# 

# Joy Ajara Tennison Razak- 10211100360

# **Streamlit-Based Machine Learning and AI Explorer**

This Streamlit application provides an interactive platform for exploring various machine learning and AI tasks through four integrated sections:

## **1. Regression**

This section allows users to analyze relationships between variables and make predictions:

* Upload regression datasets in CSV format
* Select target variable for prediction
* Preprocess data (handle missing values, encode categorical variables)
* Train linear regression models
* Evaluate performance with metrics like MAE and R² score
* Visualize predictions versus actual values
* Make custom predictions with new input data

## **2. Clustering**

This component helps users discover natural groupings in data:

* Upload datasets containing at least two features
* Interactively select the desired number of clusters
* Visualize clusters in 2D or 3D plots
* View cluster centroids and membership assignments
* Export clustered data with added labels

## **3. Neural Networks**

This section provides a framework for building and training neural networks:

* Upload classification datasets
* Configure target variable and hyperparameters (epochs, learning rate)
* Train feedforward neural networks using TensorFlow
* Monitor training with real-time performance graphs
* Test the model with new samples

## **4. Large Language Model (RAG Approach)**

This advanced component demonstrates Retrieval-Augmented Generation using Ghana's 2025 Budget Statement:

* Process user queries about the budget document
* Retrieve relevant context using vector similarity search
* Generate responses with Mistral-7B-Instruct LLM
* Display answers with supporting context and confidence scores
* Provides more factually grounded responses compared to standard LLM approaches

The application emphasizes user interaction, visualization, and practical exploration of machine learning and AI concepts.