Module 1 :

Machine Learning Review

CAS Advanced Machine Learning : Module 1 Introduction

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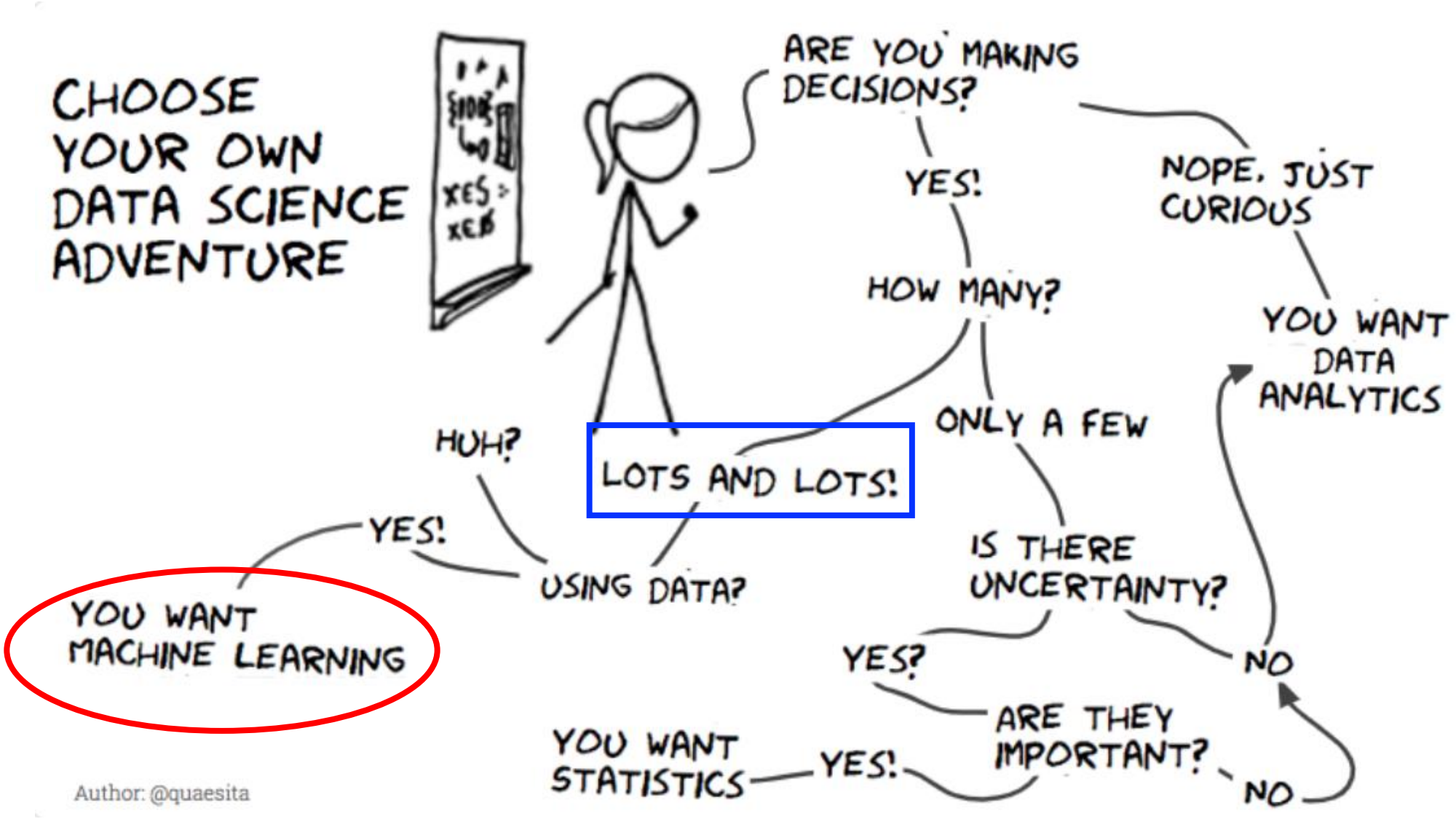
Welcome !


CHOOSE YOUR OWN DATA SCIENCE ADVENTURE
ARE YOU MAKING DECISIONS?
YES!
NOPE. JUST CURIOUS
HOW MANY?
YOU WANT DATA ANALYTICS
ONLY A FEW
LOTS AND LOTS!
HUH?
YES!
USING DATA?
IS THERE UNCERTAINTY?
YOU WANT MACHINE LEARNING
YES?
NO
ARE THEY IMPORTANT?
YOU WANT STATISTICS
YES!
NO
Author: @quaesita

Module 1 Learning Outcomes

- Know general concepts and methods of Machine Learning
- Can design, tune, and train Neural Networks
- Can measure performance of Neural Networks

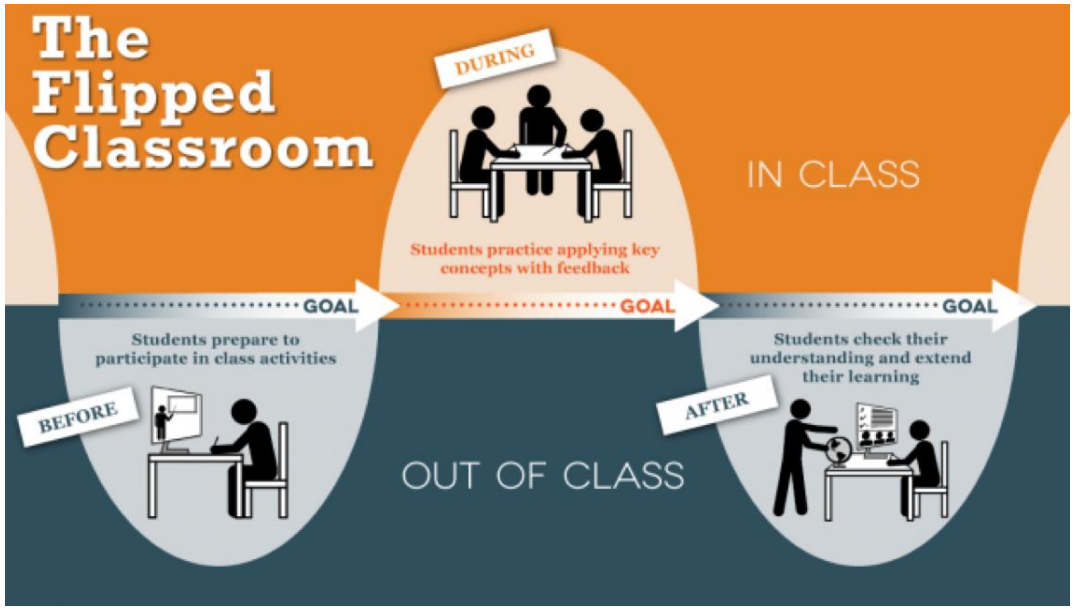
Learning Objectives

Learning objectives	• Learning Algorithms • Capacity, Over- and Under-Fitting • Hyper-Parameters and Validation Set • Estimators, Bias and Variance • Maximum Likelihood Estimation • Bayesian Statistics • Supervised Learning Algorithms • Unsupervised Learning Algorithms • Stochastic Gradient Descent • Building a Machine Learning Algorithm • Challenges Motivating Deep Learning

Teaching method

Inverted classroom based

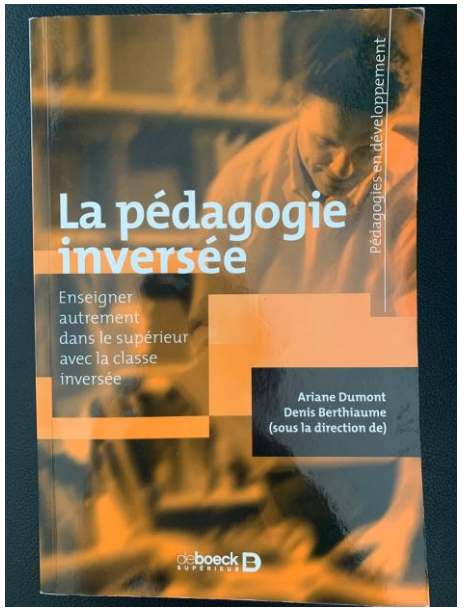
- Introduction lectures – as interactive as possible (videos, readings, exercises)
- Real content you learn yourself with the notebooks. *Either to put in practice your knowledge or to learn ahead of another lecture*
- Discussion sessions based on your questions and comments
- Everyday, a quiz to *test your knowledge and add complements*



Why

- Supposed to be better
- More fun
- Learning by doing

To give back sense to being present (Marcel Lebrun)



Inverted classroom in practice

- Lively discussion sessions every morning about previous Notebook
- Quizzes at the end of each day
- Presentations about chosen topic in groups
- Videos, exercises, readings, webpages to check out

Notebooks

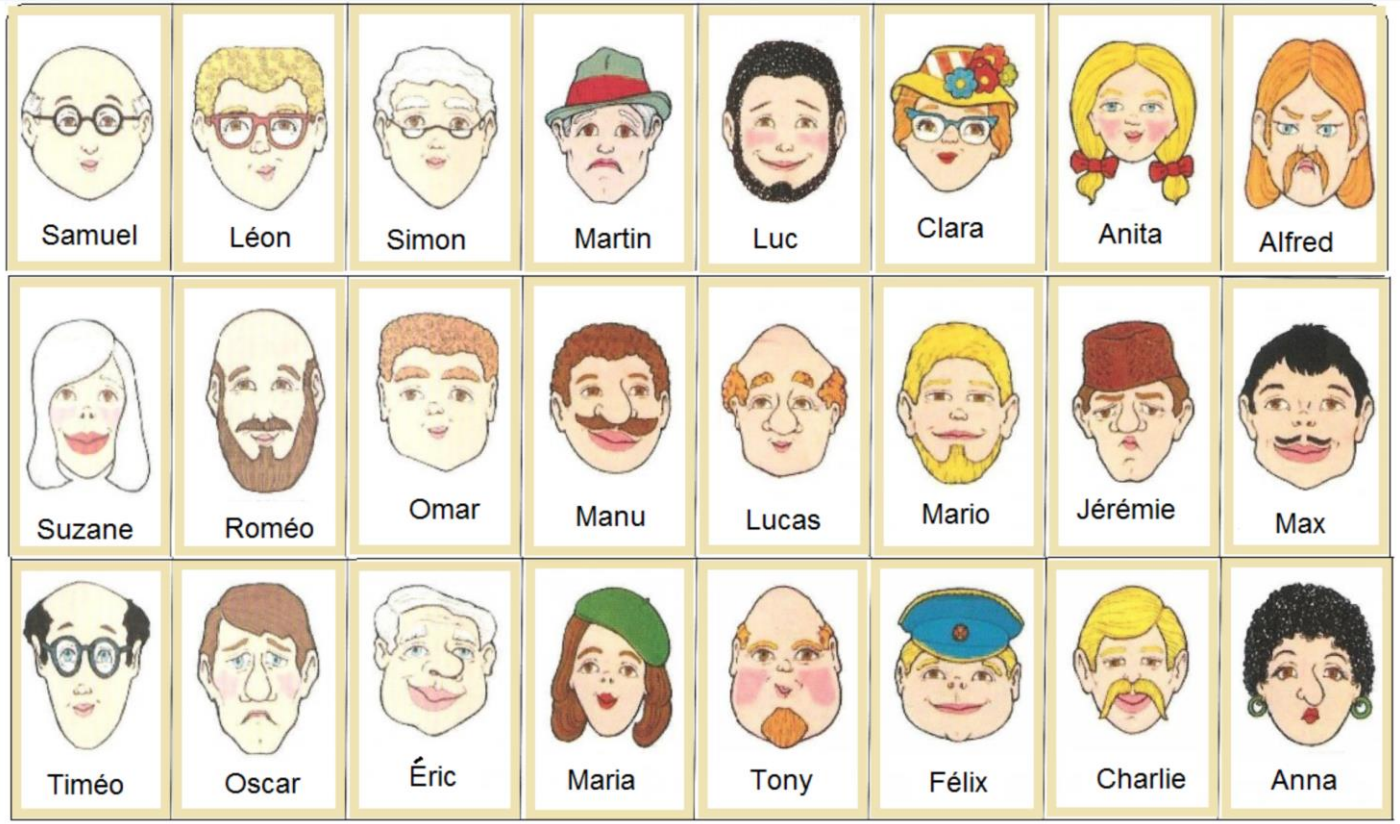
- Today, I will start presenting the first notebook
- On Wed,Thu,Fri,next Tue : discussions (30-45min) about the notebooks from the previous day
  - We will form four groups
  - One/several people will report what the notebook is doing
  - You will have some time in the morning (30min) to work on the notebooks, and the whole afternoon is planned for it

- For the practical side of the class (notebooks), please :
  - Use the CAS Forum (you have the link in Ilias)
  - Send me your questions by email (gconti.epfl@gmail.com)

Prerequisites

- Programming (python)
- Linear algebra calculus
- Statistics
- Some Machine Learning experience
  - CAS Applied Data Science (some concepts shared with Module 3)

About you ☺



https://www.socrative.com/

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About me ☺


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Bibliography

- Deep Learning book (Goodfellow, Bengio, Courville)
- Machine Learning @ Stanford (Prof Andrew Ng)
- Hands-On Machine Learning with Scikit-Learn & Tensorflow (Aurélien Géron)

The Project

- will cover modules 1 and 2 together
- If possible, in groups (2 or 3 people)
- if possible, all the parts on the same dataset
- Apply at least one method from each module on your dataset
- Results should be notebooks and presentation of 30 min max (date to be defined)

Feedback

- Feedback form to fill at the end of the module 1 (found on Ilias)

- Quizzes on Socrative every day
  - To check knowledge acquired during the lecture
  - To add new elements that complete the lecture