# ML Projects (SC) – 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 (not the original dataset). The **updated dataset for each project** will be included in Lab 8 materials.

#### ➤ In the practical exam:

- We will you give you an unseen test set.
- 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:-

#### 1- Classification:

- Split your dataset into 80% training and 20% testing.
- Train at least 4 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 can be fixed.

#### 2- Dimensionality Reduction:

- Apply PCA on the training set to reduce the dimensionality. You need to study at least **three** different values for the reduced dimensionality. Explain your choice.
- Train and evaluate your classifiers (for the reduced features) on your validation set.

#### Milestone 2:

➤ Classification, Hyperparameter tuning, Dimensionality reduction effect on classification results.

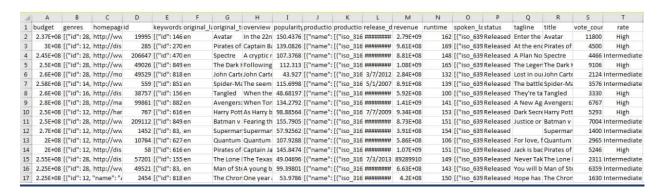
#### **Milestone 2 Report Must Include:**

- 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.
- \* Explain your choices for 3 different values for the **reduced dimensionality** and their effect on the data.
- ❖ After applying PCA and training the 4 classification models on the new reduced features, Summarize the classification accuracy, total training time, and total test time using three bar graphs.
- ❖ 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): Predicting Movie Success**

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

#### **Updated Dataset Snapshot:**



#### **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.** 

# **Project(2): Predicting Mobile Game Success**

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

**Updated Dataset Snapshots:** 

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	URL	ID	Name	Subtitle	Icon URL	User Ratin	Price	In-app Pu	Description	Develope	Age Ratin	Languages	Size	Primary (	G Genres	Original Relea	Current Versi	Rate
2	https://ac	2.85E+08	Sudoku		https://is:	3553	2.99		Join over	Mighty Mi-	\$+	DA, NL, EN	15853568	Games	Games, St	11/7/2008	30/05/2017	High
3	https://ap	2.85E+08	Reversi		https://is4	284	1.99		The classi	Kiss The N	1+	EN	12328960	Games	Games, St	11/7/2008	17/05/2018	High
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,	https://ap	2.86E+08	Sudoku (F	ree)	https://is:	190394	0		Top 100 fr	Mighty Mi	1+	DA, NL, EN	21552128	Games	Games, St	23/07/2008	30/05/2017	High
,	https://ar	2.86E+08	Senet Del	uxe	https://is:	28	2.99		"Senet De	RoGame S	\$+	DA, NL, EN	34689024	Games	Games, St	18/07/2008	22/07/2018	High
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7	https://ac	2.89E+08	Awele/O	vare - Mar	https://is:	112	0	0.99	Awele/O	SOLILAB	1+	EN, FR, DE	1.23E+08	Games	Games, St	31/08/2008	6/4/2015	Intermediate
8	https://ac	2.89E+08	Chess Gar	ne	https://is:	504	0		"How abo	Mementic	4+	EN	444163	Games	Games, Bo	2/9/2008	7/10/2009	Intermediate

## **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