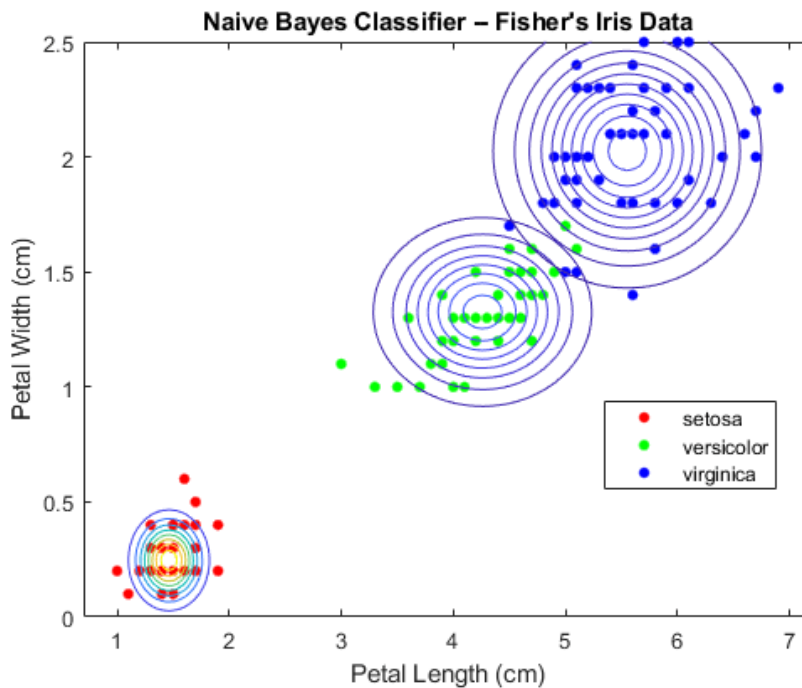


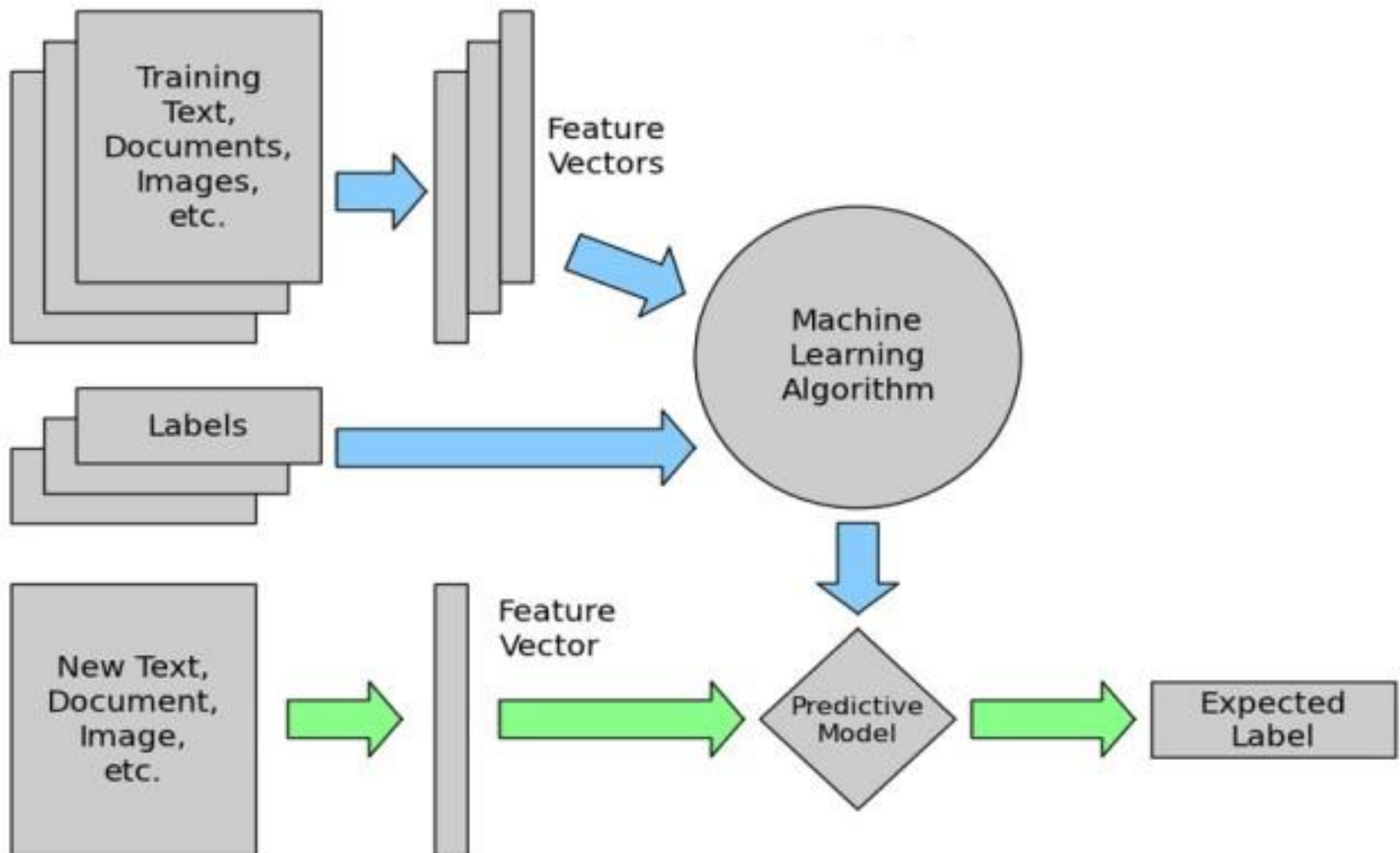


# Intro : IID classification

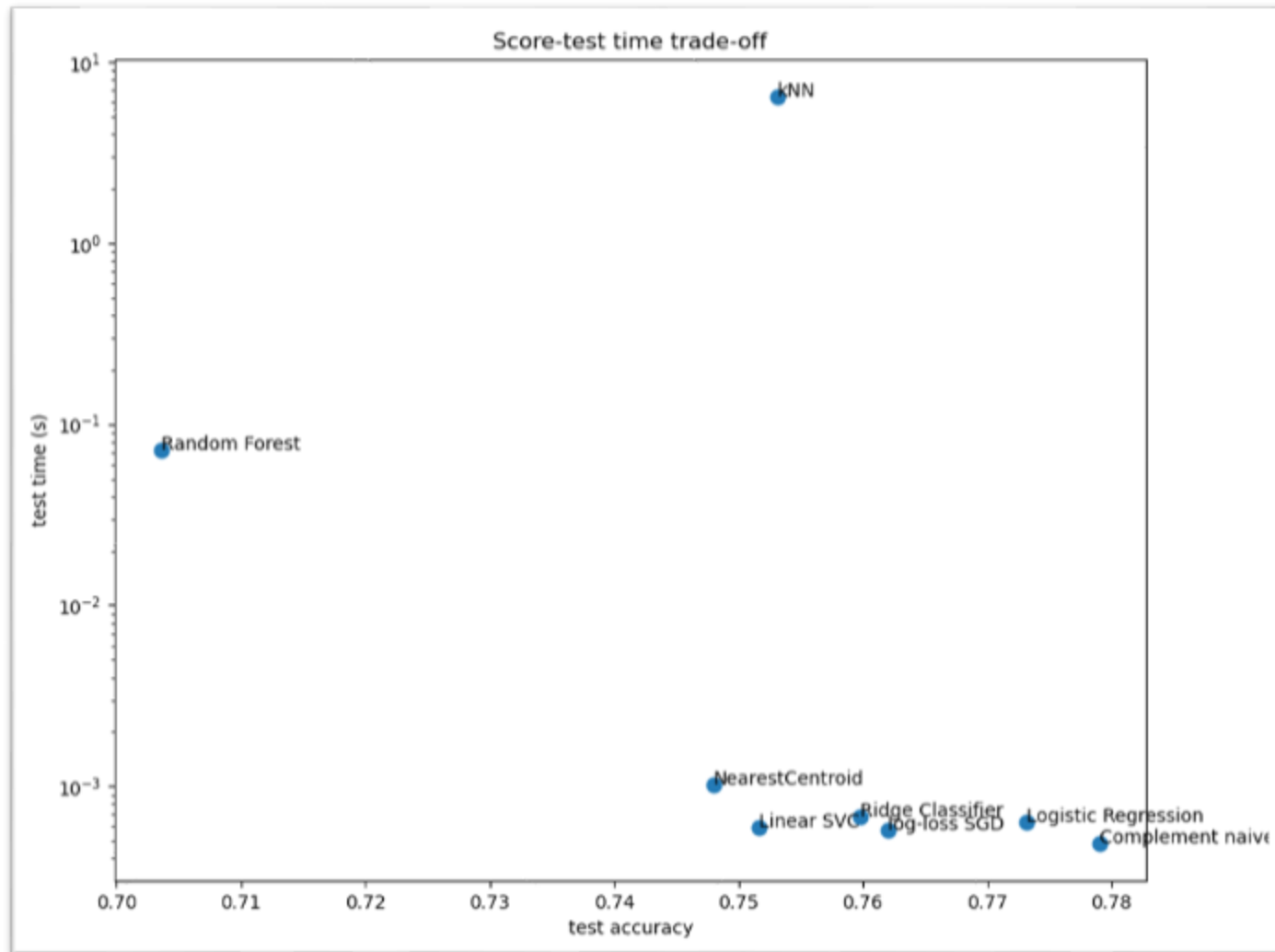
Independant data  $\rightarrow$  IID model



# Intro: Text classification



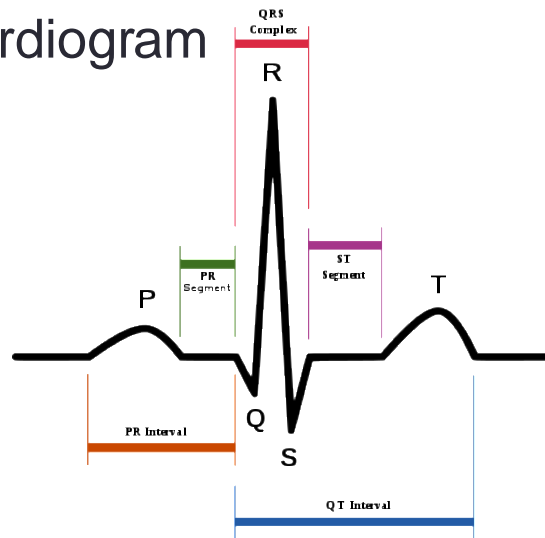
# Intro: text classification



# Intro: time series classification

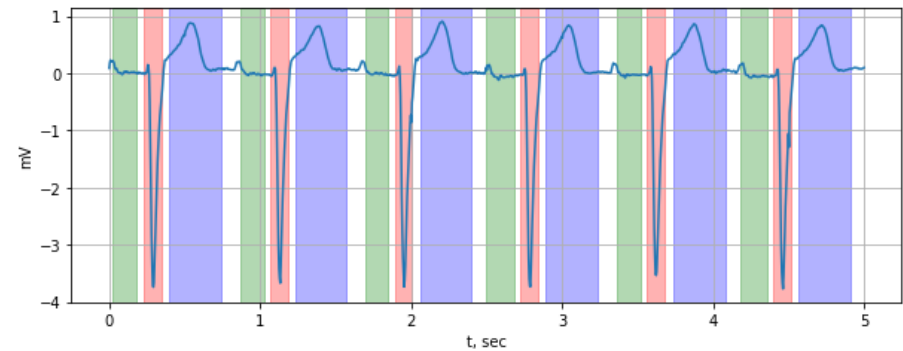
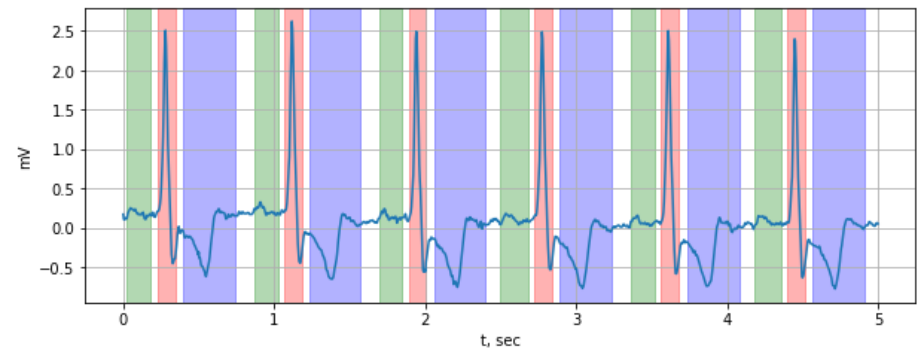


Electrocardiogram



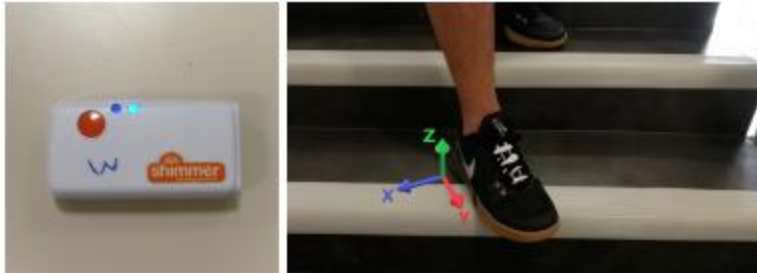
## ECG signal annotation

Heart rate: 72 bpm

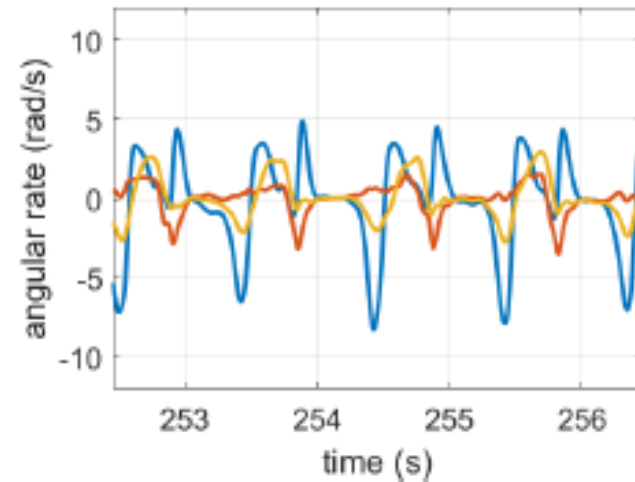


Hidden Markov chain

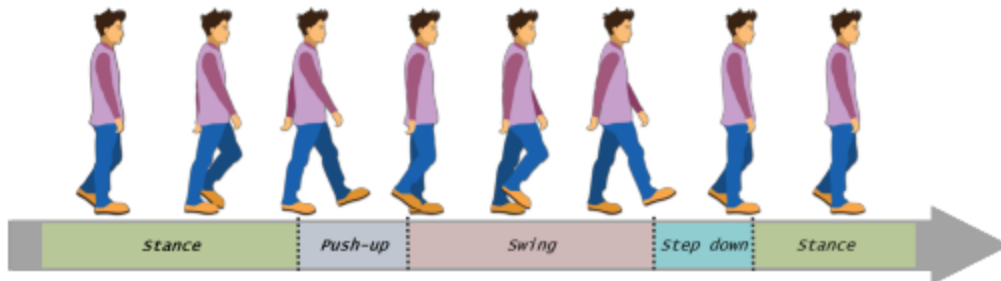
# Application: Human activity monitoring



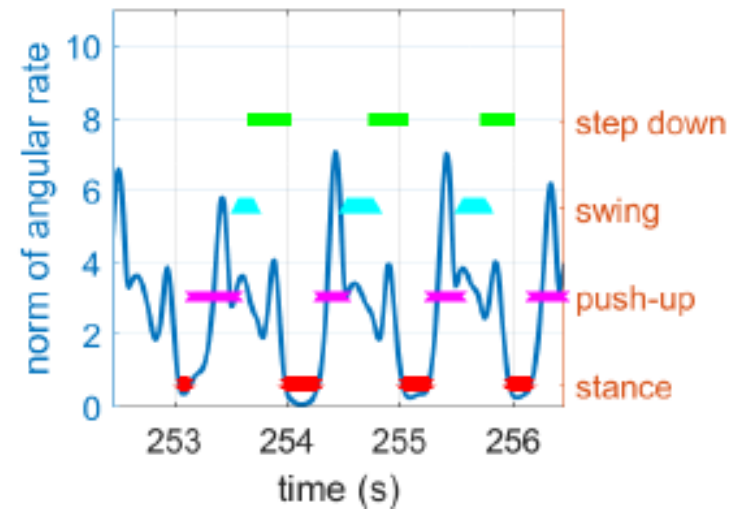
Inertial Measurement Unit



(d) Stair descent.



Gait  
cycle

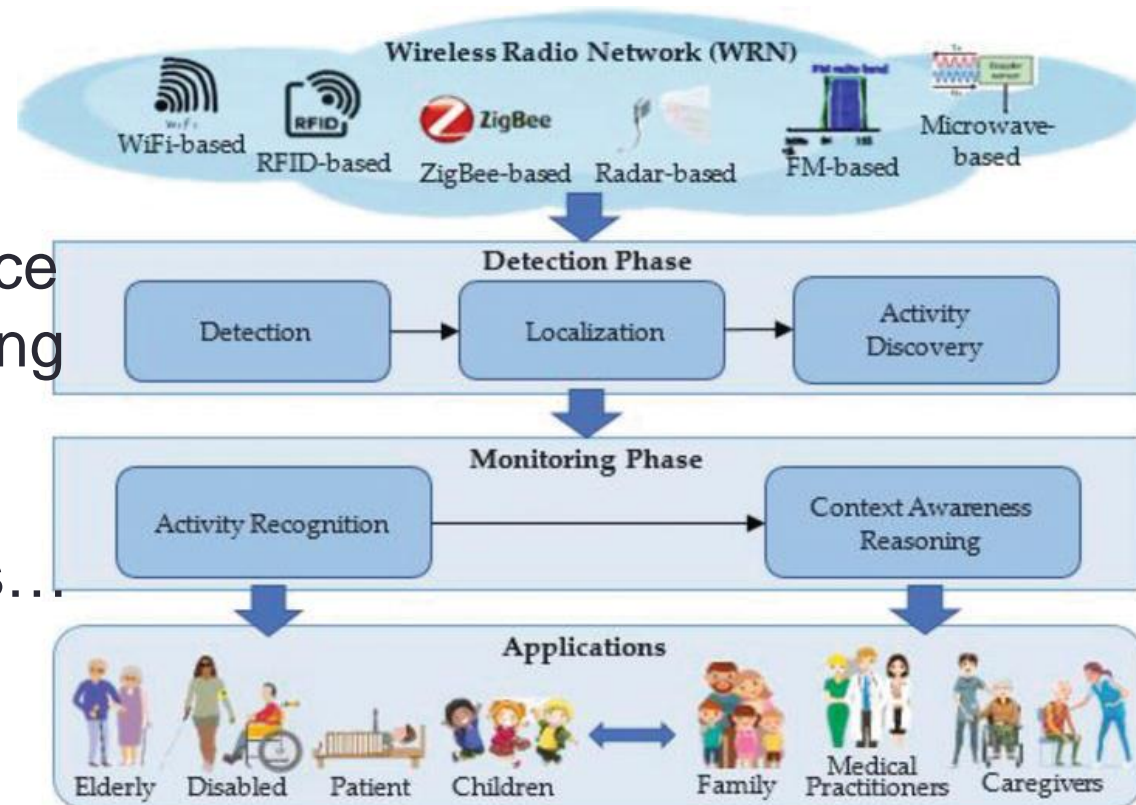


(d) Stair descent.

# Application: Human activity monitoring using IoT network

## Home automation / domotics.

Development of surveillance systems for the elderly using wireless beacon signal analysis, such as WIFI, Bluetooth, ZigBee sensors...

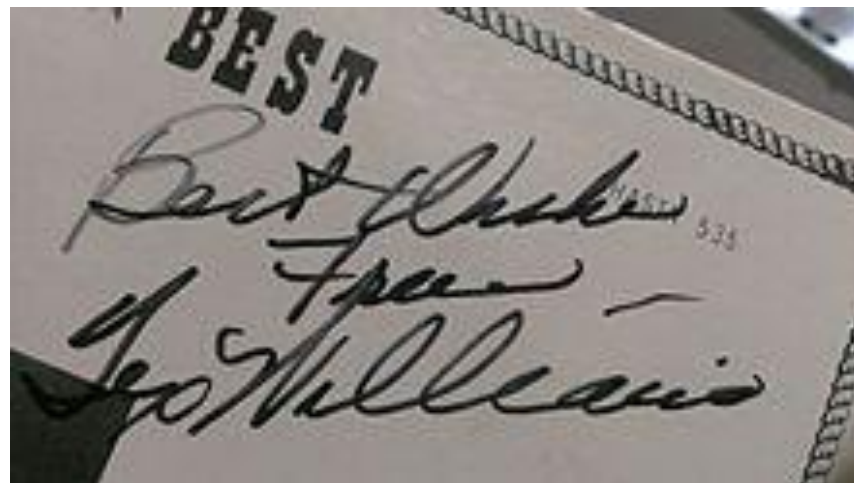


# Intro: Markov chain models everywhere!

## Also (from wikipedia):

- Finance and econometry (stock exchange),
- Speech coding and synthesis, handwriting recognition,
- Biology : Gene prediction, bio-sequence alignment, DNA motif recovery...

**Handwritten Text Recognition (HTR)**, is the ability for a computer to interpret intelligible handwritten input from sources such as paper documents, photographs, touch-screens and other devices.

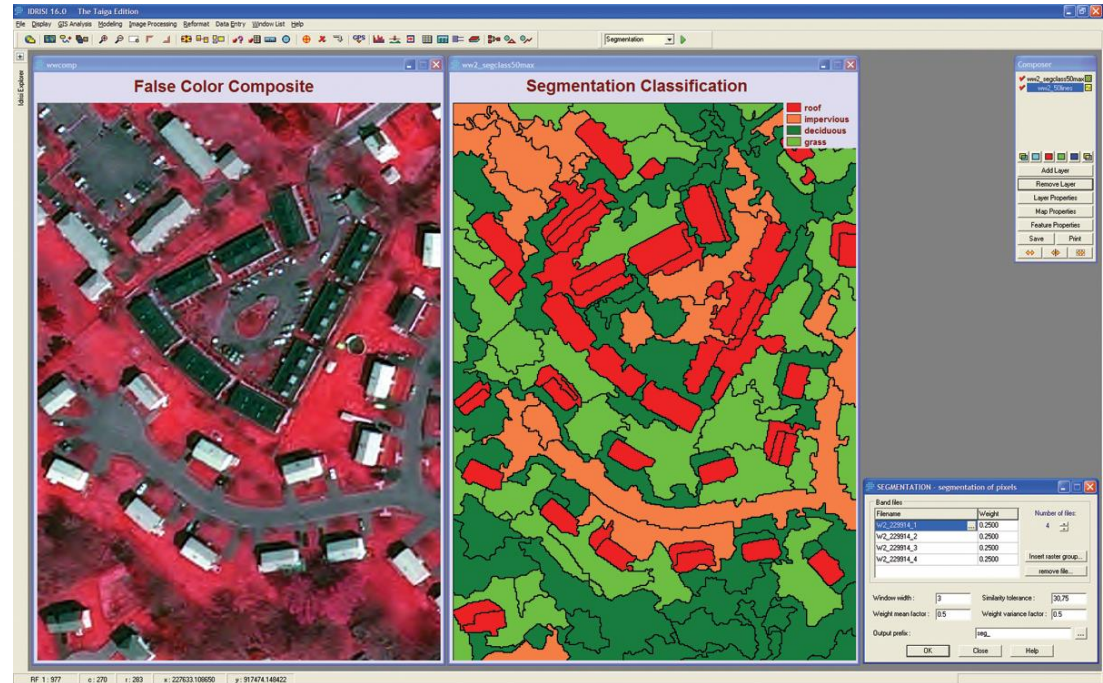




# Intro: Image segmentation

Satellite image segmentation

Aerial photography  
for Woburn, Massachusetts  
in 2005.



Hidden Markov Random Field Model

# Lesson agenda

1. Bayesian decision (1.5h)
2. Mixture model (2h)
3. HMC model (2h)
4. Practical Work (4h) to develop an algorithm in *Python*

Slides, exercise and lab statements collected at:

<http://perso.ec-lyon.fr/derrode.stephane/Teaching.php>