Machine Learning

Exam Details
&
Project Description

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A. Y. 2025/2026

Final Evaluation

Project

1) Code shared using GitHub (to be evaluated for plagiarism)

2) Written report (to be evaluated)

3) Oral presentation and Q&A about the project

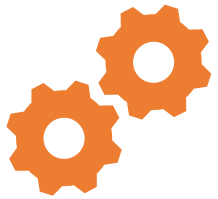
Theory

Q&A about

the theory part

of the course

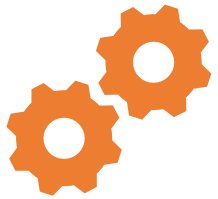
Project – Rules



- The project can be carried out in groups of 2 people max
  - In case you are a group of two, then it is your responsibility to ensure that both individuals contribute the realization of the project equally.

- Each group should present:
  - A written technical report, to be evaluated by the lecturer and the tutor.
  - Project code, shared using GitHub
  - An oral presentation of about 10 min, to be done by all authors by preparing a presentation **(e.g., in PowerPoint)**
  - After the presentation, a few questions related to project will be asked

Project – Rules



- The official dates of the exams will be announced in MOODLE as well as by the department.
- **Remember that you need to register for the exam before!!!**
- Also, you need to send us the report and code **1 week before the exam date!**
  - *If you fail to submit the report on time, you will not be allowed to take the exam (not even the theoretical part!).*

Project report structure

- You can adjust the following instructions as you want.
  - **Problem and task definition:** classification, regression, clustering, etc.., and associated application
  - **Dataset and its description** (e.g., size, dimensionality, classes)
  - **Feature extraction from data** (if applied)
  - **Data pre-processing** (e.g., dimensionality reduction, missing values, categorial data conversion)
  - **Models** and their description (e.g., values of the parameters, how did you decide such values)
  - **Results** in terms of **evaluation metrics** and **discussions** on the results (e.g., how the results can be improved in the future and/or what is the failure cases)

Dataset

- You can find datasets from Kaggle.com or https://paperswithcode.com/datasets or collect your data from internet (*in this case be careful about the data size, which might limit you with respect to the model that can be used*).

How to write a technical report

- No fixed number of pages
  - 8-20 pages are recommended, important to include everything listed in the “project report structure” slide

- **COVER PAGE:** Project Title, Master degree, Course, Academic Year, Author(s)
- Table of context
- Subdivision in the following **Sections** (next slide)

- The following suggested subdivision in Sections is indicative of the logical structure of the report, but not necessarily the only possible one

How to write a technical report

- Section MOTIVATION AND RATIONALE
  - Place the proposed project in context, possibly identifying a Research Theme(s) of interest. What is the problem addressed by your project? Why is it significant?
- Section STATE OF THE ART (SOTA) [optional, but at least a glance]
  - Describe the state of the art relevant to the project. What results or techniques do you plan to exploit? Which are the weak points of the SOTA methods, and which ones need to be improved? Why? How?
- Section OBJECTIVES
  - Please, clearly state the general and specific objectives of your project

How to write a technical report

- Section METHODOLOGY
  - Discuss method(s), algorithms, datasets, analytical and computational tools that are necessary to pursue the project objectives
- Section EXPERIMENTS & RESULTS
  - Describe the evaluation protocol, conditions, datasets used and metrics to measure the performance (accuracy, confusion matrix, recall & precision, etc.)

How to write a technical report

- Section CONCLUSIONS
  - Summarize the project (goals, methods, results, discussions, e.g., failure cases, when it performs better, where it fails) and sketch possible future works
- Section BIBLIOGRAPHY or REFERENCES
  - Only list the bibliographic references that are strictly relevant for describing the research project. All references should correspond to a citation in the text

How to write a technical report: Chat GPT, etc.

- No section should be written with automatic tools (ChatGPT, Gemini, …).
- Every report will be checked with detectors to understand how much of your text is written by you or by AI.

Project Example

- Hair color classification of every celebrity present in the CelebA dataset
- Features: HoG features
- Dimensionality reduction: PCA
- 3 model variants to test:
  - K-NN (K=3, 5, 7)
  - SVM (3 different kernels)
- Cross validation applied