A Network Tour of Data Science

Lab Sessions

Teachers
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Assistants
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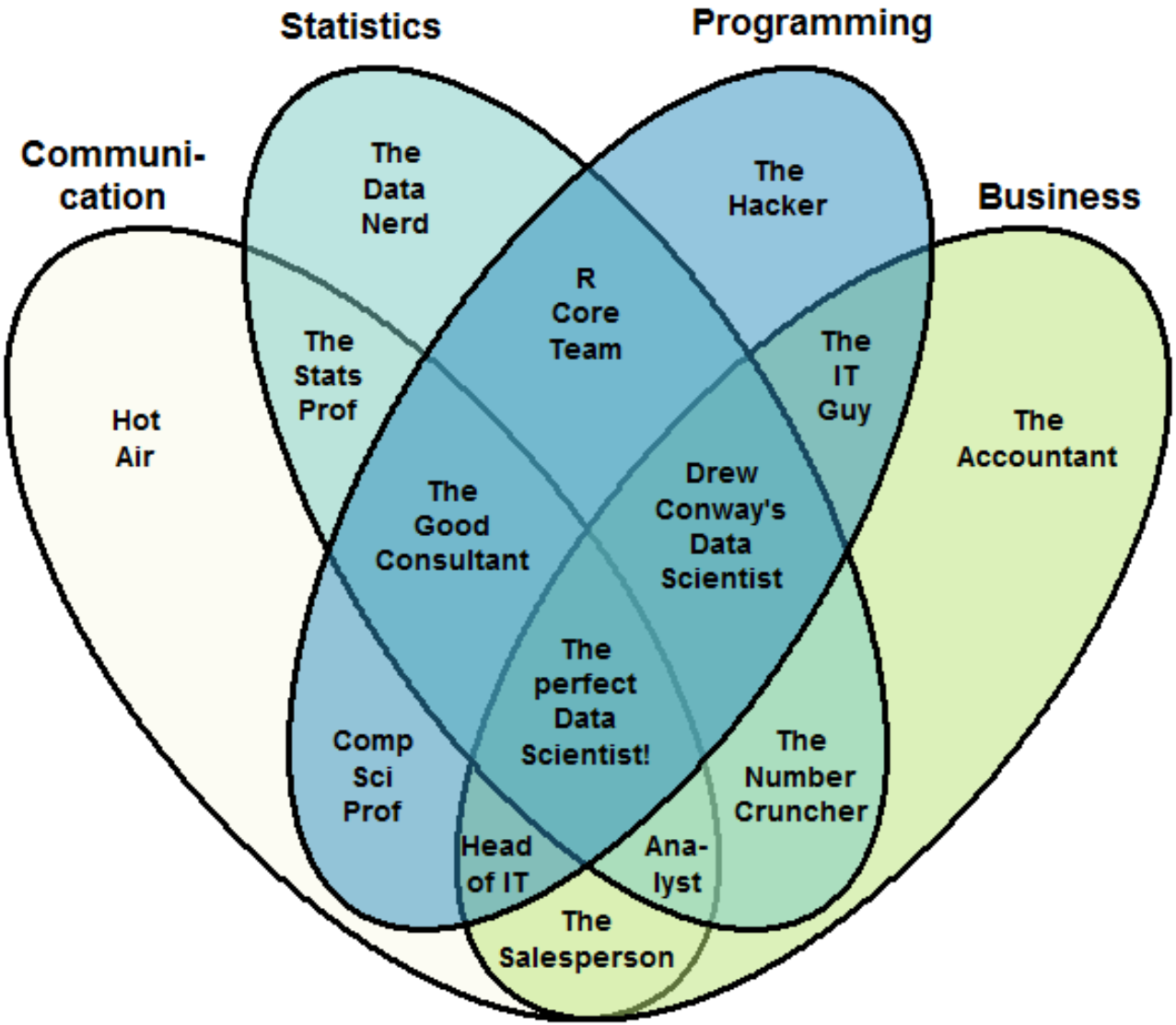
EPFL LTS2 & LTS4 laboratories

September 22, 2017

Data Scientist



Goal

Apply the material learned in class in a Data Science contest.

During the labs, we will:

- Demo tools, e.g. how to manipulate a graph in Python.
- Demo techniques, e.g. how to collect data from Twitter.
- Explain the assignments and give directions.
- Answer questions about the assignments and project.

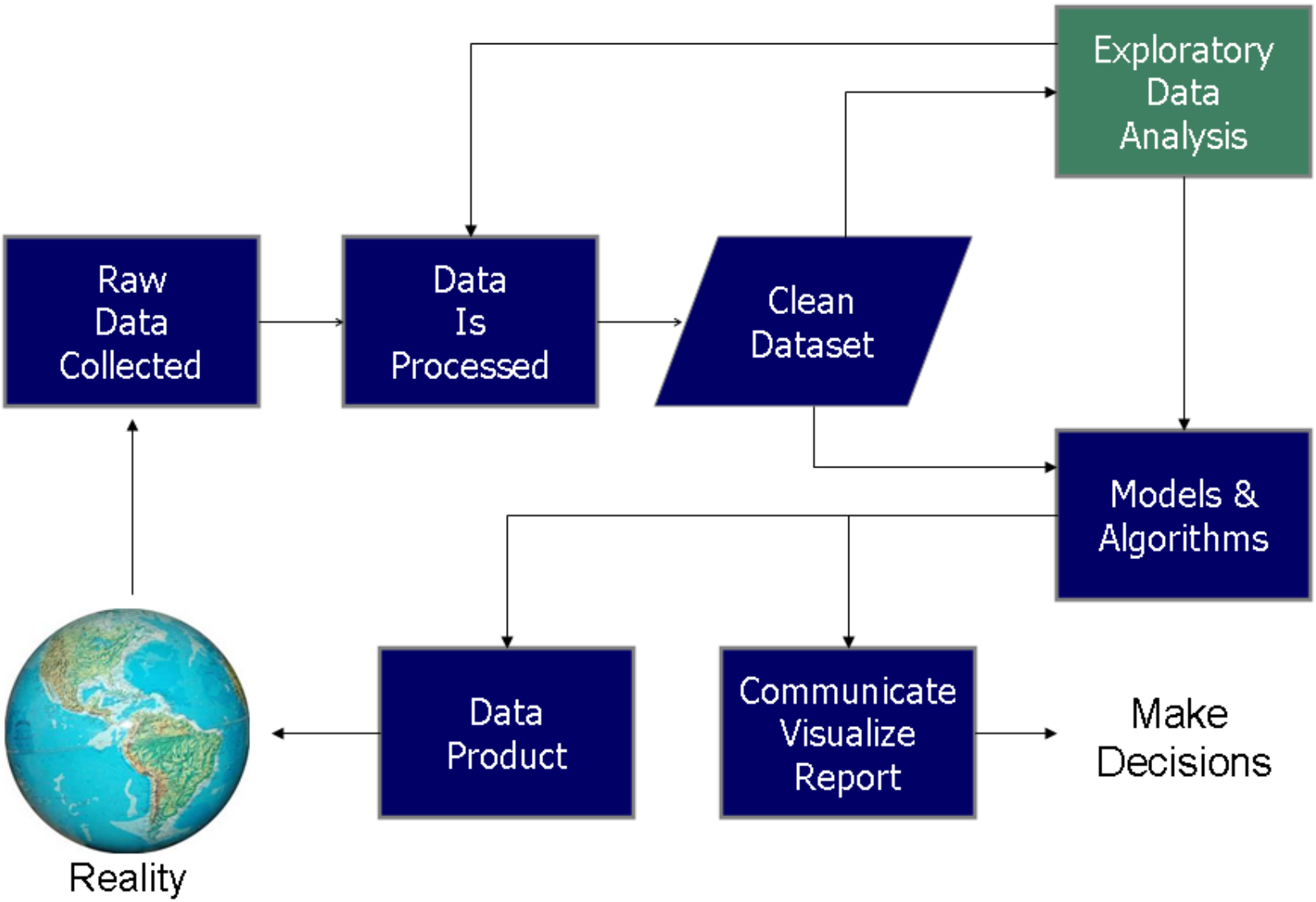
We expect you to:

- Bring your laptop.
- Work outside the hours on the assignments and project.

Schedule (tentative)

Sep 29	Data Science in Python
Oct 2	Lab 1 – Network properties
Oct 13	Lab 1 – Network properties
Oct 23	Lab 2 – Network models
Oct 30	Lab 2 – Network models
Nov 6	Lab 3 – Spectral graph theory
Nov 13	Lab 3 – Spectral graph theory
Nov 24	Project discussion
Nov 27	Lab 4 – Graph signal processing
Dec 4	Lab 4 – Graph signal processing
Dec 11	Lab 5 – Machine learning
Dec 18	Lab 5 – Machine learning
Dec 22	Project discussion

Data Science Process



Tools

Python scientific stack + git

To be installed with Anaconda:

- Python: programming language
- IPython: interactive computing
- NumPy: N-dimensional arrays
- SciPy: scientific computing
- matplotlib: visualization
- pandas: data analysis
- NetworkX: network science
- graph-tool: network science
- PyGSP: graph signal processing

Grading

1. 50% assignments (reports)
   $\rightarrow$ the continuous evaluation.

2. 50% project (report & presentation)
   $\rightarrow$ the final exam!

Assignments

1. Template notebook with instructions given on Githbub.
2. Two weeks to complete.
3. At least one lab session to ask questions.
4. Completed notebook to be handled on Moodle.
5. Solutions posted on Github.
6. Grades given on Moodle.

Topics from lectures, with a Data Science taint:

1. Network properties
2. Network models
3. Spectral Graph Theory
4. Graph Signal Processing
5. (Machine Learning)

Project

1. Proposal: define a problem you are interested in.
   - Single page document. Organize yourselves in groups.
   - Deadline in November (to be confirmed). Upload on Moodle.
   - Not graded. Discussion with TAs will follow.

2. Report: your solution, using the theory seen in class and the practical skills trained during labs.
   - Jupyter notebook with text, math, code, analyzes and results.
   - Deadline in January (to be confirmed). Upload on Moodle.
   - Graded.

3. Presentation: impress us!
   - Presentation of 15 minutes in front of the class.
   - Held in January (to be confirmed).
   - Graded.

PROJECT NTDS
Face Emotion Recognition

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

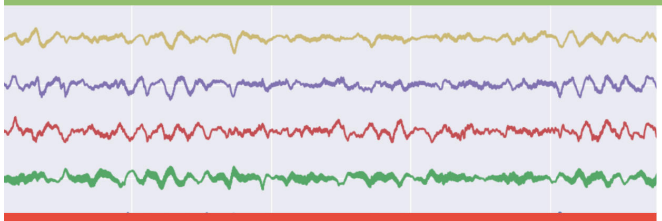
Patryk OLENIUK
Carmen GALOTTA

How Do Fake-News Go Viral?

Or why Bernie Sanders could replace Trump with little-known loophole.

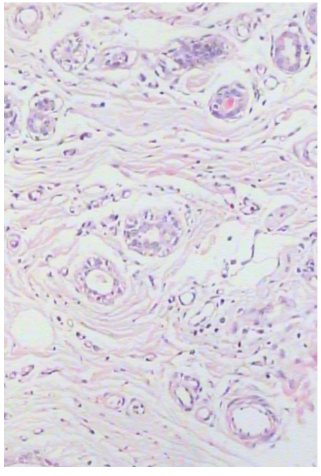
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE
EE-558: A Network Tour of Data Science

William Trouleau & Victor Kristof



Epileptic Seizures Prediction

Sophie du Bois



The ClaFISHicator

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Open Source Software Support
A Network Tour of Data Science

Matthaios Olma
Pavlos Nikolopoulos
Stefanos Skalistis

BREAST CANCER CLASSIFICATION
based on histopathological images

by:
Robin Demesmaeker
MA3, EE

Predicting an Election from Tweets

Michaël Juillard, Mikhail Vorobiev, Chiara Ercolani
A Network Tour of Data Science
18th January 2017

Data Acquisition Pipeline

Scrape Facebook posts

Add BuzzFeed ratings

Add political orientation

For all posts in 2016:

- Post id
- Time of creation
- Type of post
- Text message of the post
- Number of shares
- Number of comments
- Number of reactions

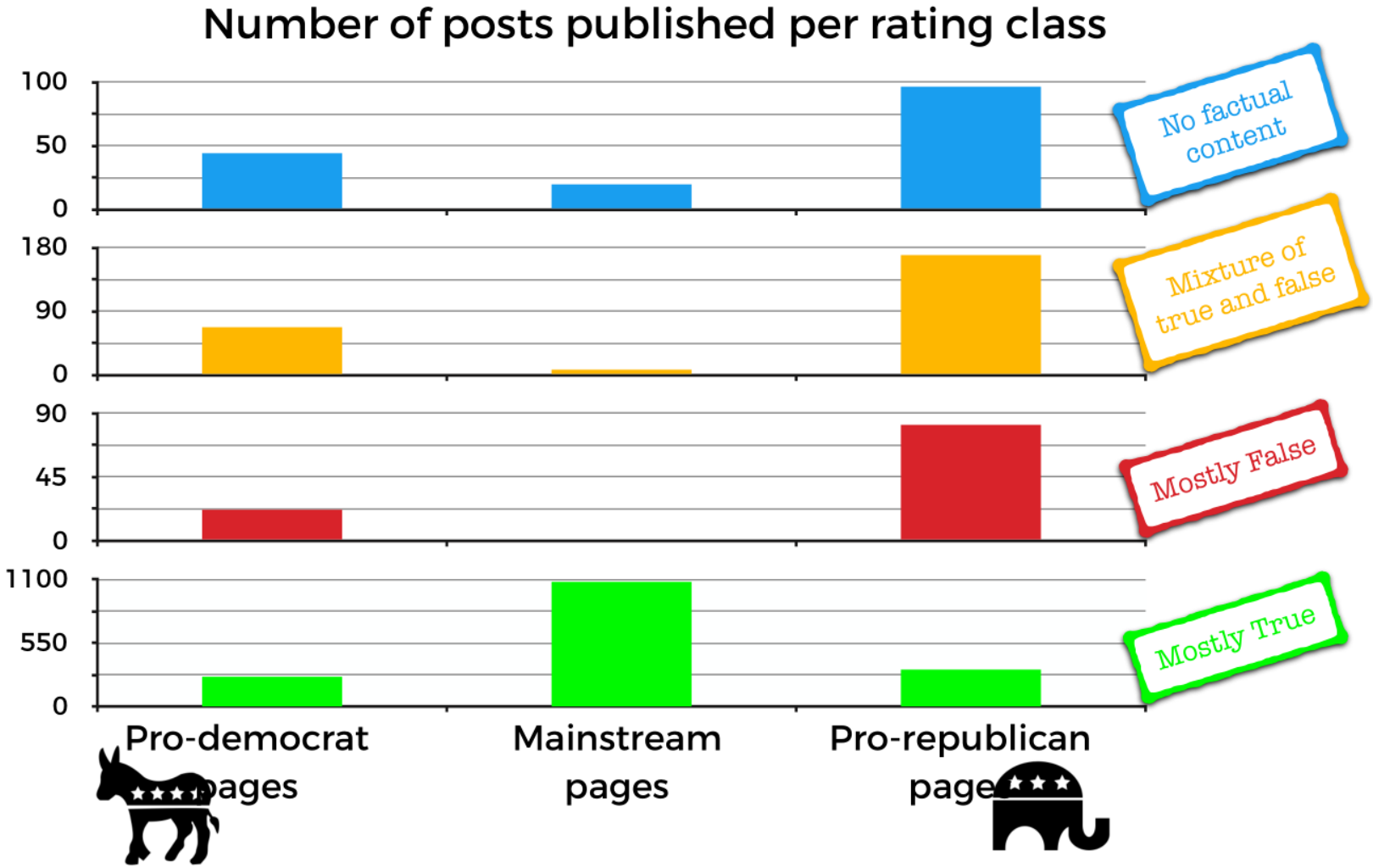
Add BuzzFeed rating:

- Mostly true
- Mixture of true and false
- Mostly False
- No factual content

Add political orientation category:

- Pro-democrat page
- Pro-republican page
- Mainstream page

How much can we trust these pages?



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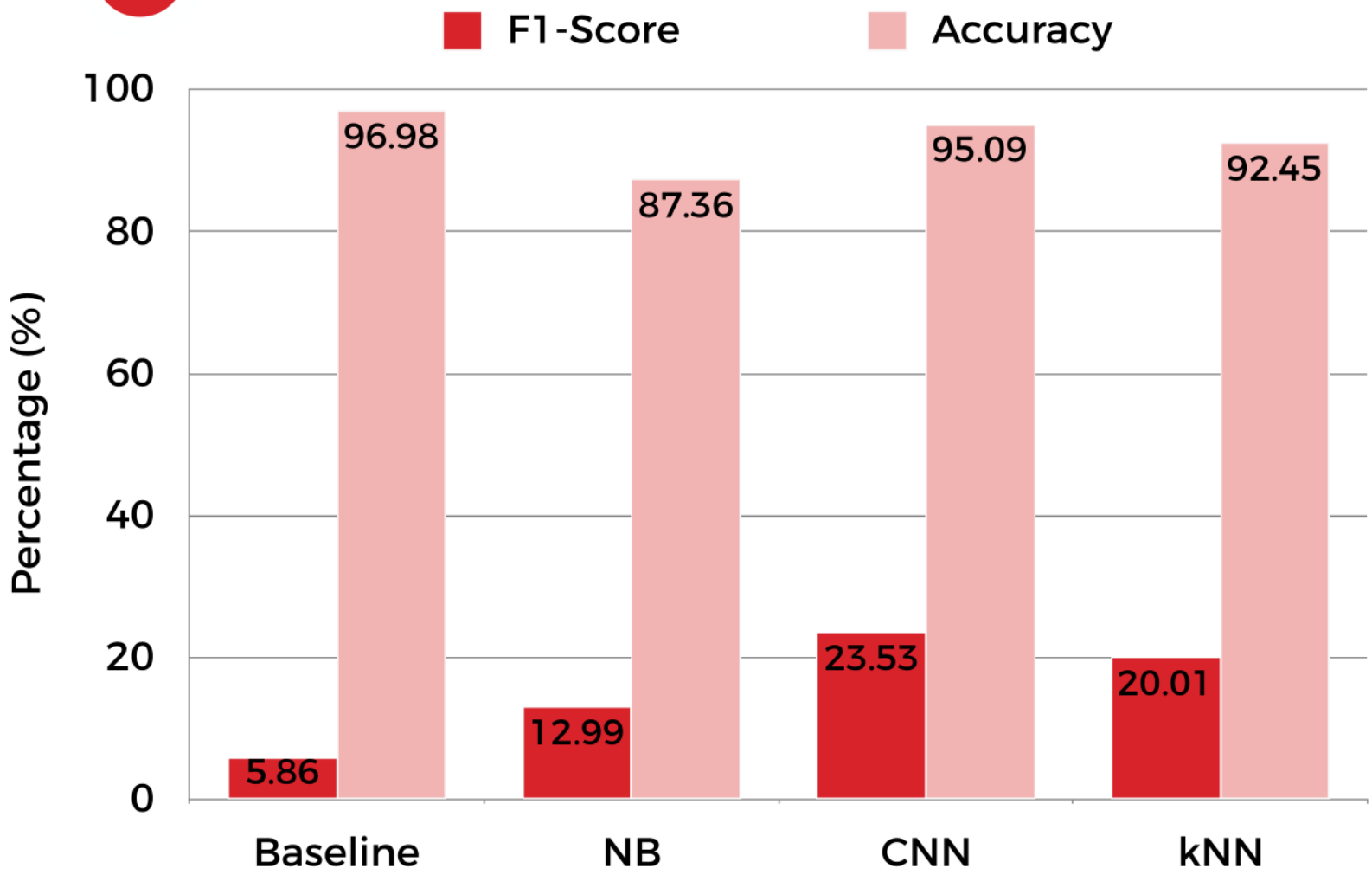
Evaluation: k-Nearest Neighbors



Online

Moodle: `https://moodle.epfl.ch/course/view.php?id=15299`

- Slides.
- Grades.
- Official announcements.
- Discussion forum.

GitHub: `https://github.com/mdeff/ntds_2017`

- Installation instructions.
- Demos.
- Assignments.
- Projects.

Questions?