

# Image Understanding

## Joint course AI Paris Saclay - DataAI IP Paris

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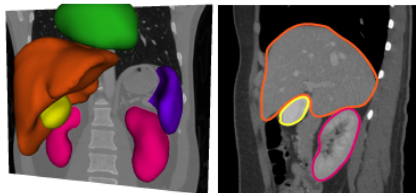


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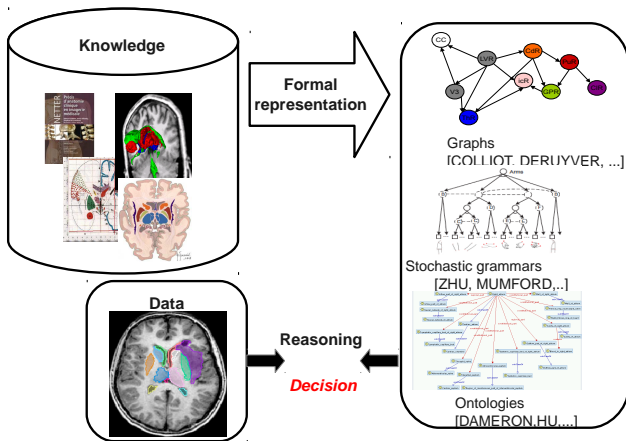


# Models to guide image understanding

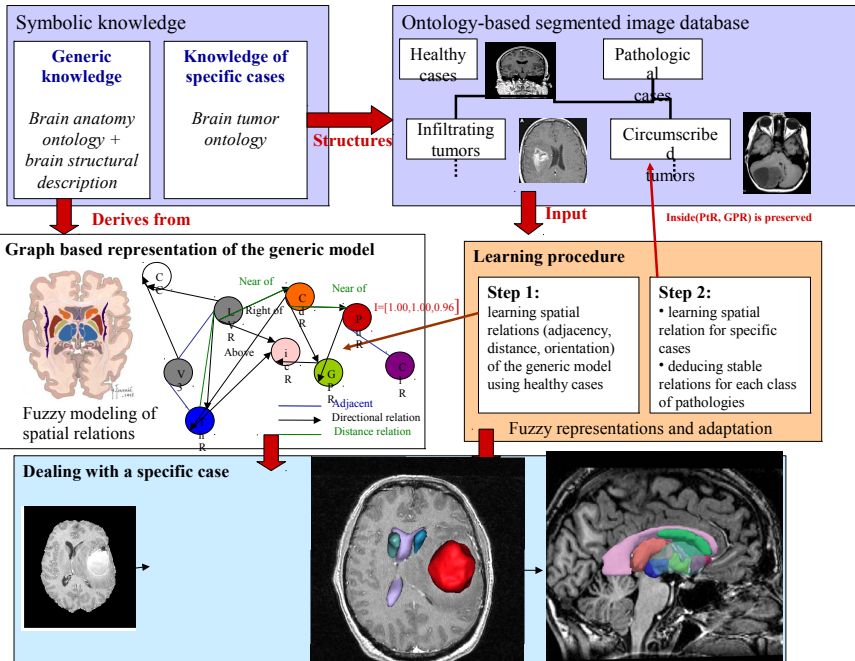
- Develop mathematical models to represent
  - knowledge (context, expertise, spatial organization...),
  - information contained in images (geometry, statistics, shape, appearance...),
  - and to combine them,leading to operational and efficient algorithms for image understanding.
- Semantic gap?
- Pathological / unexpected cases?
- Adaptation to application needs.



# Representation and reasoning

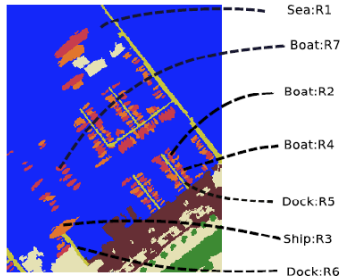


(Inexact) graph matching, alignment and instantiation of models (ontologies, conceptual graphs...), constraint satisfaction problems, spatial reasoning...

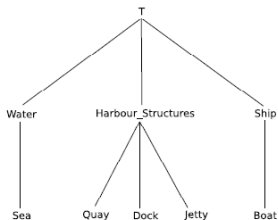




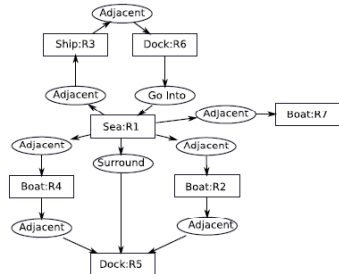
(a) Example image.



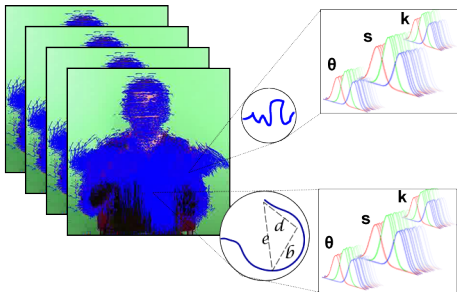
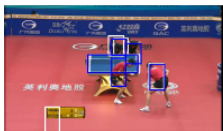
(b) Labeled image: The blue regions represent the sea, the red and orange represent ships or boats and the yellow regions represent the docks.



(c) Concept hierarchy  $T_C$  in the context of harbors.



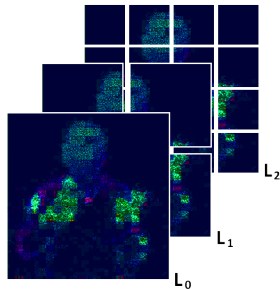
(d) Conceptual graph representing the spatial organization of some elements of Figure 5.8(b).



(a)

(b)

(c)



## Physical entities models



human

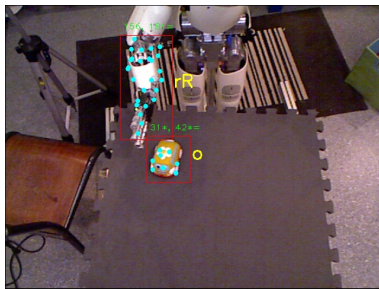
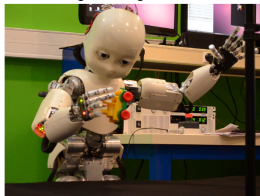
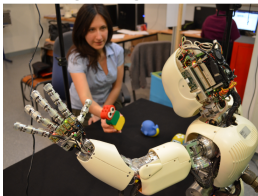
object

robot



Learning through observation

Learning through interaction





## Professors:

- Isabelle Bloch (Télécom Paris)
- David Filliat (ENSTA Paris)
- Céline Hudelot (Centrale Supélec)
- Antoine Manzanera (ENSTA Paris)
- Florence Tupin (Télécom Paris)

## Pedagogy:

- Courses: methods, applicative examples in various domains.
- Analysis and synthesis of scientific papers.