

# Decision Analysis - Project 3

## 1 Introduction

Project 3 is about performing experiments with several methods and carrying out an analysis of the obtained results. Find a data set that contains a few monotonic criteria, over 100 alternatives, and at least 2 classes (if the problem has more classes, you can binarize them). One of the following data set can be used link.

- The entire project must be done **individually or in pairs..**
- The report can be made in a jupyter notebook (**.ipynb + HTML**) or as a **python project + report in PDF**.
- The code with the report should be sent by **11/05/2023 23.59**

Briefly describe the data set including the criteria descriptions. For this dataset, train the following models:

- One interpretable ML model (XGBoost or rankSVM or Logistic Regression)
- One interpretable neural MCDA method (ANN-Ch-Constr. or ANN-UTADIS)
- Neural network with a few layers with nonlinear activation functions

## 2 Experiments

For each model:

- report Accuracy, F1 and AUC
- Models should be presented with all visualizations to facilitate interpretation.
- All presented values should be rounded to a maximum of 4 decimal places.
- Based on the parameters obtained, can we say something about the user's preferences? Are there any criteria that have no effect, or have a decisive influence. Whether there are any preference thresholds? Are there any evaluations on criteria that are indifference in terms of preferences?

- Take 3 alternatives and say what the minimum change to a **single criterion** should be done that the option is classified into a different class.
  - Try answer this question in an analytical way based only on the values of the model parameters and explain why such a change is minimal (without sampling).
  - Perform space sampling by slightly changing the evaluations of alternatives to get a different class. Do the results agree with theoretical predictions?
  - Explain the predictions for these objects using at least one technique (Anchors LIME, SHAP, ... )
- Interpret the model by at least one ( Global Surrogate, Partial Dependence Plot Permutation Feature Importance ...)

A list of tools that contain various techniques for explaining and interpreting the model:

- Shapash
- Alibi
- Explainerdashboard
- DALEX
- eli5
- aix360