COVID19 SYMPTOMS ANALYSIS USING TWITTER DATA

An end-to-end data science project

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Presentation of this session

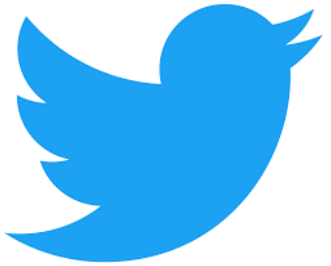
Giving you technical tools and basic understanding of how they work on a concrete example: a Twitter analysis of COVID19 symptoms.

→ We want to analyze the reception of the global pandemic on social media, and more specifically, COVID19 symptoms people might mention on Twitter.

Overview of this session	
Tweets collection	How to use the Twitter API and code example
Data preparation	Preprocessing and filtering of textual data
Data visualization	Interactive graphs using plotly
Modelization	Building a machine learning classifier

All ressources and notebooks:
https://github.com/Naila-elh/CRI_BigDataCourse_2020

TWITTER API



Requirements: create a developer's account on https://developer.twitter.com/en

Ressources:

- Official API documentation: https://developer.twitter.com/en/docs/twitter-api
- Python package *tweepy*: http://docs.tweepy.org/en/latest/index.html

Some requests examples:

- Get user timeline: get historical data, up to the 3,200 last tweets of a user *(ref: API | tweepy)*
- Streaming: get real-time sampled data (1%) + filter *(ref: API | tweepy)*
- Lookup user: get information – screen name, description, profile picture – on a user *(ref: API | tweepy)*
- Followers_ids: get a user's followers *(ref: API | tweepy)*

TWITTER API

→ Tweets as **json** objects


```
{
  "created_at" : "Thu Apr 06 15:24:15 +0000 2017" ,
  "id_str" : "850006245121695744" ,
  "text" : "1\/ Today we\u2019re sharing our vision for the future of the Twitter API platform!\nhttps:\/\/t.co\/XweGngmxlP"
  "user" : {
    "id" : 2244994945 ,
    "name" : "Twitter Dev" ,
    "screen_name" : "TwitterDev" ,
    "location" : "Internet" ,
    "url" : "https:\/\/dev.twitter.com\/" ,
    "description" : "Your official source for Twitter Platform news, updates & events. Need technical help? Visit https:\/\/
  } ,
  "place" : {
  } ,
  "entities" : {
    "hashtags" : [
    ] ,
    "urls" : [
      {
        "url" : "https:\/\/t.co\/XweGngmxlP" ,
        "unwound" : {
          "url" : "https:\/\/cards.twitter.com\/cards\/18ce53wgo4h\/3xo1c" ,
          "title" : "Building the Future of the Twitter API Platform"
        }
      }
    ] ,
    "user_mentions" : [
    ]
  }
}
```

TWITTER API

How we collected the tweets

Streaming
Filter : Île-de-France
Collecting 30 651 users

Timelines
On the 30,651 users
Historical data

Data cleaning
55M of tweets
Symptoms analysis

Updating timelines
On the 30,651 users
Dernière actualisation: 26/10/2020

SOME CODE EXAMPLE: streaming api ; get timeline api

DATA ANALYSIS

Aim: getting the tweets of people talking about their symptoms.

Preprocessing:

- Remove retweets (half of the dataset)
- Remove mentions (@mention) and url ([url])
- Dictionary of symptoms

Symptoms:

- Cough (toux, tousse)
- Fever (fièvre)
- Sore throat (maux de gorge, mal à la gorge)
- Headache (mal de tête, mal à la tête, mal de crâne)
- Breathing difficulties (difficultés à respirer, difficultés respiratoires, mal à respirer)
- Loss of taste and smell (perte du goût, perte de l'odorat)
- Symptom (symptôme)

HANDS ON! Notebook 3 - Data analysis and visualization

CITIZEN SCIENCE

Issue: many **false positives** in our tweets mentioning symptoms

Symptom before

« @mention J\'ai eu beaucoup de symptômes.. fin Février debut Mars, fin Mars (essoufflement quoi que je fasse) je suis donc allée chez le medecin, "c\'est le stress" 😰 je me reconnais dans ce Tread..' »

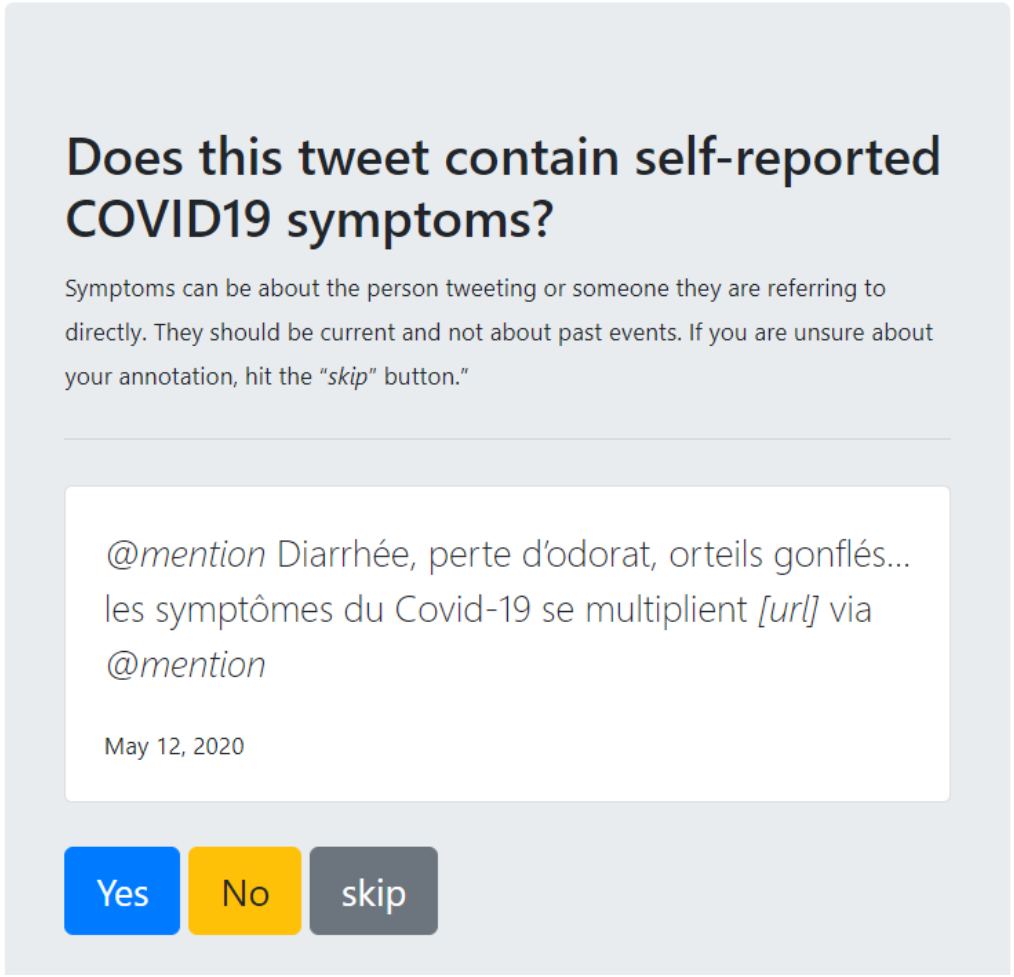
NOT a symptom

« Jcrois j'ai trop rigoler ojd j'ai mal à la gorge »

General news

« En cas de fièvre, privilégiez le paracétamol. En effet, les anti-inflammatoires comme l'ibuprofène, de part leur mécanisme d'action, peuvent aggraver l'infection ! 💊 En cas de doute, demandez conseil à un professionnel de #santé 🧑\u200d⚕️👩\u200d🔬 #COVID—19 [url] »

CITIZEN SCIENCE



What is this about?

In this study, we aim to create **a model of how tweets about self-reported COVID19 symptoms can help predict upcoming pandemic waves**, and more generally the rise and fall of the disease. To that end, we crawled public tweets from the Paris region filtered by symptoms keywords, and plotted them in time (see the graph below).

However, this filtering is very crude, e.g people don't only tweet about symptoms when they are currently falling sick, but also about that one time a year ago when they fell sick, or when talking about the general news.

To filter out such false-positives we need **your** help! Which of these tweets are describing an acute symptom and which ones don't? Your contribution will make a direct impact!

If you want to learn more about the people behind this project you can visit our *About* page.

Citizen science platform: https://covid-twitter.thecommons.science/

CLASSIFICATION

Based on the 7,300 annotations from the platform, can we predict which tweets are true positive?

Steps:

- Clean the labels: only consider tweets that have been labelled similarly several times
- Build the features from the textual data
- Train a classifier and tune the hyperparameters
- Define metrics to evaluate the results
- Plot the corrected curve

HANDS ON! Notebook 4 - Classification

THANK YOU!

Any questions, clarifications?

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