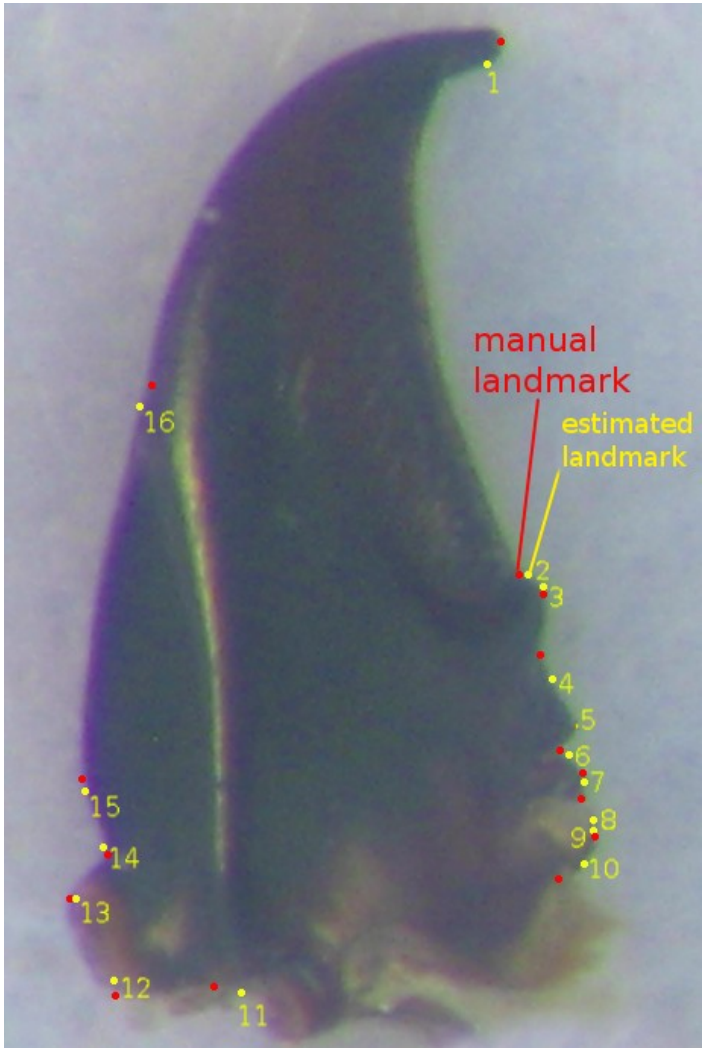


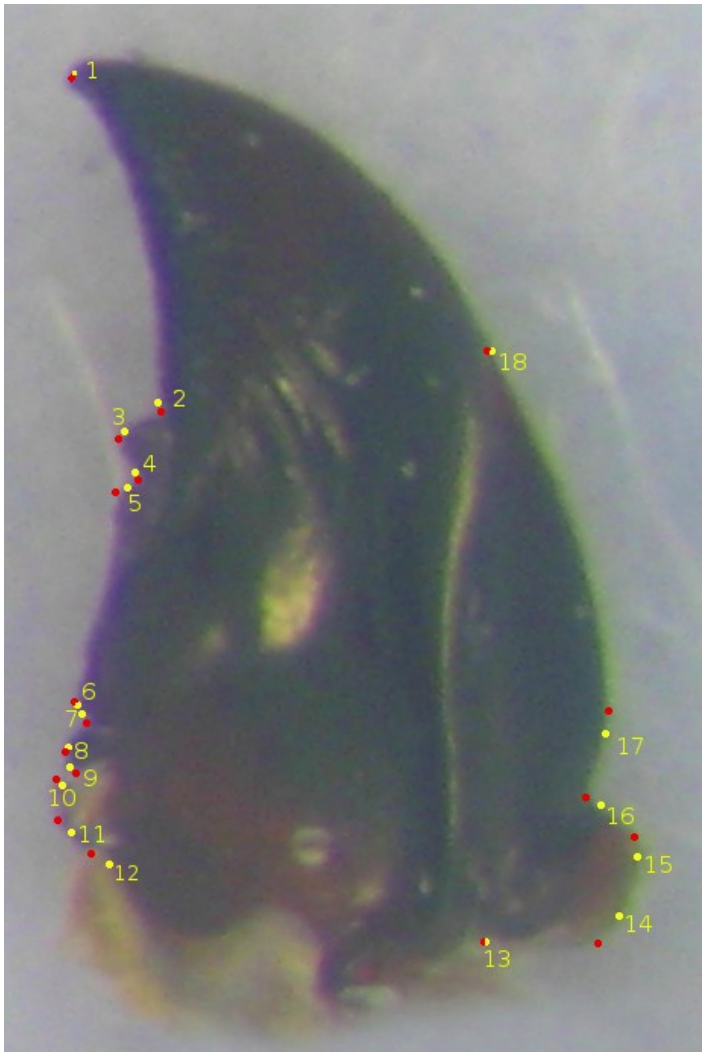


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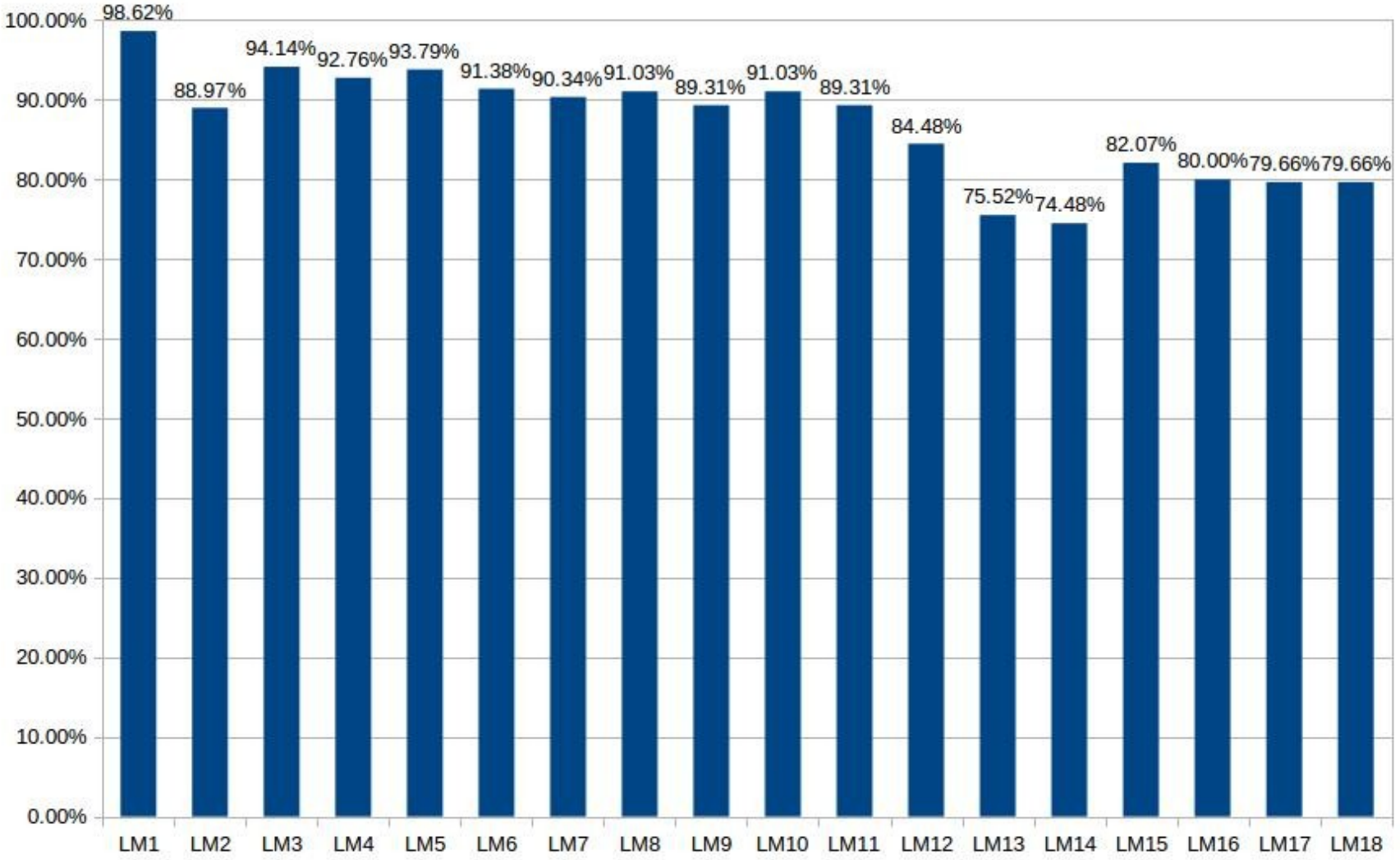


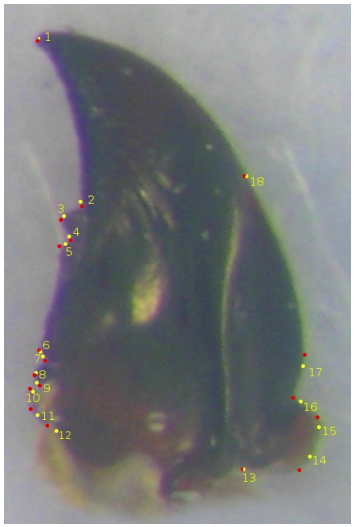

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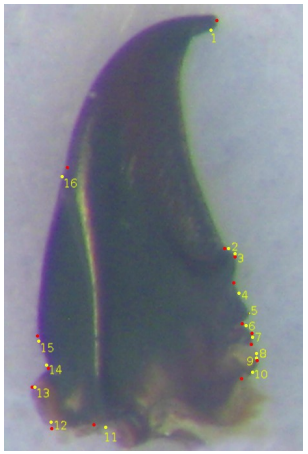
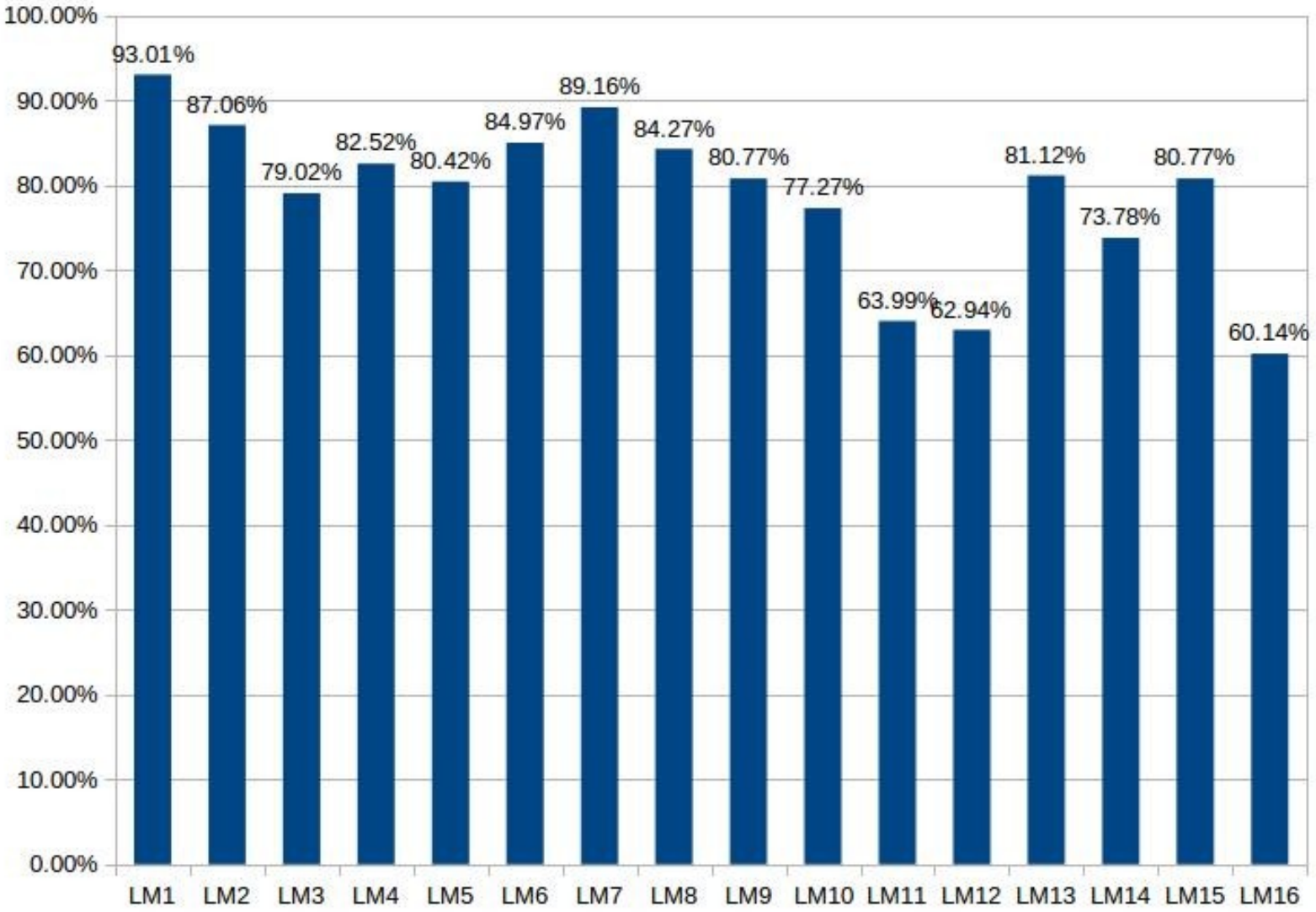
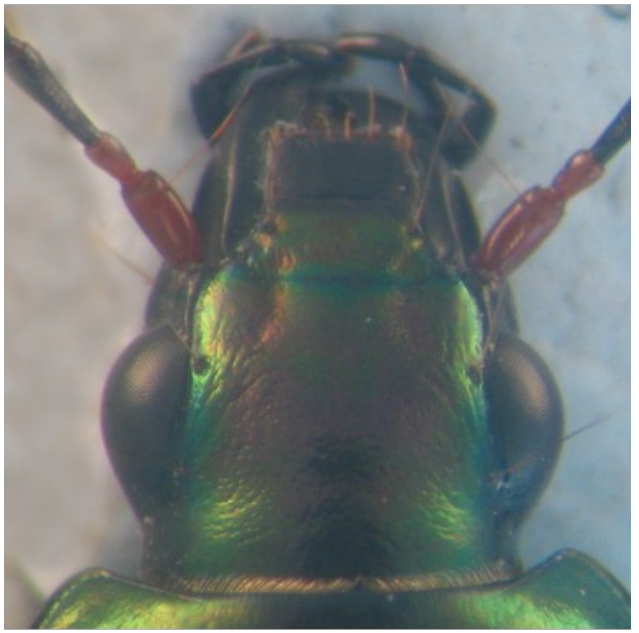
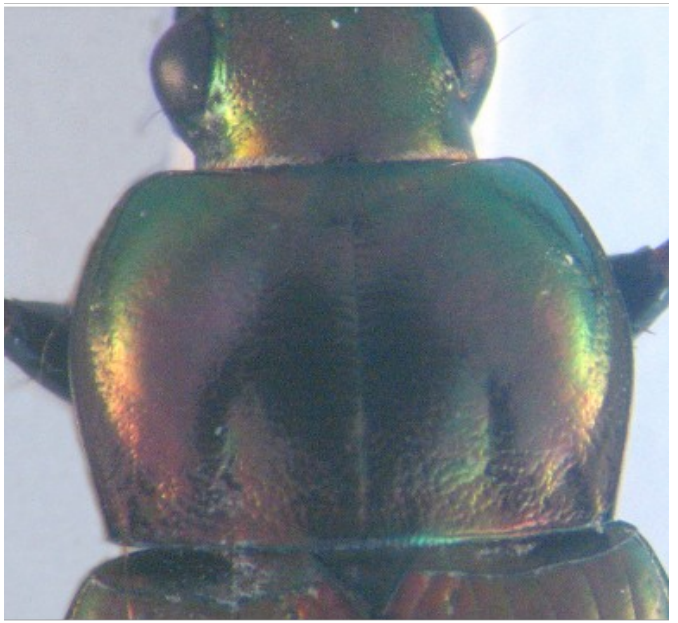




# Future works

- Deep learning
- Texture localization techniques





# Training courses attended

- M1 Informatique S8 (4TIS801S): **Traitement d'Image**
- Online courses:
  - Module 1 – Les enjeux de l'intégrite scientifique
  - Module 2 – Les manquements à l'intégrité scientifique: c'est quoi? Pourquoi?
  - Module 3 – Prevenir les inconduites: quelques règles de base
  - Module 4 – La régulation de l'intégrité scientifique

Thank you