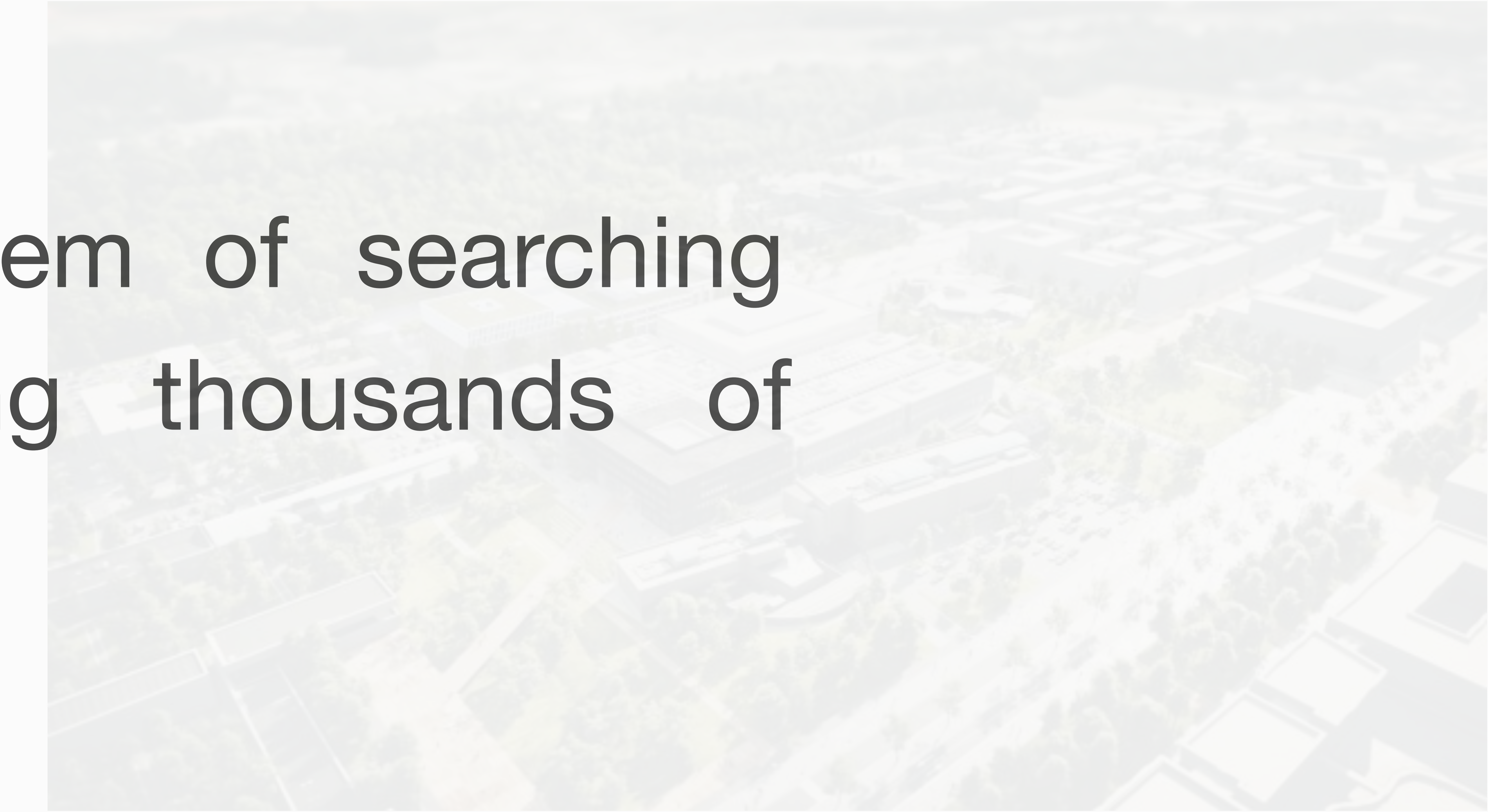
Multi-Class Email Classification Challenge

2EL1730 - Machine Learning

Assignment 2 - Kaggle Challenge

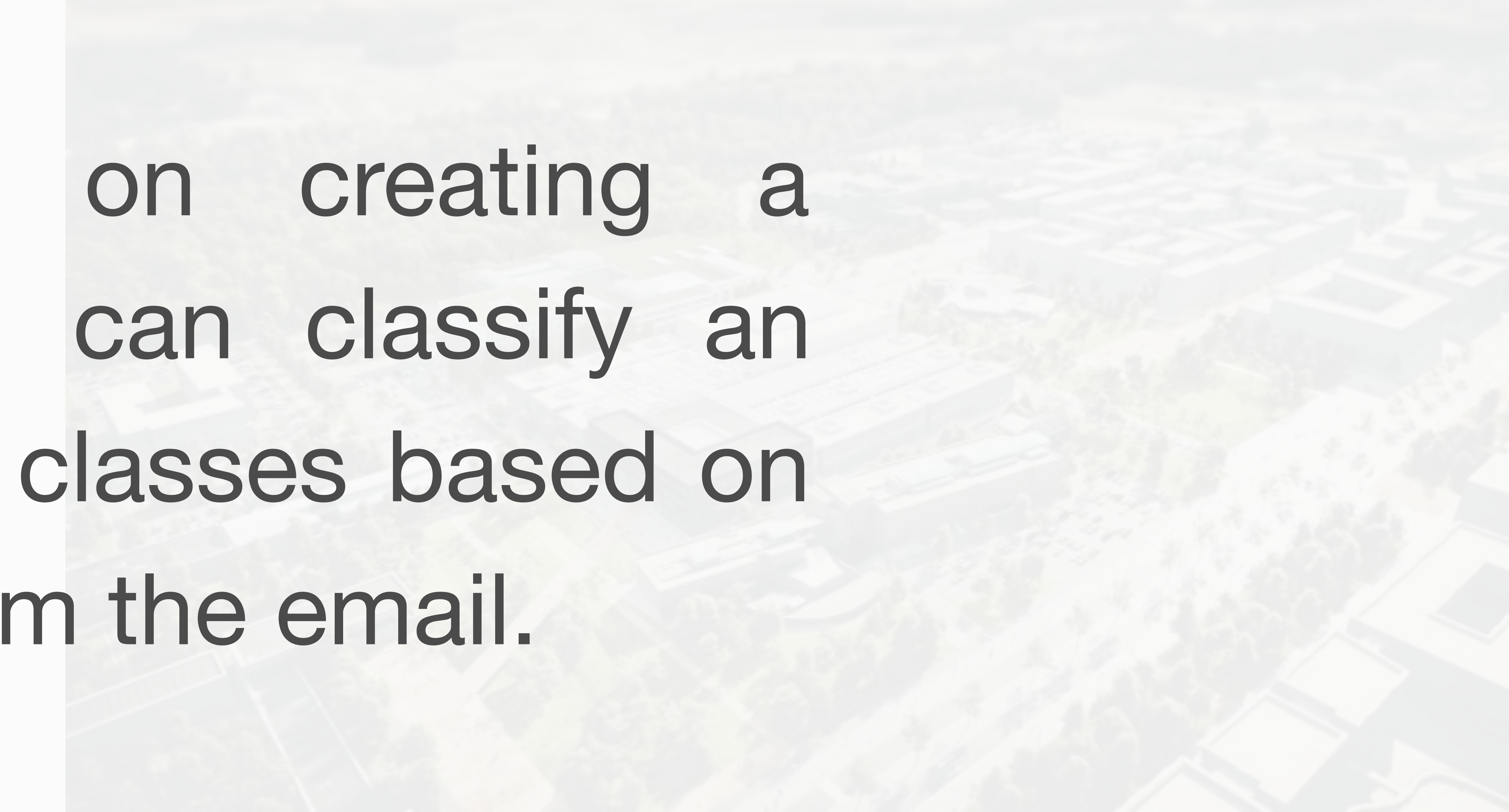
CentraleSupélec

Motivation



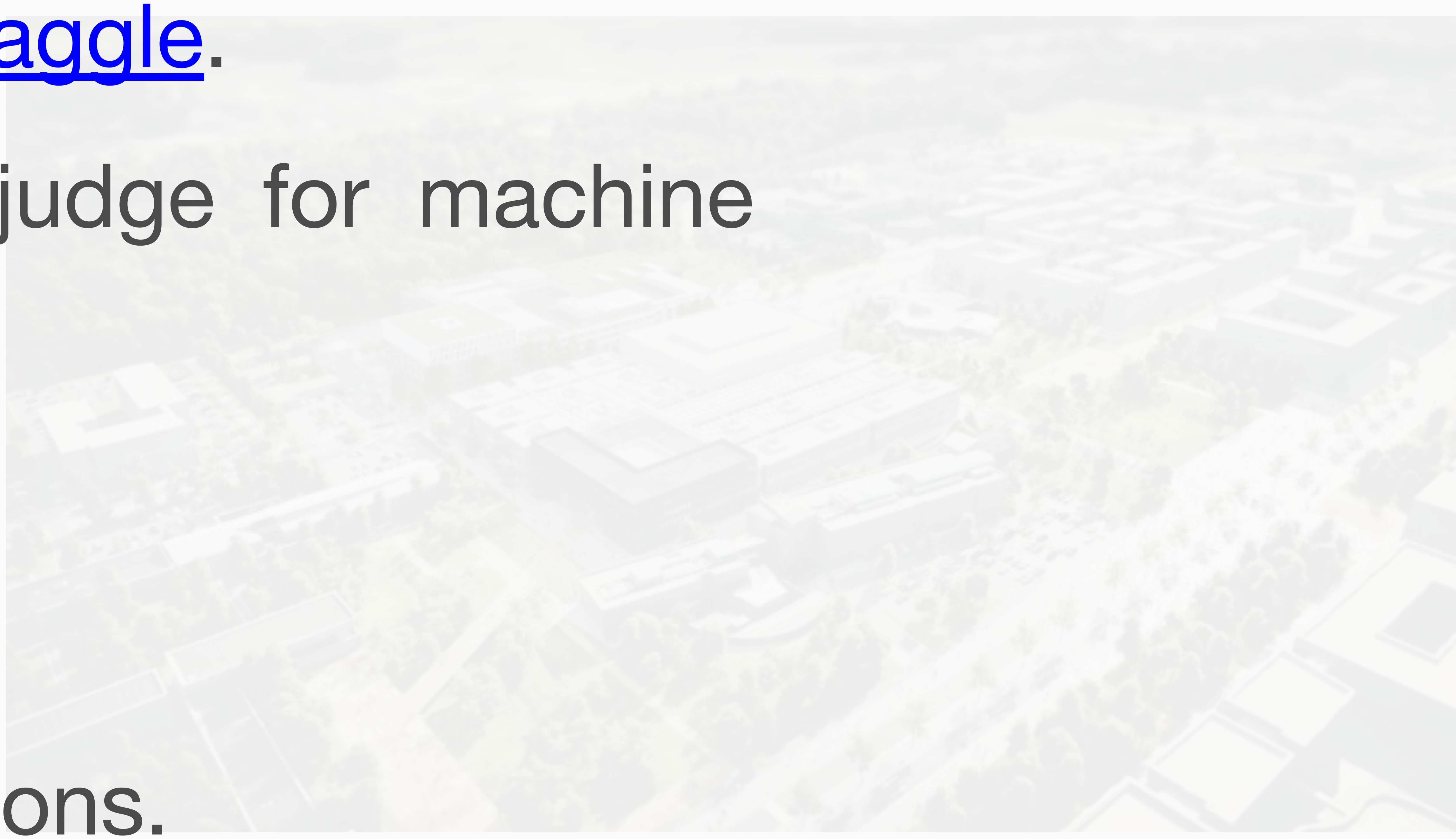
We often face the problem of searching meaningful emails among thousands of promotional emails.

Challenge Goal



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

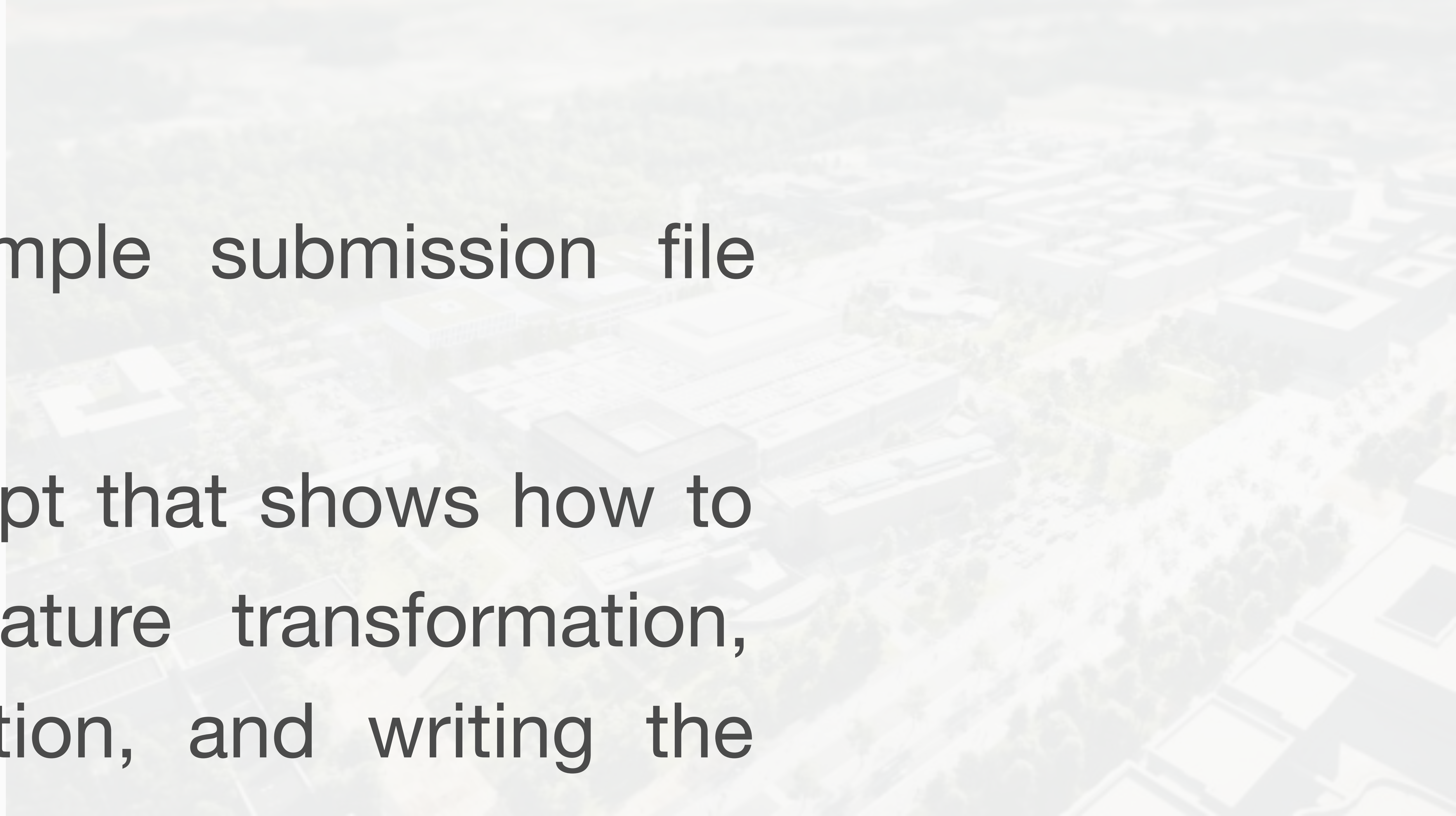
How to start with the challenge?



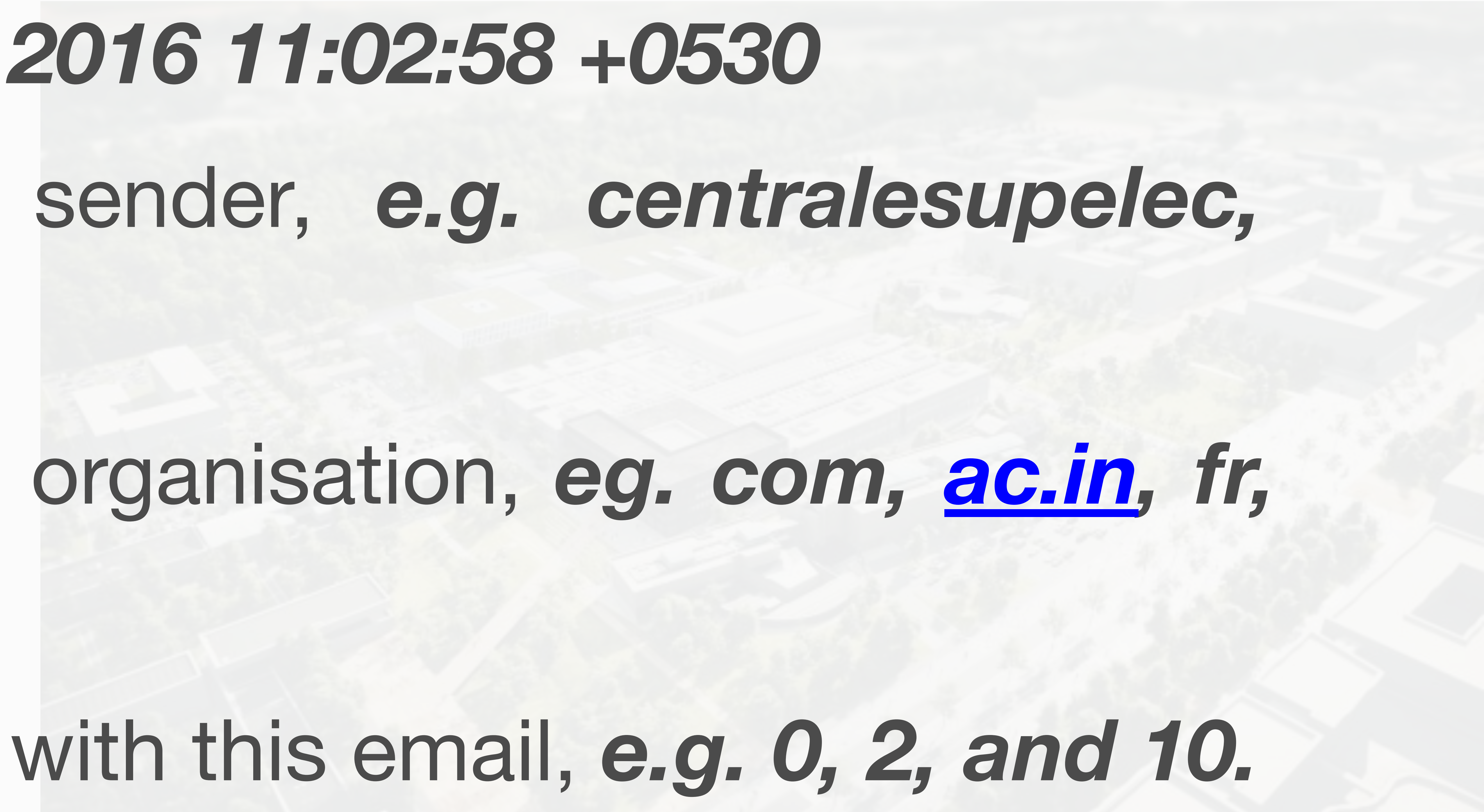
- The challenge is hosted on kaggle.
- Kaggle provides an online judge for machine learning problems.
- Register on kaggle.
- Go to the challenge.
- Accept the terms and conditions.

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.



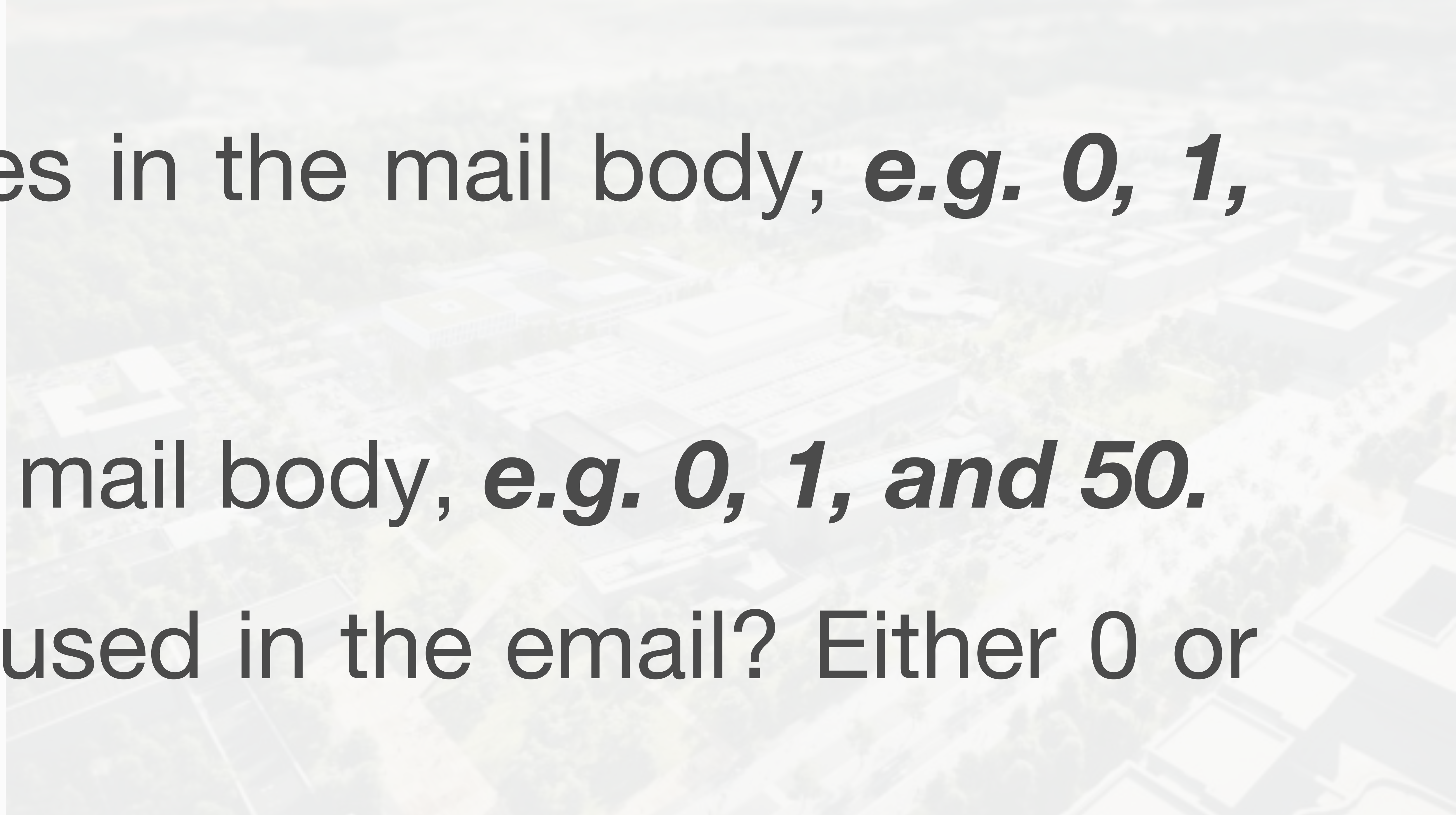
Dataset Features



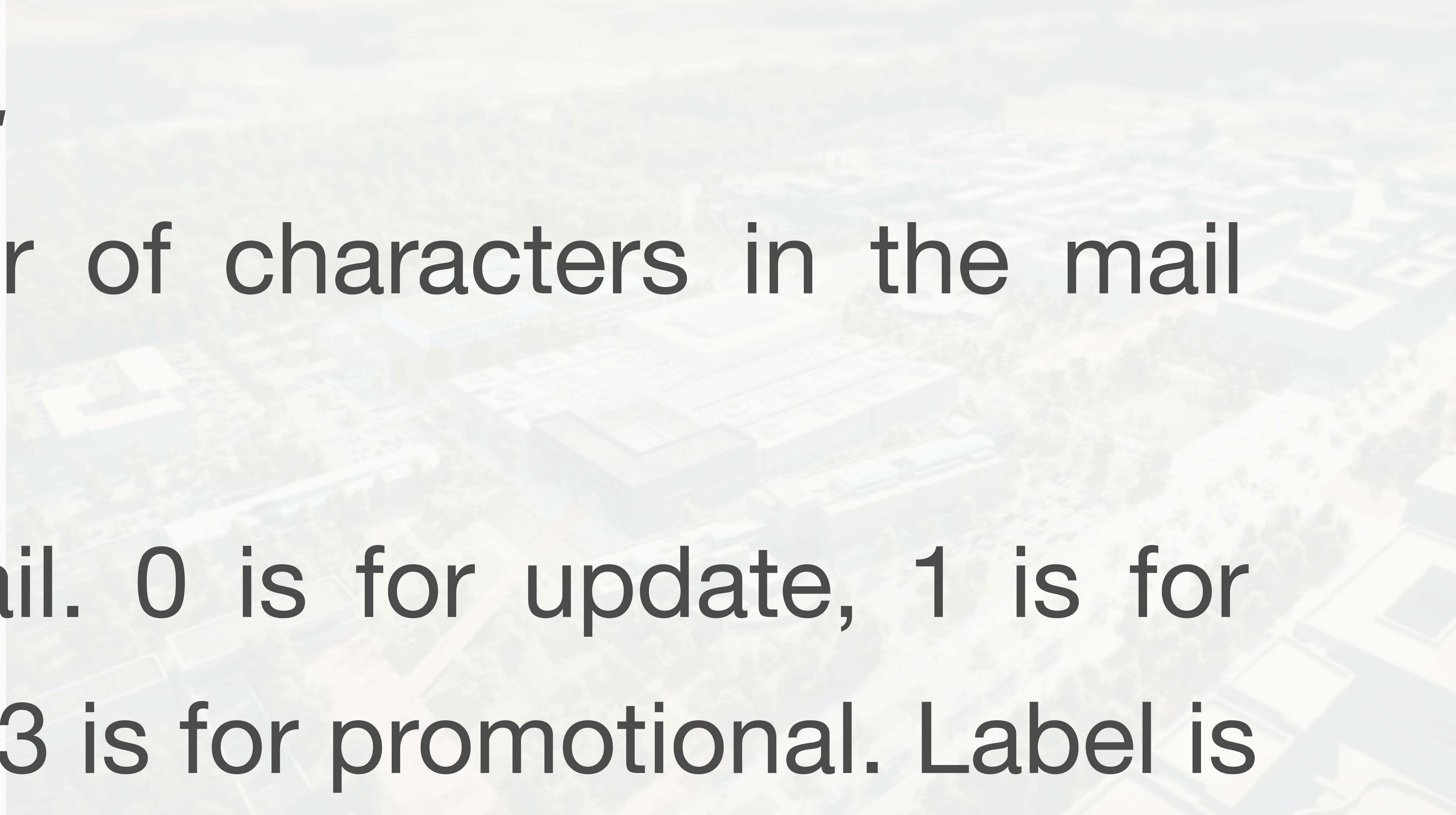
- **date** - unix style date format, date-time on which the email was received, ***e.g. Sat, 2 Jul 2016 11:02:58 +0530***
- **org** - organisation of the sender, ***e.g. centralesupelec, facebook, and google.***
- **tld** - top level domain of the organisation, ***eg. com, ac.in, fr, and org.***
- **ccs** - 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.

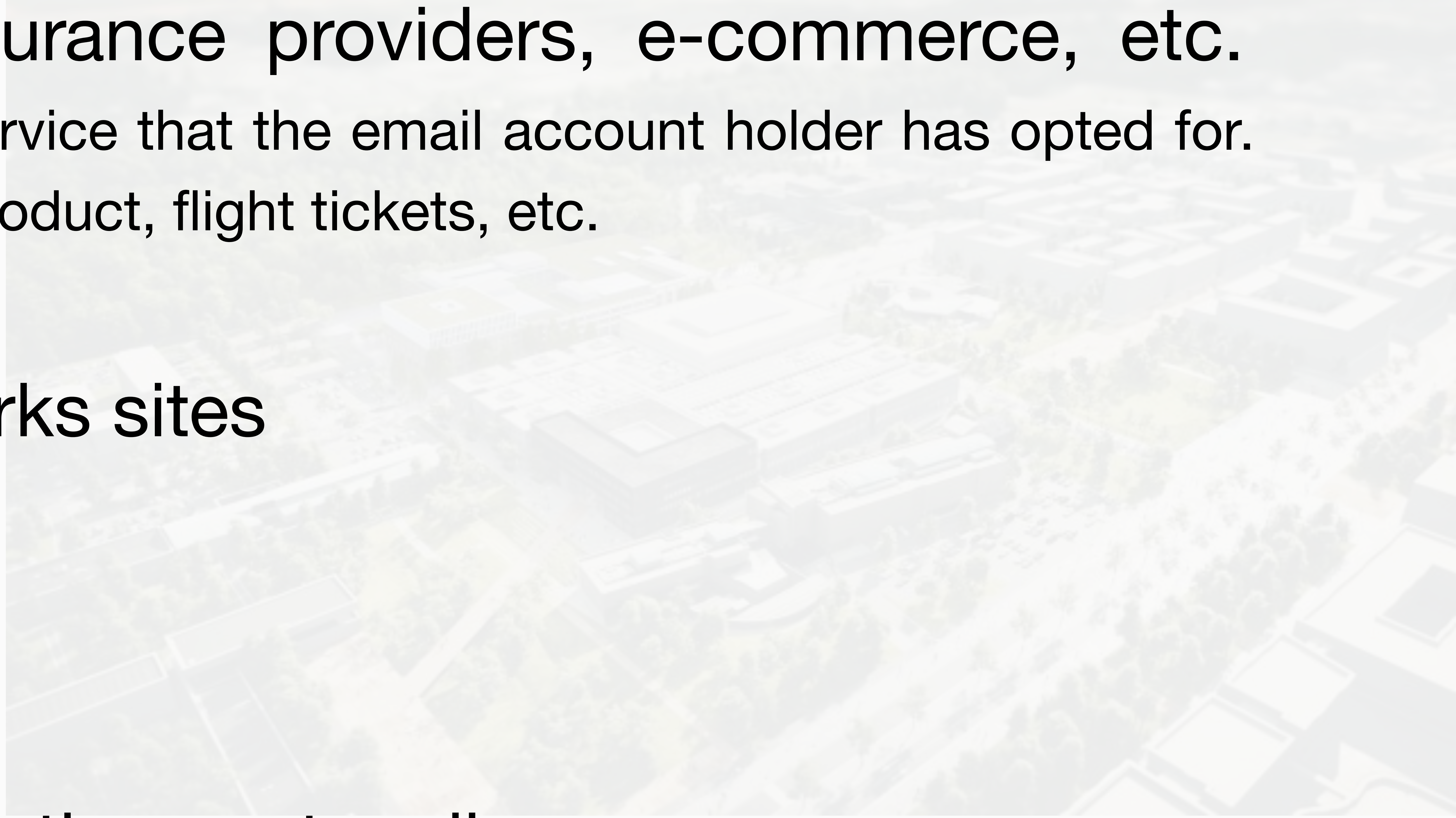


Dataset Features (Cont.)



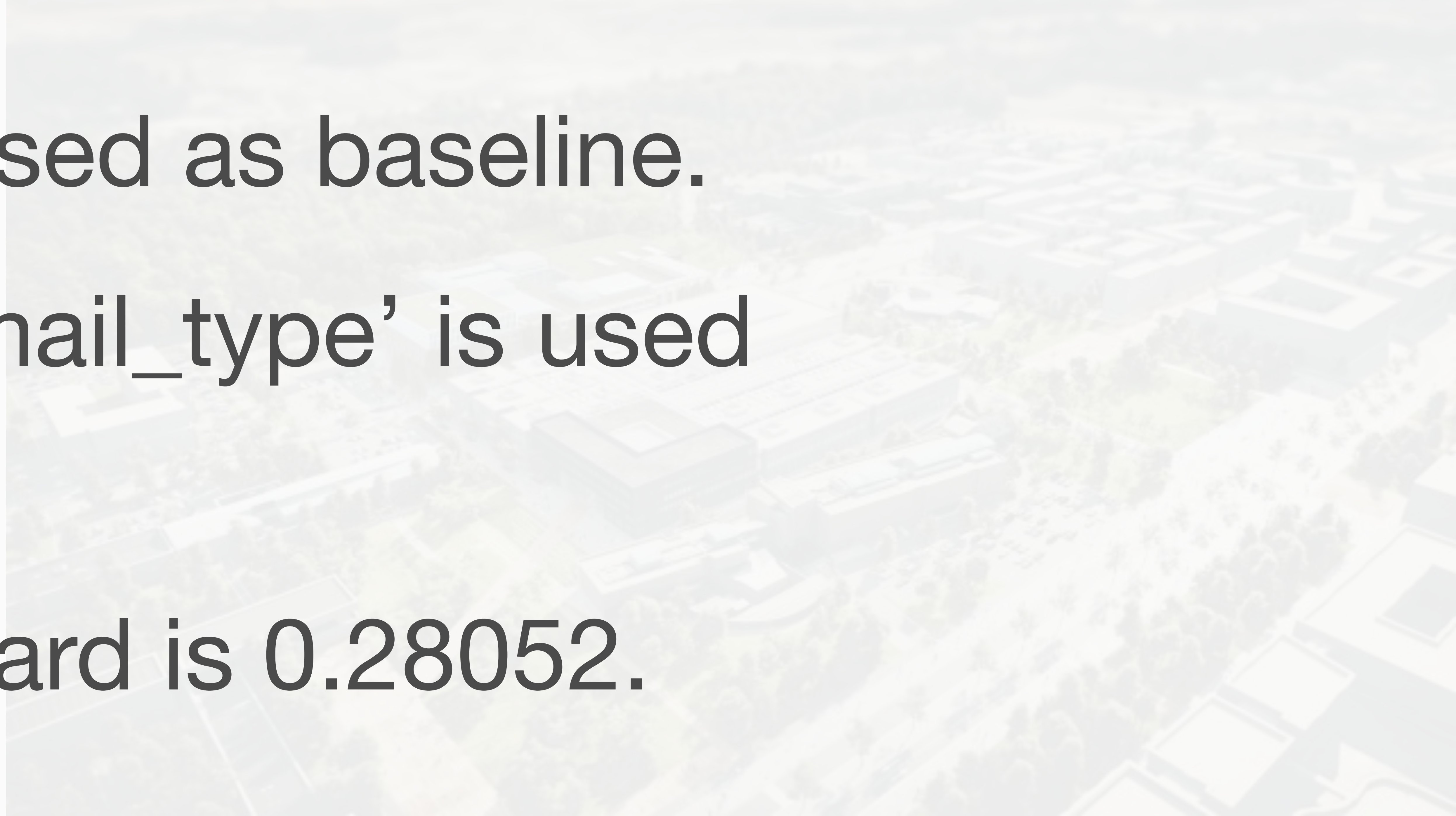
- **chars_in_subject** - number of characters in the mail subject, ***e.g. 0, 1, and 10.***
- **chars_in_body** - number of characters in the mail body, ***e.g. 10 and 10000.***
- **label** - label of this email. 0 is for update, 1 is for social, 2 is for forum and 3 is for promotional. Label is only present in train.csv. test.csv has all other features.

Class Labels (4 Classes)



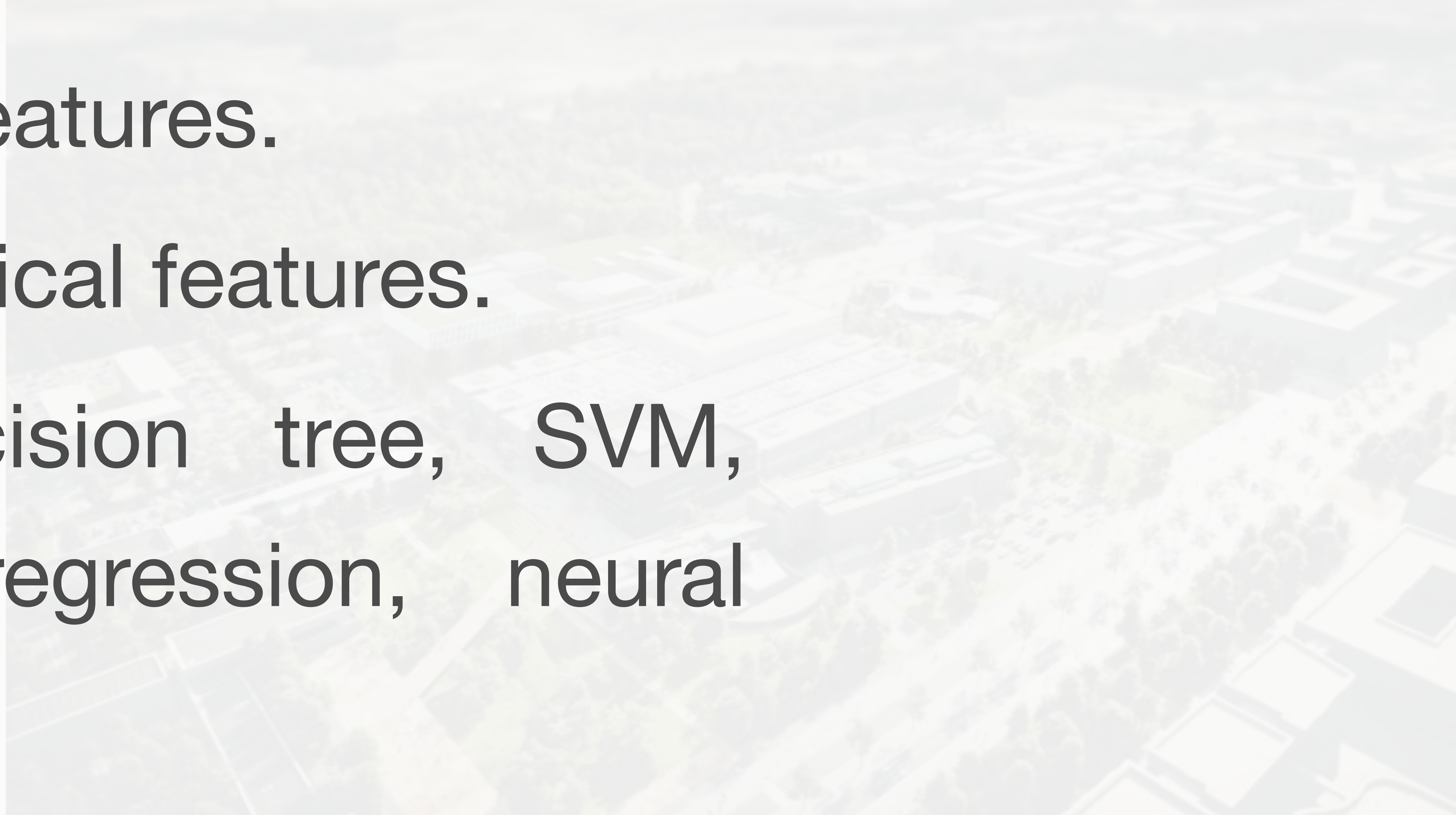
- **0, update**: Mails from bank, insurance providers, e-commerce, etc.
  These emails are update on some kind of service that the email account holder has opted for. Mails about account statement, delivery of product, flight tickets, etc.
- **1, social**: Mails from social networks sites
- **2, forum**: Personal mails
- **3, promotional**: Promotional/advertisement mails

Baseline Model



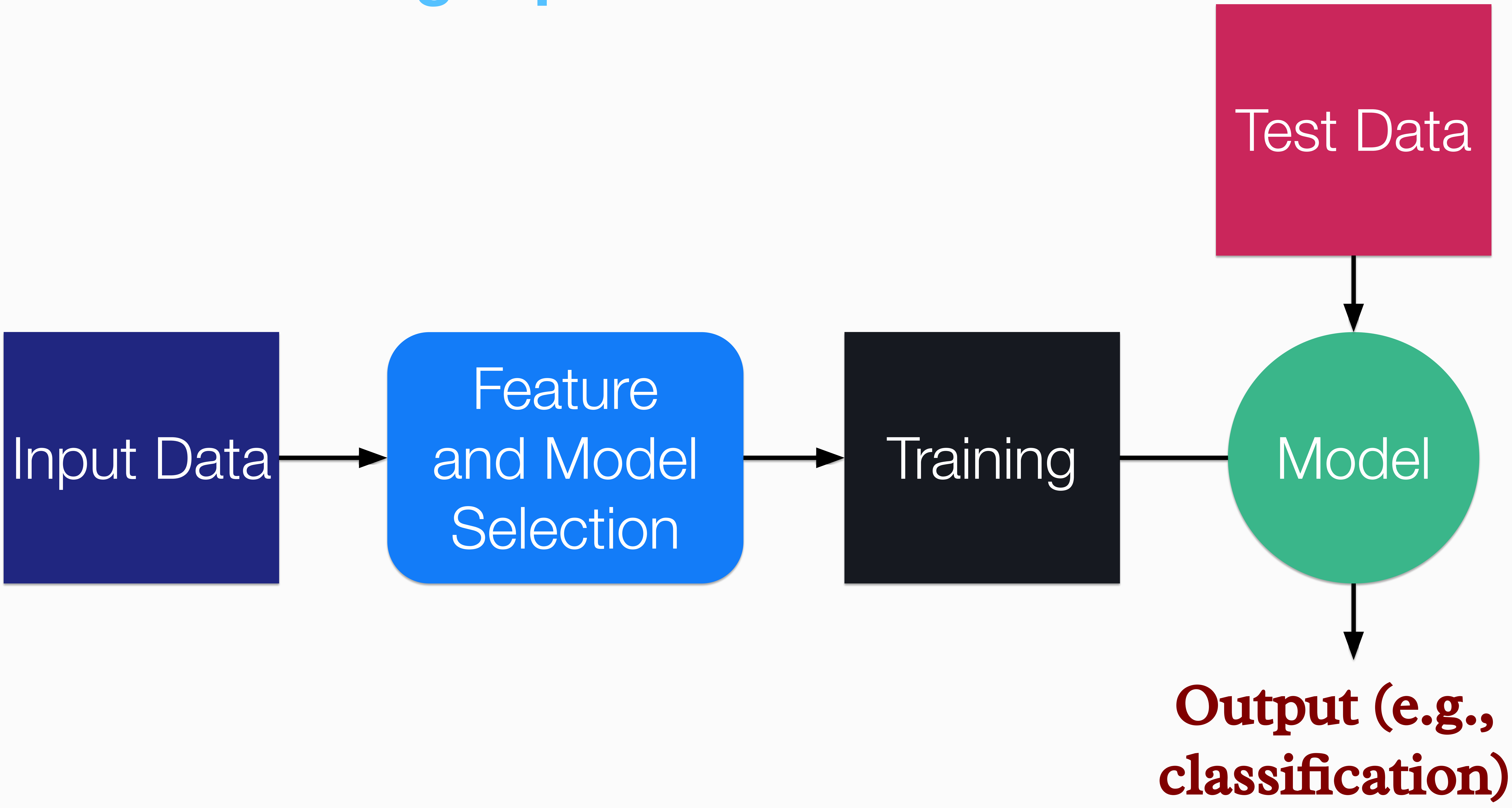
- K-Nearest Neighbour is used as baseline.
- Only one of the feature ‘mail_type’ is used in the baseline.
- F1-score on the leaderboard is 0.28052.

Improving 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.

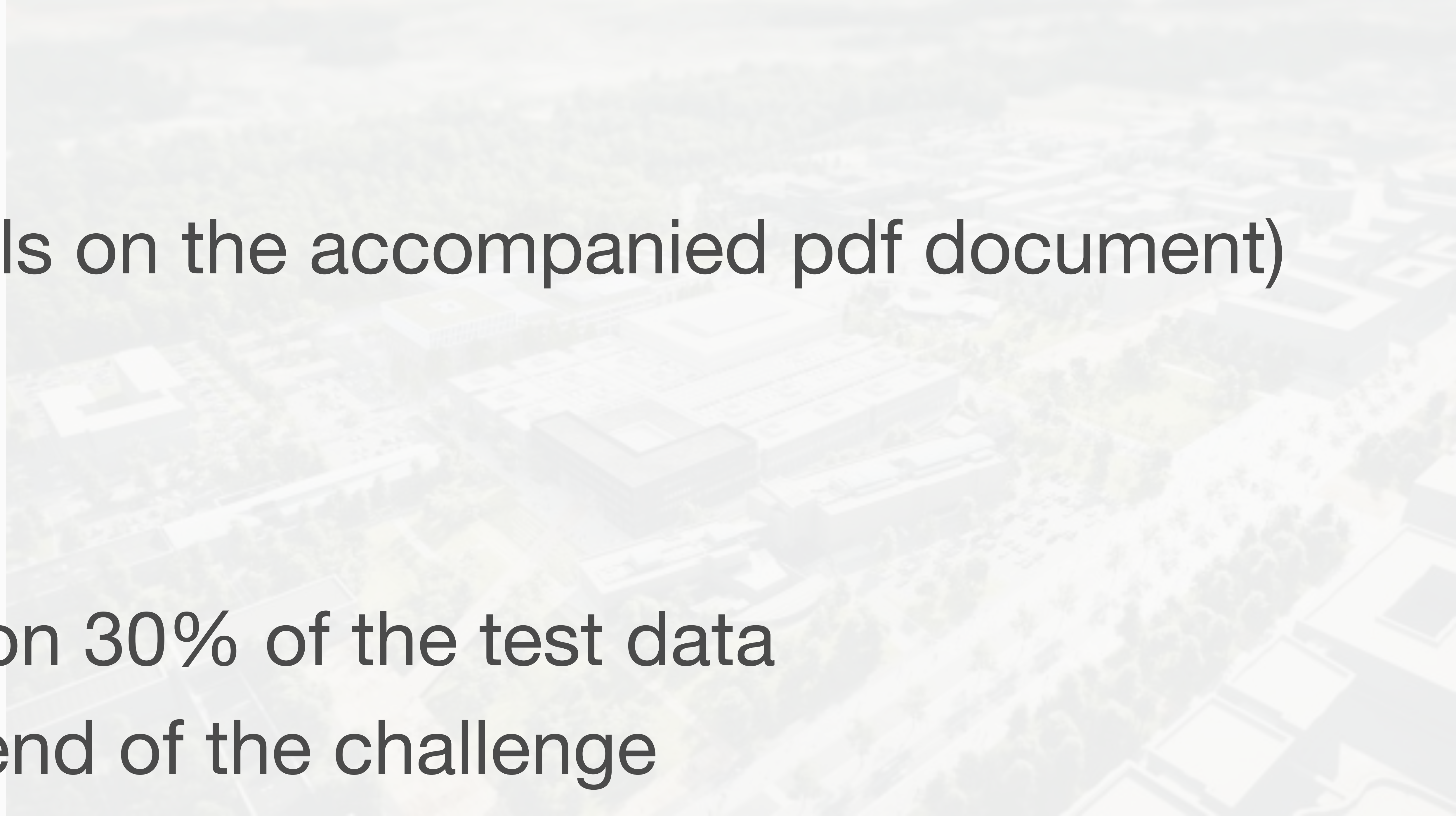
Machine Learning Pipeline



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: January 14, 2020

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

  Email: sagar.verma@centralesupelec.fr

Good Luck and Enjoy!