Multi-Class Email Classification Challenge

DSBA-FML: Foundations of Machine Learning

Fall 2020

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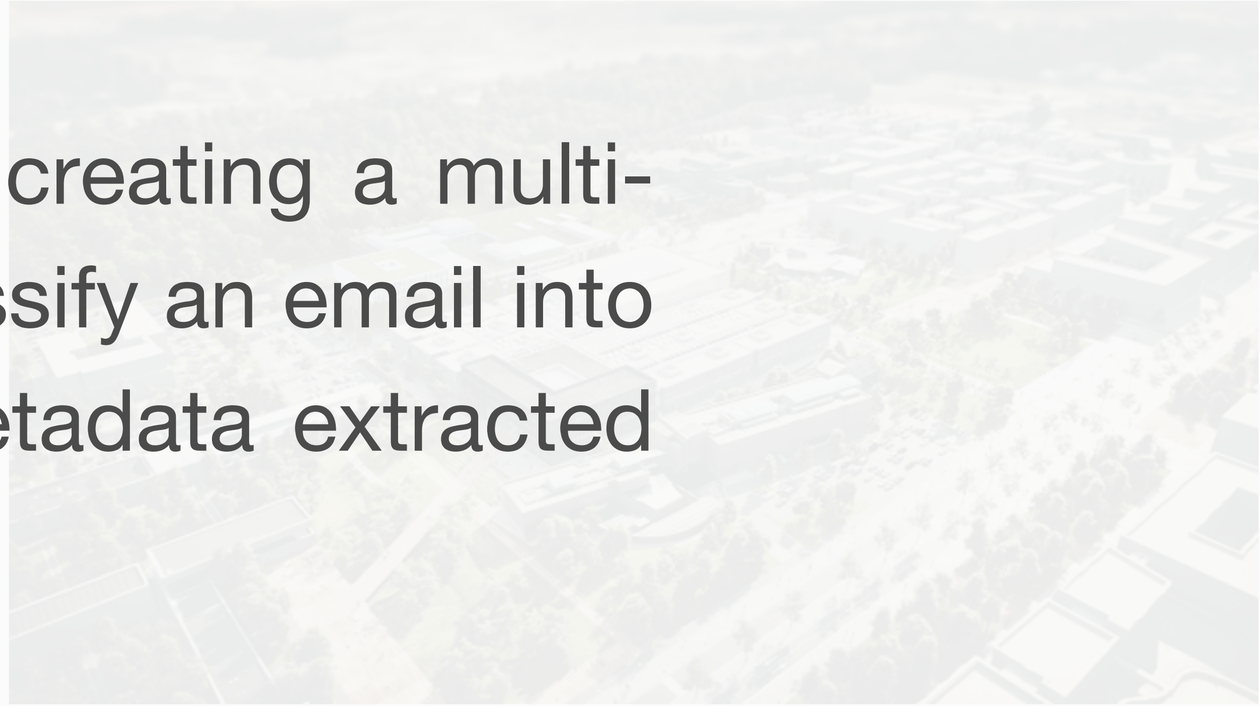
Motivation

We often face the problem of searching meaningful emails among thousands of promotional emails.

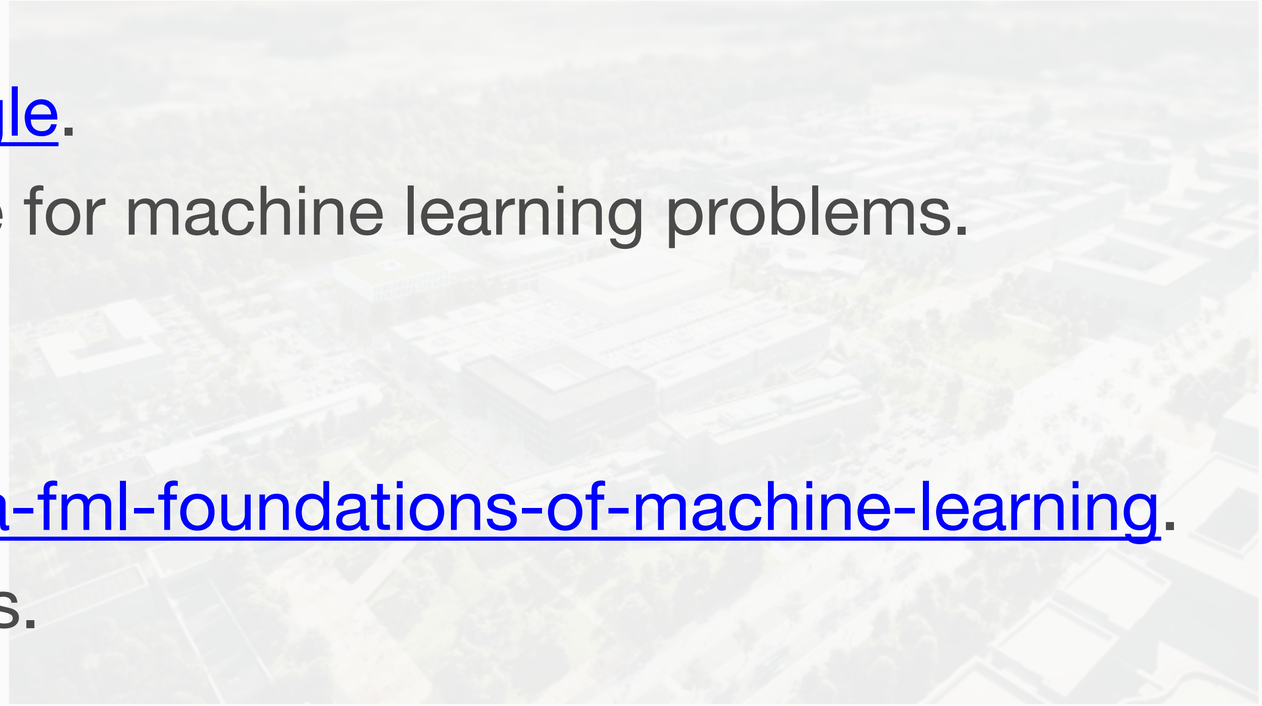
Challenge Goal

This challenge focuses on creating a multi-class classifier that can classify an email into eight classes based on metadata extracted from the email.



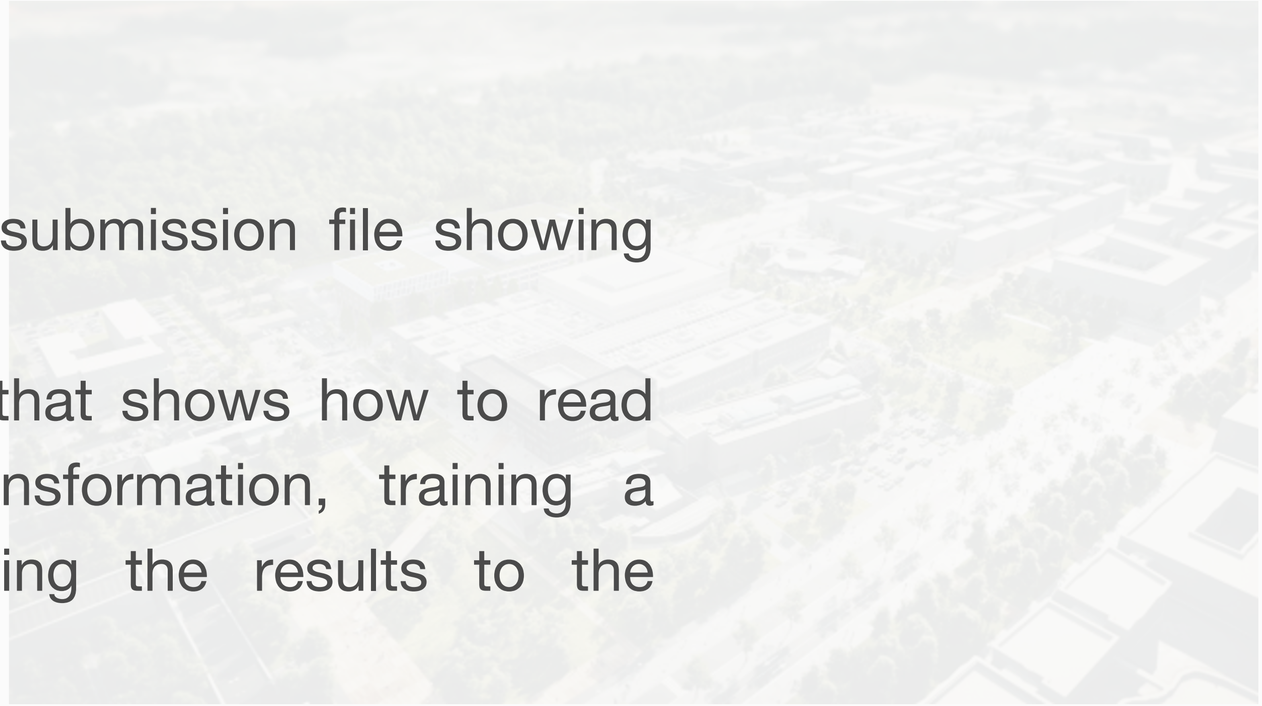
How to start with the challenge?

- The challenge is hosted on kaggle.
- Kaggle provides an online judge for machine learning problems.
- Register on kaggle.
- Go to the challenge at https://www.kaggle.com/c/dsba-fml-foundations-of-machine-learning.
- Accept the terms and conditions.



Data and Files

- train.csv - the training set
- test.csv - the test set
- sample_submission.csv - a sample submission file showing the correct format.
- skeleton_code.py - a python script that shows how to read the data, how to do feature transformation, training a benchmark knn solution, and writing the results to the submission csv file.



Dataset Features

- **date** - unix style date format, date-time on which the email was received, ***e.g. Sat, 2 Jul 2016 11:02:58 +0530***
- **org** - organisation of the sender, ***e.g. centralesupelec, facebook, and google.***
- **tld** - top level domain of the organisation, ***eg. com, ac.in, fr, and org.***
- **ccs** - number of emails cced with this email, ***e.g. 0, 2, and 10.***
- **bcced** - is the receiver bcc'd in the email. Can take two values 0 or 1.

Dataset Features (Cont.)

- **mail_type** - type of the mail body, ***e.g. text/plain and text/html.***
- **images** - number of images in the mail body, ***e.g. 0, 1, and 100.***
- **urls** - number of urls in the mail body, ***e.g. 0, 1, and 50.***
- **salutations** - is salutation used in the email? Either 0 or 1.
- **designation** - is designation of the sender mentioned in the email. Either 0 or 1.

Dataset Features (Cont.)

- **chars_in_subject** - number of characters in the mail subject, ***e.g. 0, 1, and 10.***
- **chars_in_body** - number of characters in the mail body, ***e.g. 10 and 10000.***
- **label** - label of this email. Eight classes are 'Updates', 'Personal', ‘Promotions’, 'Forums', 'Purchases', 'Travel', 'Spam', and ‘Social’. Class ids start from 0 to 7.

Class Labels (8 Classes)

- **0, Updates**: Mails from bank, insurance providers, etc. These emails are update on some kind of service that the email account holder has opted for. Mails about account statement, delivery of product, flight tickets, etc.

1, Personal: Mails from personal network

2, Promotions: Promotional/advertisement mails

3, Forums: Mails from professional groups

4, Purchases: Updates about purchases

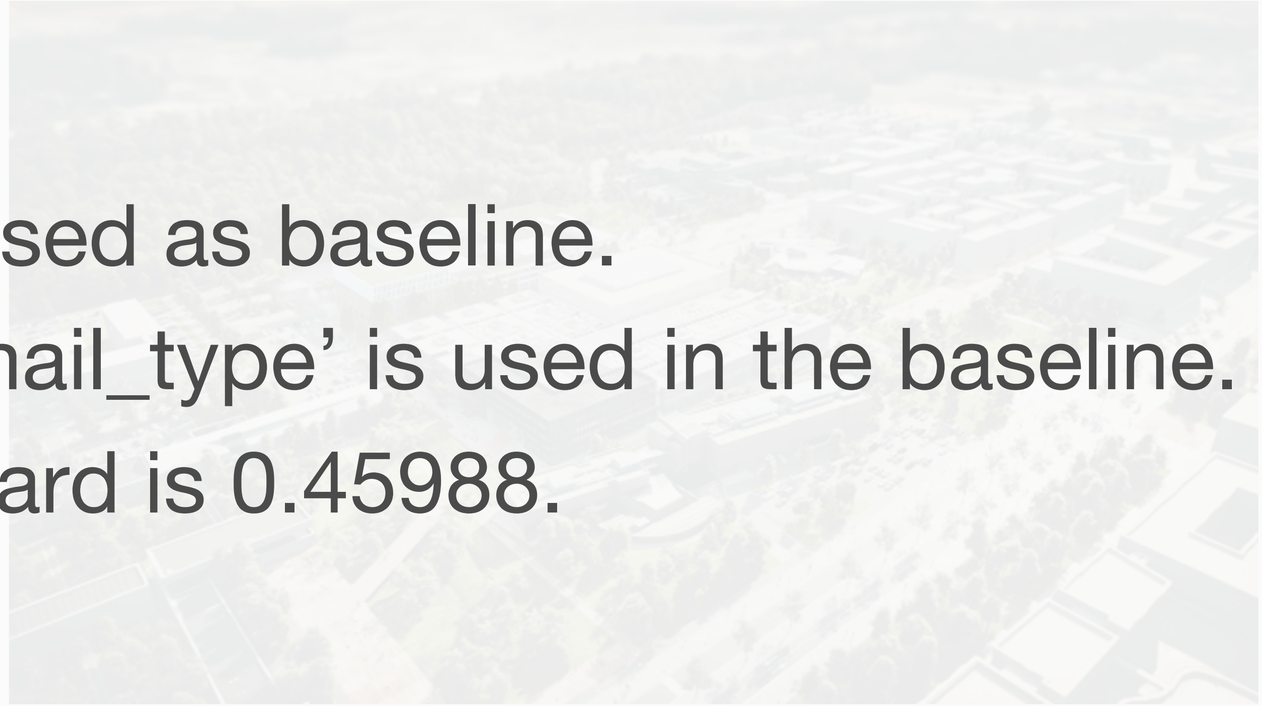
5, Travel: Advertisement about travel and tourism

6, Spam: Spam mails

7, Social: Mails from social networks

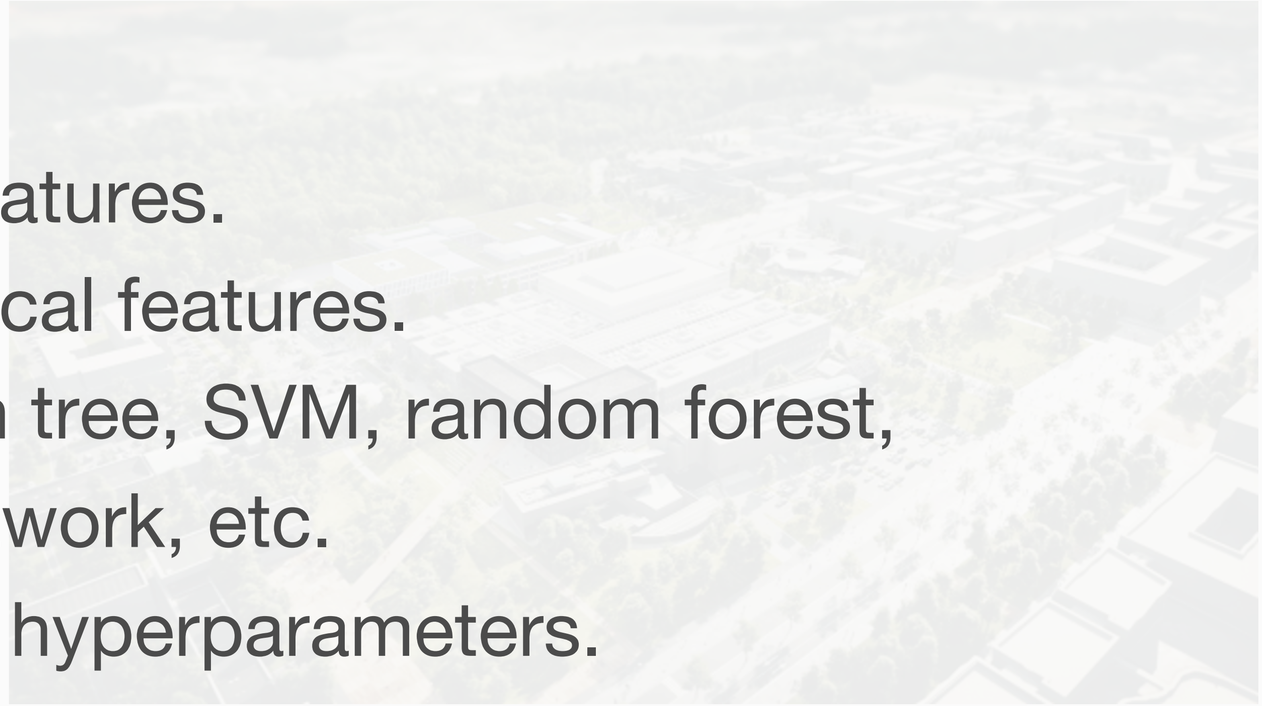
Baseline Model

- K-Nearest Neighbour is used as baseline.
- Only one of the feature ‘mail_type’ is used in the baseline.
  F1-score on the leaderboard is 0.45988.

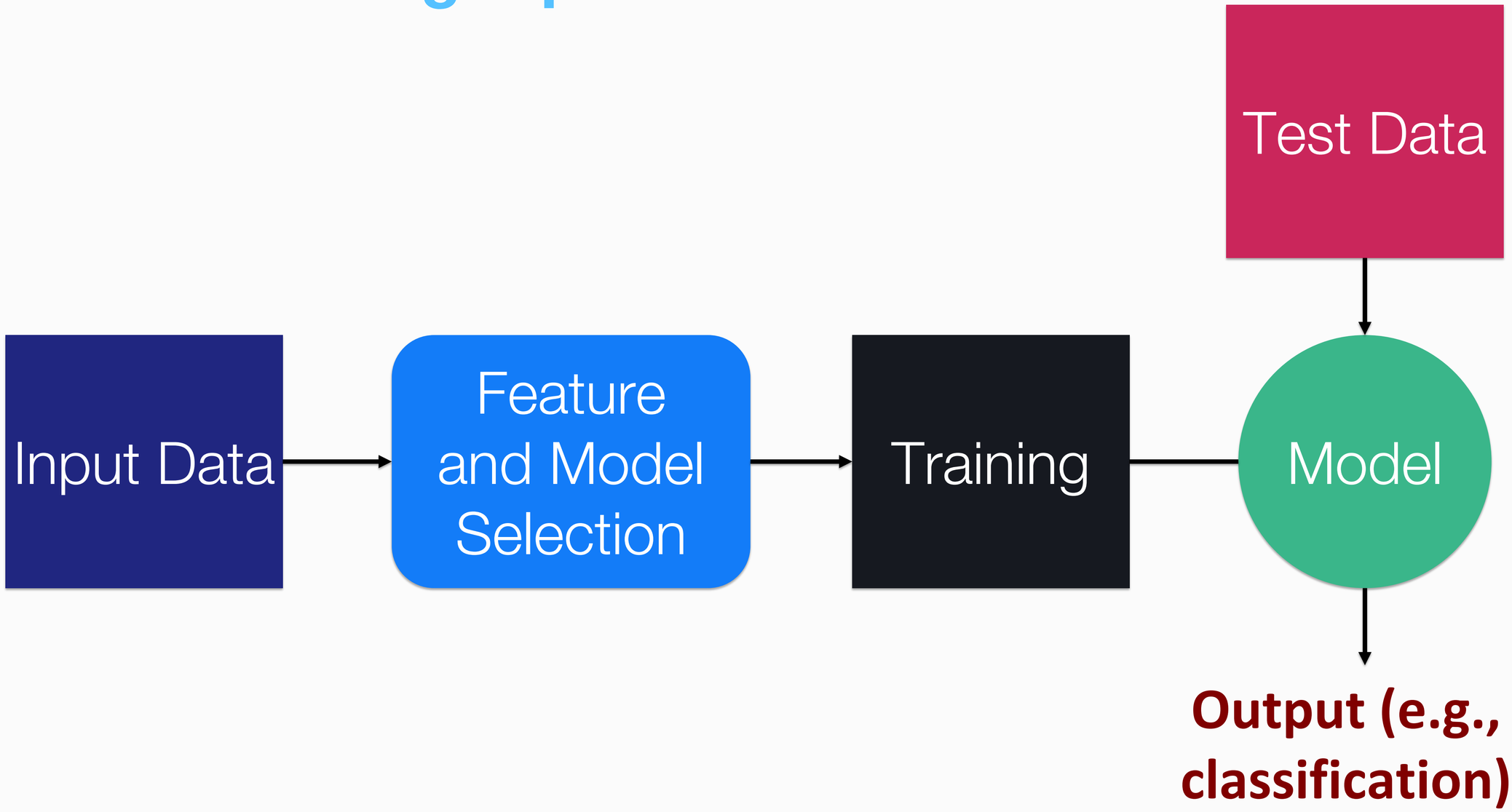


Improving the Baseline Model

- KNN with multiple features.
- Normalisation of numerical features.
- One hot encoding of categorical features.
- Trying other models: decision tree, SVM, random forest, logistic regression, neural network, etc.
- Grid search over models and hyperparameters.

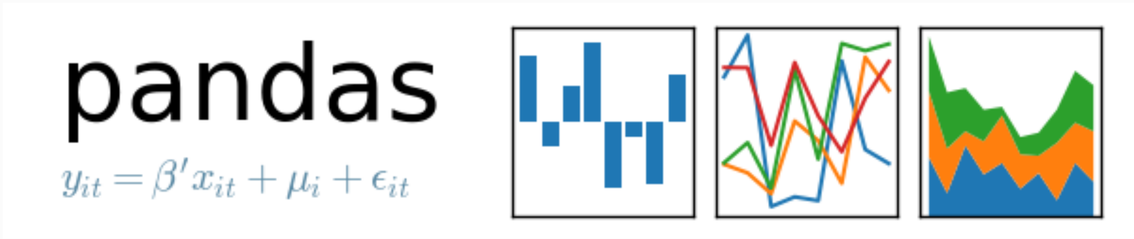


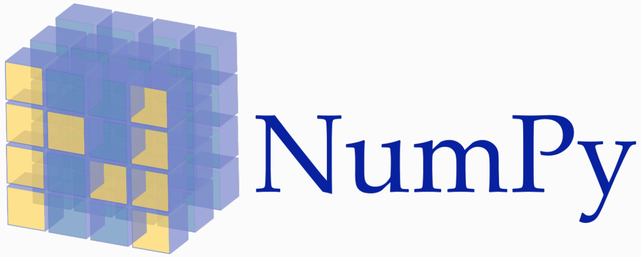
Machine Learning Pipeline



Software Tools

- Python libraries
- numpy
- scipy
- scikit-learn
- pandas
- anaconda includes almost all the required packages



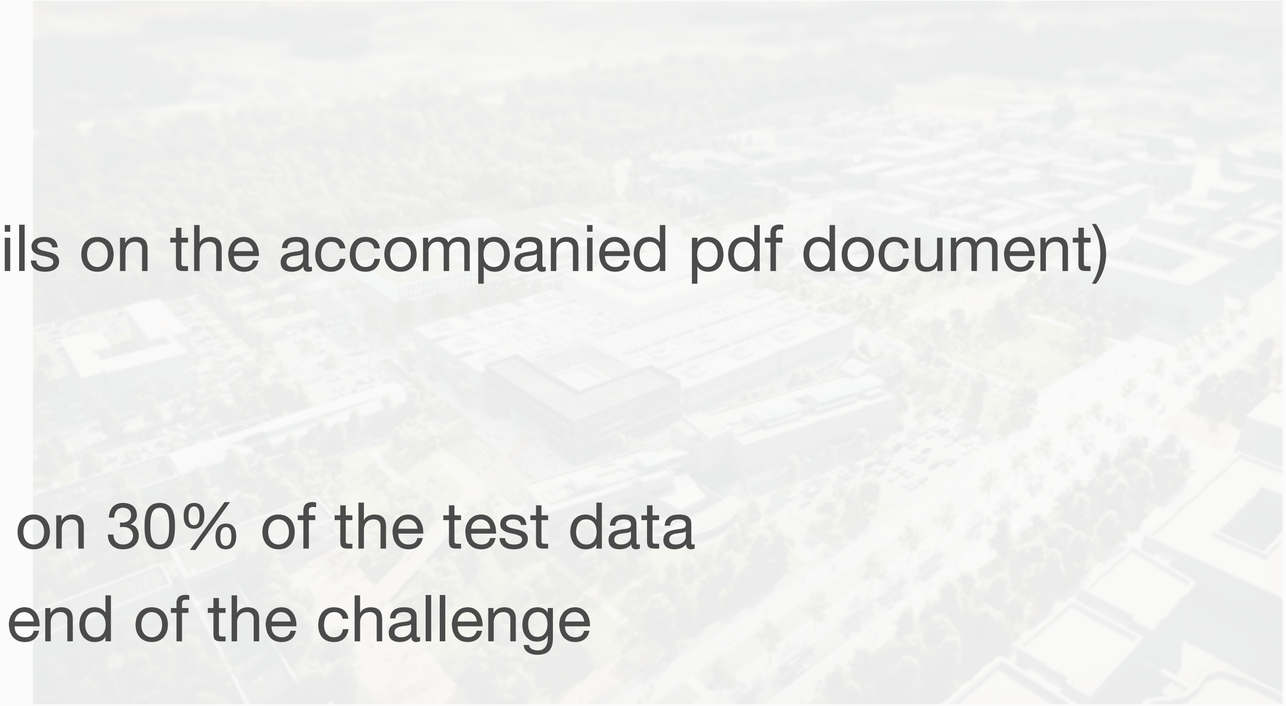


Submission Details

- Submission on kaggle (see the details on the accompanied pdf document)
- Your best performing model
- Leaderboard score

  Public: what you see - computed on 30% of the test data

  Private: will be announced at the end of the challenge



Deadline: November 29, 2020

- 11:00 PM: Submission deadline
- For any help contact Sagar

  Email: sagar.verma@centralesupelec.fr

Good Luck and Enjoy!