Mini-Project Guidelines: Docker & Deep Learning

1. Work organization

The mini-project is carried out in groups of two (02) students. Each group is responsible for all phases of the project, from understanding the problem to deploying the model.

2. General objective of the project

The objective of this mini-project is to implement a complete and data-driven Artificial Intelligence project by leveraging Docker for reproducibility, training acceleration and the deployment of a Deep Learning model.

3. Choosing the theme and the model

Each group must choose a free theme related to Artificial Intelligence, according to their interests.

- Examples of possible themes:

    Computer vision (image classification, object detection, OCR, etc.).
    Natural language processing (NLP).
    Voice recognition.
    Time series and prediction.

The group must then select an appropriate Deep Learning model (CNN, RNN, LSTM, Transformer, etc.) and justify this choice.

4. Mandatory phases of the project (Data-Driven Project)

4.1 Understanding the problem

Describe the problem to be solved, define the objectives of the model and specify the context of use.

4.2 Data

Present the data source (public or constructed dataset), describe the preprocessing steps and explain the data organization using Docker volumes.

4.3 Model Training

Implement and train the Deep Learning model using Docker. CPU or GPU usage must be clearly indicated. A comparison between local and Dockerized execution is mandatory.

4.4 Containerization with Docker

Create one or more Dockerfiles for the project, manage dependencies, and use Docker Compose if necessary. Containerization best practices must be followed.

4.5 Model Deployment

Deploy the model as a prediction service via a fully containerized and tested API (Flask or FastAPI).

4.6 Dimension MLOps

Highlight the reproducibility of experiments, the structuring of the project and the role of Docker in the MLOps cycle.

5. Expected Deliverables

- The project deliverables include:

  The complete source code of the project.
  The Dockerfile and docker-compose.yml files. A
  README file describing the execution steps. A
  written report in PDF format.
  An oral presentation with demonstration.

6. Evaluation

The evaluation will focus on the relevance of the chosen problem, the quality of the Deep Learning model, the proper use of Docker, the completeness of the data-driven cycle, as well as the clarity of the report and the oral presentation.