**Lending Club Issued Loans Analysis Protocol**

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# Introduction

Here you have to give some known facts about the field you will work on.

Try to focus on the problems that are most common and then state the goals of the project.

* You can try to answer to the following question:
* Which questions do we want to answer ?
* What is known about the problem?
* How we define the outcome(s)?
* What is known to influence the outcome?
* Does we have any possible new knowledge that has not been in use before?

This part must be between half to one and half page.

In this project we analyzed Landing Club Issued Loans data in aim of estimating the credit risk of each loan, meaning estimating the probability to default of each loan.

Credit risk problems have great importance for credit providers such as banks or credit cards companies and credit risk rating models are at the heart of their business model.

Hence, credit risk problems have been studied extensively, both in industry and academia.

In particular, this Lending Club data set has studied by many, Noteworthy ( Riza Emekter, Yanbin Tu, Benjamas Jirasakuldech & Min Lu, 2015)

<https://www.tandfonline.com/doi/abs/10.1080/00036846.2014.962222>

who found that credit grade, debt-to-income ratio, FICO score and revolving line utilization play an important role in loan defaults and that higher interest rates charged on the high-risk borrowers are not enough to compensate for higher probability of the loan default.

# Methodology (Project design)

## Data

Here you have to describe how do you plan to manipulate the data. For this you have to answer to the following questions:

* Which data will be used?
  + Describe data sources
  + Describe possible external data sources that may enrich our data
  + Data for external validation?
* On which time frames periods will your project will be based on?
  + Time-frame for training
  + Time-frame for test?
* How do you define your subjects?
  + Inclusion criteria?
  + Exclusion criteria?
* Which would be your outcome variable?
* Are there confounder variables that may affect the outcome?
* Is there a possible source of bias in our data?
* Describe your data exploration strategy.
* Which techniques will be applied to enrich the data?
* How you will deal with outliers?
* How you will deal with missing values
* Add at the end of the protocol (appendix) the [Data retrieval protocol](https://docs.google.com/spreadsheets/d/1pYYjgwZ_8PS1Bcmc2kRNHTL0f_rk__GCJALLs1JHPUQ/edit#gid=0)

## Models

Here you have to describe how do you plan to develop your models:

* How do you plan to divide your data
  + Training, validation, test - proportions, techniques
* Do you need to balance your data? How?
* Do you need to stratify/subsample your data? How?
* What techniques will you apply to model your outcome?
  + Unsupervised
  + Regression
  + Classification
* Will you use cross-validation and/or bootstrap?
* Which measures you will use to train and evaluate your models? Why?
* Do you plan to use ensembling or will use your best model?

## Deployment of your model

* Who will make the QA of the project?
  + Which units will be assessed
  + Write a QA protocol for each step of the project
* Who is the final user of the predictions?
* How the prediction will be presented to the final user?
* How will the final user be trained to use and interpret the prediction?
* On which platform the predictions will be deployed?
* How frequently the model will be updated?
* What will happen in cases where the model return a null prediction (eg. incomplete data)?
* Which models were used and which were selected for the final prediction.
* Which measurements were used to evaluate the prediction.
* Which results we got from those models.

# Results

Here you will present the main results of all the process. We will describe:

* The final amount of data used (total, train, test, etc)
* The amount of outliers and the way of treating them,
* The amount of missing values and the methods used for imputing them,
* The distribution of the data (timeframes)
* The methods used to transform the data and to generate new features.

# Conclusion

Here you will write about how the project began, which were the most important challenges you had when developing the project, and how did you get the final prediction. You have to discuss also the limitations of the model, when it can be used and when not.