Project Number: P10

Project Title: Building FinTech Microservices for Data Analytics and Automated Machine Learning

Project Clients: Prof. Fethi Rabhi, Alan Ng, Dr Basem Suleiman, FinTech AI Consortium**,** School of Computer Science and Engineering

Project Specializations: Software development/Engineering, Web Application Development, Big Data Analytics and visualization, Machine Learning

Background:

Data analytics and machine learning often involve an intricate combination of data collection, processing, and visualization. Each task can be complex and resource intensive. This project aims to break down these monolithic tasks into smaller, more manageable components—microservices—that can be developed, deployed, and scaled independently.

Requirements and Scope:

In this capstone project, students will work as a team to develop a set of microservices using the Python programming language. They will be responsible for creating Python functions for data collection, data processing, visualization, and automated machine learning (AutoML) applications, which will then be integrated into cohesive data analytics pipelines. Students will also need to develop a Web UI to run these services. The following are the core requirements involved in this project:

- Data Collection Microservices: a Python function to collect data from various sources (APIs, databases, etc.).
- Data Processing Microservices: a Python function to clean, transform, and preprocess the data.
- Data Visualization Microservices: a Python function to visualize data in different formats (graphs, charts, etc.).
- Automated Machine Learning (AutoML) Microservices: Using existing Python packages, a Python function to automatically train, evaluate, and deploy machine learning models.
- User Interface: a web interface using Python widgets/dashboard library or a Jupyter widgets app to interact with the microservices.
- Integration: combine all microservices (Python functions) into a single application, ensuring smooth data flow between each microservice.

A guideline will be provided for building the microservices.

Required Knowledge and skills:

- Python Programming
- Good data processing techniques and very basic machine learning knowledge
- Familiarity with Python widgets or dashboard libraries
- Basic knowledge of cloud storage and its Python API
- Familiarity with Web application development
- A Python-based application (either as a web app or Jupyter widgets app) that runs data analysis and AutoML functions as microservices.

Expected outcomes/deliverables:

- Documentation detailing the design, architecture, and usage of the microservices.
- A presentation or demo showcasing the application and its capabilities.
- Implement the system for one or more case studies to demonstrate its utility."