**Building and Deploying a Machine Learning Model**

In this assignment, you will go through the complete process of creating a simple machine learning model, serializing it using pickling, and then deploying it using containerization. You will gain hands-on experience in model development, serialization, and understanding the basics of containerization with Docker.

**Objectives**

* Develop a basic machine learning model using a standard dataset.
* Serialize the trained model using pickling.
* Create a Docker container to deploy the model.
* Test the deployed model by making predictions.

**Task 1: Model Development**

* Dataset: Use the Iris dataset available in scikit-learn or any other simple dataset of your choice.
* Model Training: Train a basic classification model (like Logistic Regression) on the dataset.
* Model Evaluation: Evaluate the model's performance with appropriate metrics.
* Model Serialization: Serialize the trained model using pickle and save it as a .pkl file.

**Task 2: Preparing for Deployment**

* Write a Python Script for Inference: Create a Python script (app.py) that loads the serialized model and uses it to make predictions. This script should:
  + Load the pickled model.
  + Define a function to take input data and return the model's prediction.
* Test the Python Script Locally: Before containerizing, ensure that your script works as expected by running it locally and testing it with sample input data.

**Task 3: Containerization with Docker**

* Create a Dockerfile: Write a Dockerfile to build a Docker image for your application. This file should specify:
  + The base image (e.g., Python 3).
  + The necessary dependencies to install (e.g., scikit-learn, numpy).
  + Instructions to add your script and pickled model to the Docker image.
  + The command to run your script.
* Build the Docker Image: Use the Docker command-line interface to build an image from your Dockerfile.
* Run a Container: Start a container from the image and test its functionality.

**Task 4: Testing the Deployment**

* Interact with the Deployed Model: Use command-line tools or write a simple script to send requests to your containerized model and get predictions.
* Document the Process: Write a brief report documenting your approach, challenges faced, and how you tested the model's functionality in the container

**Deliverables**

* Source code for the model training and serialization.
* The Python script for model inference.
* Dockerfile used for creating the Docker image.
* Documentation/report on the process and your findings.