« BAYESIAN LEARNING » INTRODUCTION

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Intro: IID classification

Independant data \rightarrow IID model





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



https://medium.com/data-analysis-center/annotating-ecg-signals-with-hidden-markov-model-56f8b9abd83a

Application: Human activity monitoring



Inertial Measurment Unit



(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...



https://www.intechopen.com/books/intelligent-video-surveillance/device-free-localization-for-human-activity-monitoring

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/

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