« BAYESIAN LEARNING »
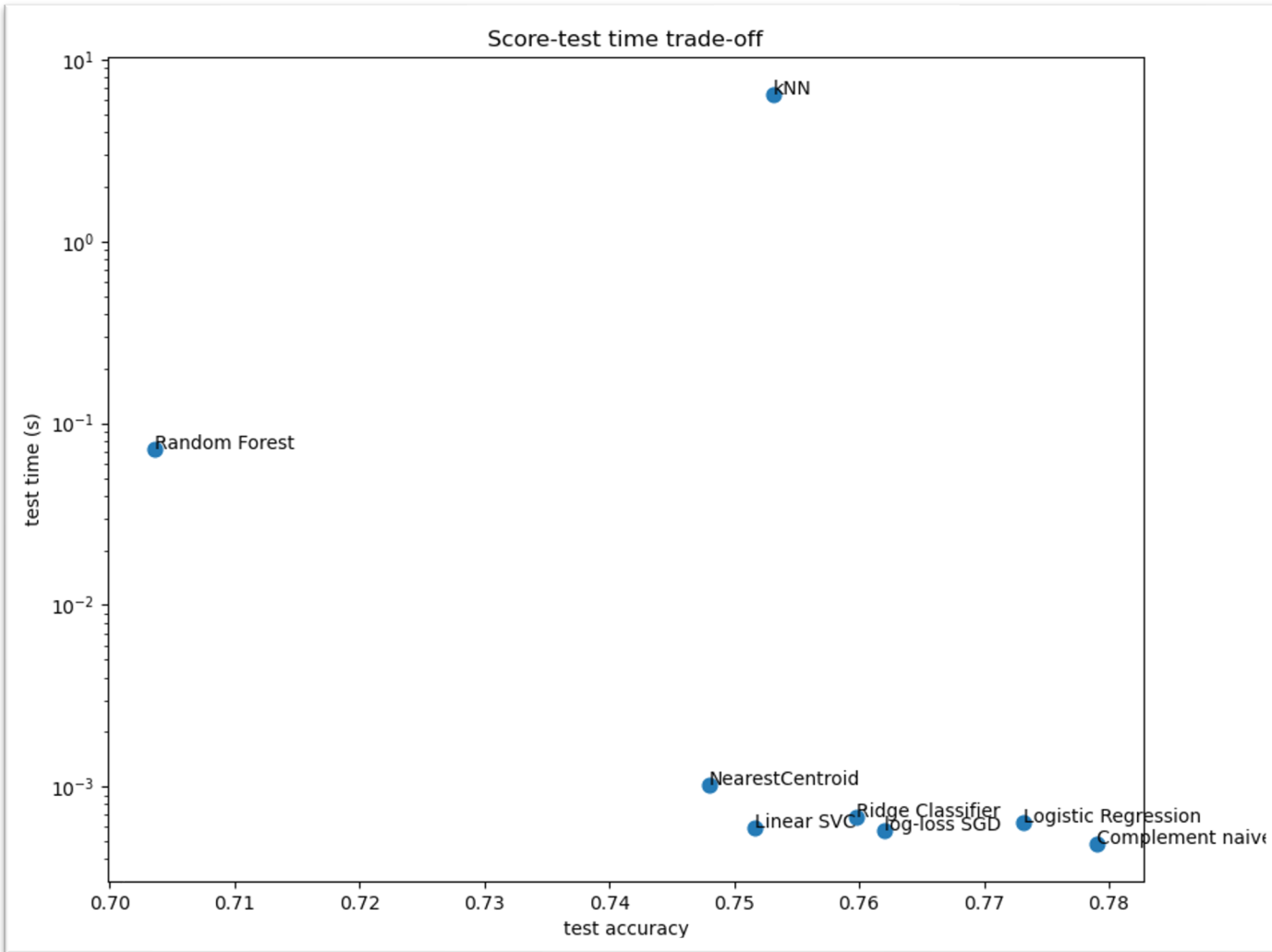## *INTRODUCTION*

Stéphane Derrode, Dpt MI
stephane.derrode@ec-lyon.fr

Intro : IID classification

Independant data → IID model

Naive Bayes Classifier – Fisher's Iris Data

Intro: Text classification

https://iq.opengenus.org/text-classification-naive-bayes/

Intro: text classification

https://scikit-learn.org/stable/auto_examples/text/plot_document_classification_20newsgroups.html#sphx-glr-auto-examples-text-plot-document-classification-20newsgroups-py
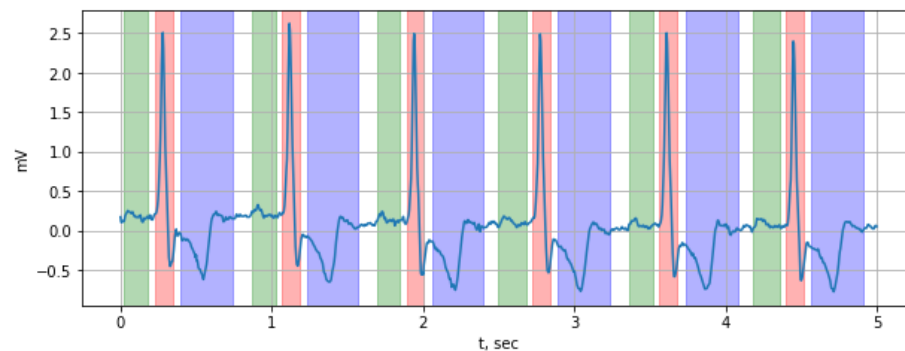
Intro: time series classification

Electrocardiogram
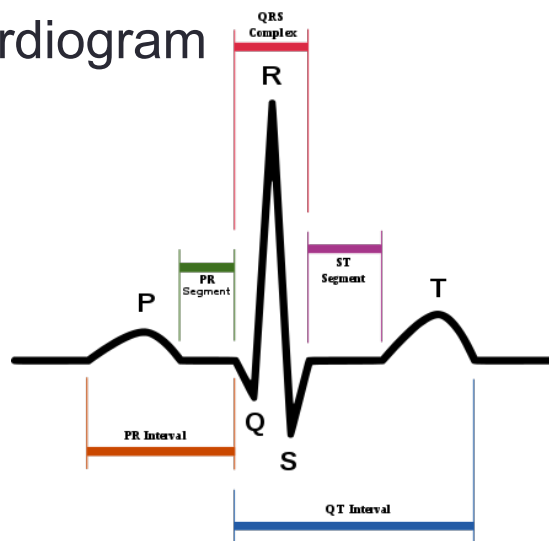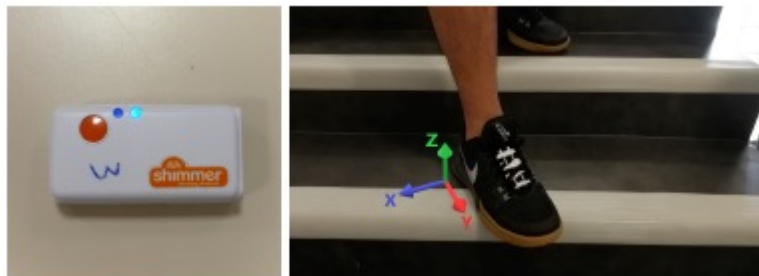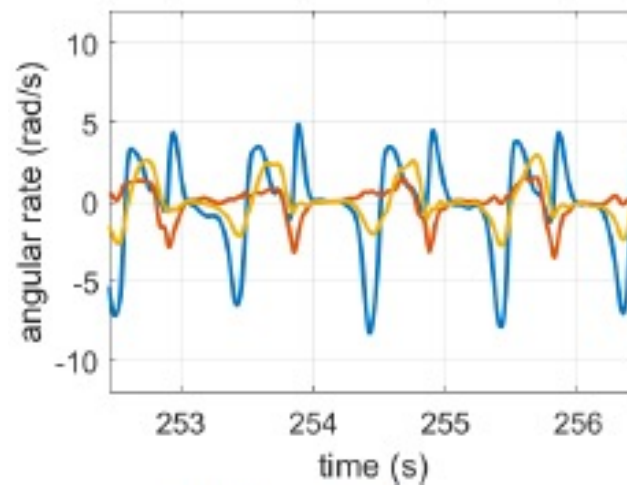
ECG signal annotation
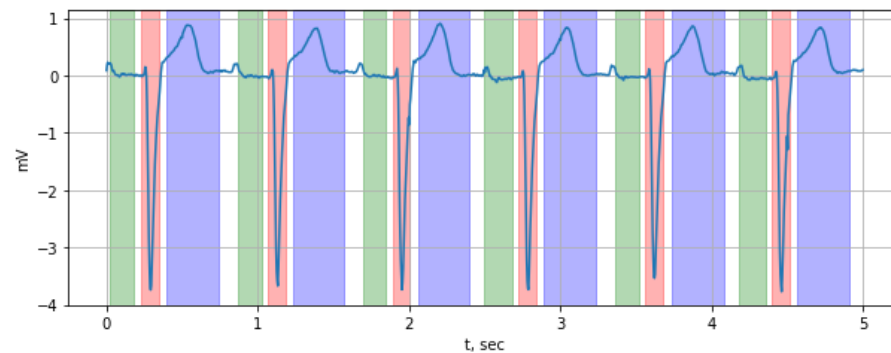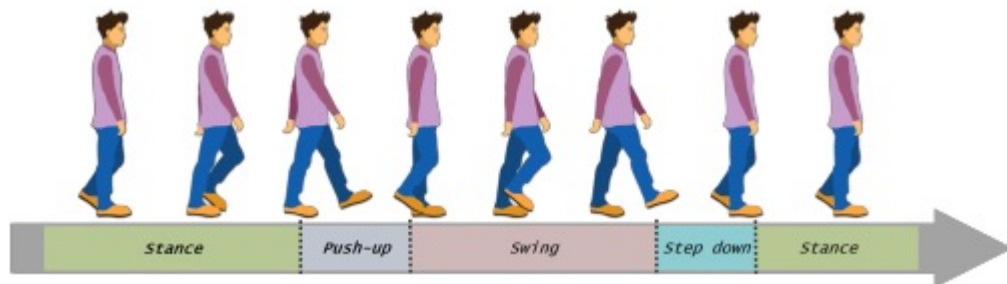
Hidden Markov chain

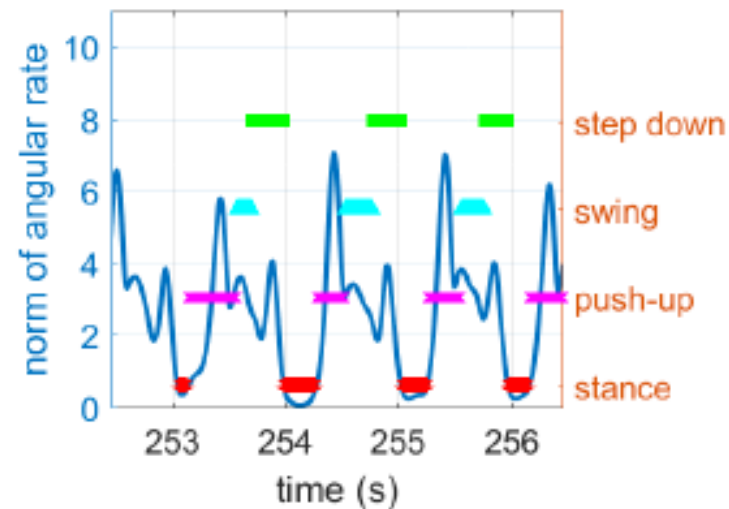# Application: Human activity monitoring

Inertial Measurment Unit

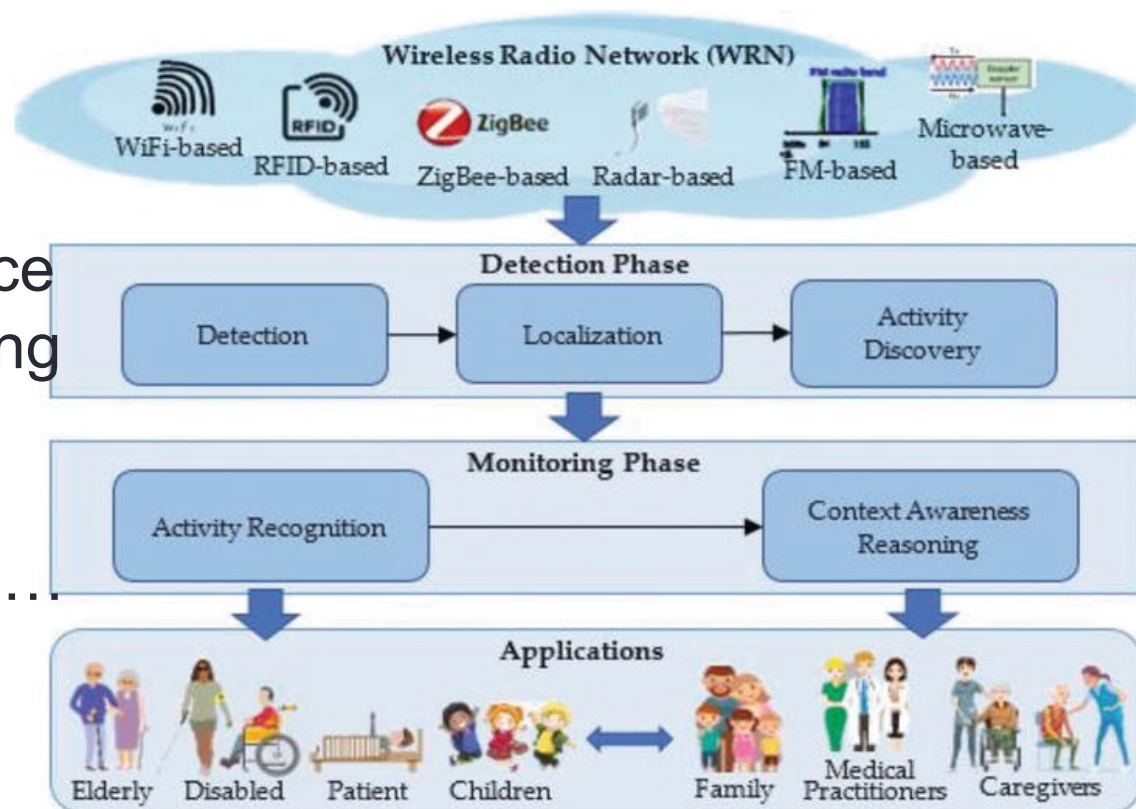(d) Stair descent.

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.

https://en.wikipedia.org/wiki/Handwriting_recognition
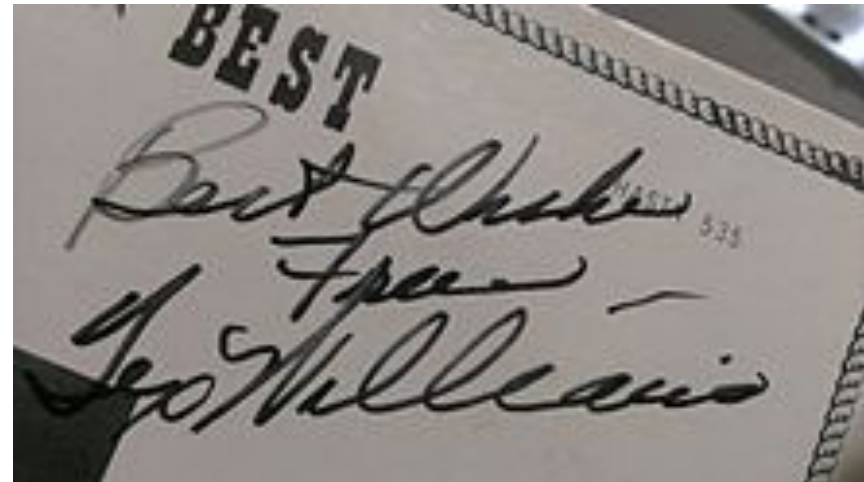
Intro: Image segmentation

Satellite image segmentation

Aerial photography
for Woburn, Massachusetts
in 2005.
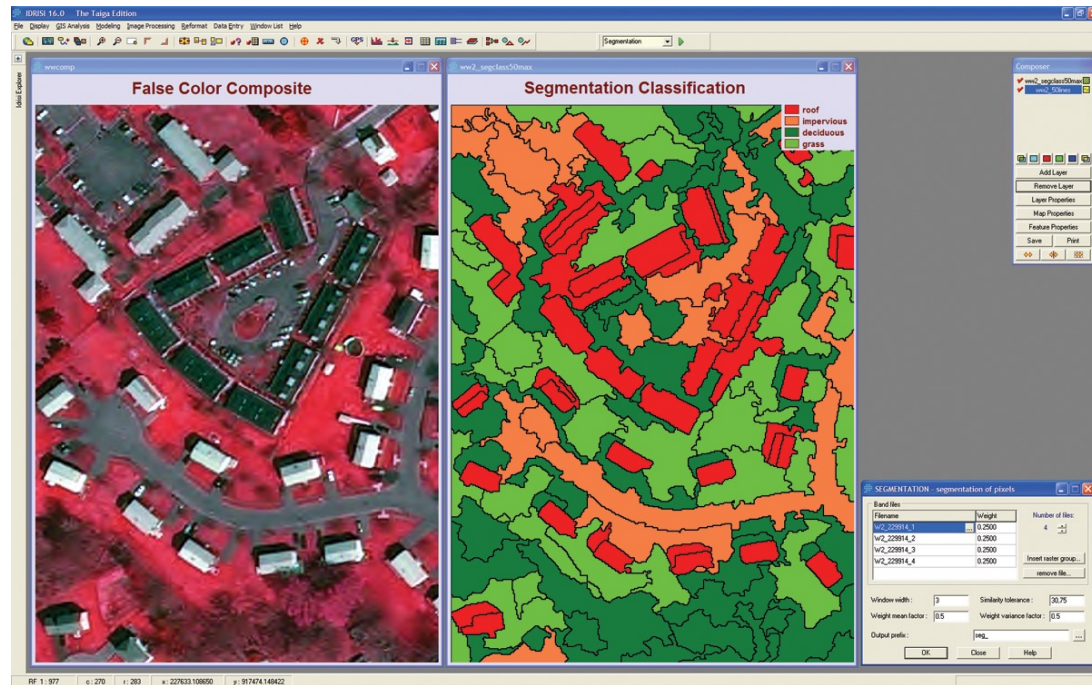
Hidden Markov Random Field Model

https://clarklabs.org/segmentation-and-segment-based-classification/
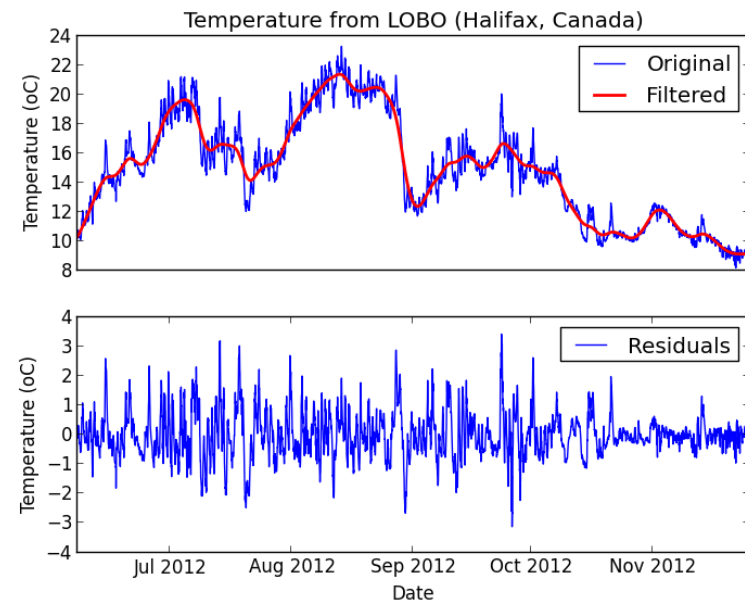
Intro: time series filtering

LOBO instrument (Land/Ocean Biogeochemical Observator)

Temperature data measured in the southwest edge of peninsular Halifax (Canada)

Kalman-like filtering

https://oceanpython.org/2013/03/11/signal-filtering-butterworth-filter/

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 (completed and updated periodically), exercise and lab statements collected at:
   http://perso.ec-lyon.fr/derrode.stephane/Teaching.php