# [2023] ML Projects (CS) – Milestone 2

The objective of the projects is to prepare you to apply different machine learning algorithms to real-world tasks. This will help you to increase your knowledge about the workflow of the machine learning tasks. You will learn how to apply pre-processing, feature engineering, regression, and classification methods.

#### **Delivering Milestone 2: Practical exam.**

- ➤ You must deliver a detailed report for milestone 2 contains all your work in this phase. Combine both reports and deliver a complete report for the project (Hardcopy).
- Each team should work on their project's updated dataset for milestone 2. The link can be found [here]
- ➤ Note that milestone 2 requirements can be added to later.

### > In the practical exam:

- We will give you two unseen test sets, one for regression and one for classification.
- In case of the movies dataset you will receive two csv files for regression and two csv files for classification
- Make sure you save your trained model and create a test script that takes the new csv file, loads the saved models, and outputs predictions. This is to allow us to test your model without retraining.

Hint 1: You can use libraries such as 'pickle' to save and load your models.

Hint 2: Any model that you need to 'fit' or 'learn' during training means you need to save it and reload it for the test to work correctly.

- You should be able to handle missing values for features in a test sample. (You can't drop an entire test sample row).
- You must Show the MSE and R2 score of the regression models and the classification accuracy of each classifier on the test set.
- Each team member will be graded individually according to their response to the oral questions related to their project.
- ➤ In the second milestone, you will apply the following: -

#### **Classification:**

- Split your dataset into 80% training and 20% testing.
- Train at least 3 models to classify each sample into distinct classes.
- Choose at least two hyperparameters to vary. Study at least three different choices for each hyperparameter. When varying one hyperparameter, all the other hyperparameters should be fixed.

#### **Milestone 2:**

Classification and Hyperparameter tuning.

# Milestone 2 Report Must Include:

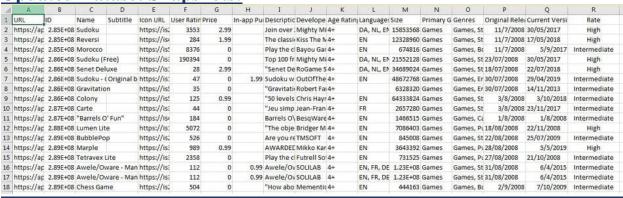
- Summarize the classification accuracy, total training time, and total test time using three bar graphs.
- Note that your **Feature Selection** process may differ in this phase (classification) than the previous (regression), If so, explain your feature selection process and how it was proved or disproved.
- \* Explain in details how **hyperparameter tuning** affected your models' performance.

❖ Finally, write a **conclusion** about this phase of the project and what intuition you had about your problem and how it was proved/disproved.

# **Project(1): Game Application Success Prediction**

An **updated dataset** will be provided for each project in the second milestone.

**Updated Dataset Snapshots:** 



## **Updated Dataset Description:**

- The "Average\_User\_Rating" column used in the previous milestone as the actual output has been removed.
- A New "Rate" column has been added instead. Each application can have a rate of {High, Intermediate or Low}.

# **Milestone 2 Classification task:**

Classify each application into one of three rate categories: (High, Intermediate or Low) based on the provided features in the updated dataset

# **Project(2): Movie Popularity Prediction**

An **updated dataset** will be provided for each project in the second milestone.

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## **Updated Dataset Snapshot:**

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#### **Updated Dataset Description:**

- The "vote\_average" column used in the previous milestone as the actual output has been removed.
- A New column is added "Rate". A movie can have a rate of {High, Intermediate or Low}.

## **Milestone 2 Classification task:**

Classify a movie into one of three categories: High, Intermediate or Low based on the provided features in **the updated dataset.**