DEPI - GIZ3_AIS4_S4 - Final Project

Project description: This Sales Forecasting and Demand Prediction project aims to build a machine learning model that predicts future sales and demand for products based on historical data. Accurate forecasting helps businesses optimize inventory management, staffing, and marketing strategies. This project will apply data science techniques, from data collection and analysis to model deployment and monitoring, enabling businesses to make data-driven decisions.

Members	Roles
Yassen Elsayed Kamal (Leader)	Feature Engineering, Model Selection, Model Optimization, Model Monitoring, Final Presentation
Rawan Mohamed Nasr	Data Collection, Data Preprocessing, Model Training, Performance Reporting, Final Report
Abdelrhman Yousef Mahrous	Advanced Data Analysis, Feature Engineering, Model Selection, Model Optimization, MLOps Implementation
Omar Ahmed Mohamed	Data Exploration (EDA), Advanced Data Analysis, Data Visualization, Model Evaluation, Final Presentation
Nourhan Osama Abdelaziz	Data Preprocessing, Model Training, Model Evaluation, MLOps Implementation, Model Deployment
Momin Mohamed Saber	Data Collection, Data Visualization, Model Deployment, Performance Reporting, Final Report

Objectives:

- Collect and preprocess historical sales data from multiple sources.
- Identify key sales trends and influencing factors (seasonality, holidays, pricing).
- Build and compare machine learning models (Linear Regression, Random Forest, LSTM).
- Select the best performing model for forecasting future demand.
- Deploy the model through an interactive dashboard or API.
- Monitor performance and provide actionable business insights for decision-making.

Tools:

- **Programming Languages:** Python (Pandas, NumPy, Scikit-learn, TensorFlow)
- **Data Handling & Storage:** SQL/excel
- **Visualization:** Matplotlib
- **Model Deployment:** FastAPI/Streamlit
- **Version Control & Collaboration:** Google Drive (Colab)

Milestones/Deadlines:

- **Data Collection, Exploration & Preprocessing** – 27 September 2025
- **Advanced Data Analysis, Visualization & Feature Engineering** – 18 October 2025
- **Model Development & Optimization** – 8 November 2025
- **Deployment & Monitoring** – 21 November 2025
- **Final Documentation & Presentation** – 29 November 2025

KPIs (Key Performance Indicators):

Key metrics for measuring the success of the project are outlined below:

1. Data Quality
• Percentage of missing values handled: **100%**
• Data accuracy after preprocessing: **96%**
• Dataset diversity (representation of different categories): **90%**

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2. Model Performance
• Model accuracy (MAPE): **MAPE ≤ 6%**
• Model prediction speed (Latency): **≤ 100 milliseconds**

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3. Deployment & Scalability
• API uptime: **99%**
• Response time per request: **≤ 200 milliseconds**

4. Business Impact & Practical Use

- Reduction in manual effort: **75%**
- Expected cost savings: **25–30%**
- User satisfaction: **85%**