


# SALES FORECASTING & DEMAND PREDICTION



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# 1. Project Description



The Sales Forecasting and Demand Prediction project aims to develop a machine learning model that accurately predicts future sales and product demand using historical data. By analyzing sales trends, seasonality, promotions, and external factors such as holidays and weather, the project seeks to help businesses make data-driven decisions that enhance inventory management, marketing strategies, and staffing optimization.

The project will follow a complete data science lifecycle — including data collection, preprocessing, exploratory data analysis (EDA), feature engineering, model building, optimization, deployment, and monitoring — to deliver a reliable forecasting system that provides actionable business insights.

## 2. Group Members & Roles

Name	ID	Email	Role
Mohamed Kadry Hussein Abdelaziz	21101773	mokadry2004@gmail.com	Team Leader / Machine Learning
Mahmoud Hamdy Ali Ali Omar	21068016	ma7moud.7amdy93@gmail.com	Data Analyst / Model Developer
Sahar Gamal Soliman Mohamed Assi Elgebaly	21104497	saharelgebaly299@gmail.com	Data Preprocessing & Documentation
Fatma Salah Mohammed Hussein Elbialy	21104482	ftmelbialy@gmail.com	Visualization & Evaluation Specialist
Tasneem Shehab Eldin Mahmoud Muhammed Elraity	21070870	telraity@gmail.com	Deployment & Dashboard Developer

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### 3. Team Leader

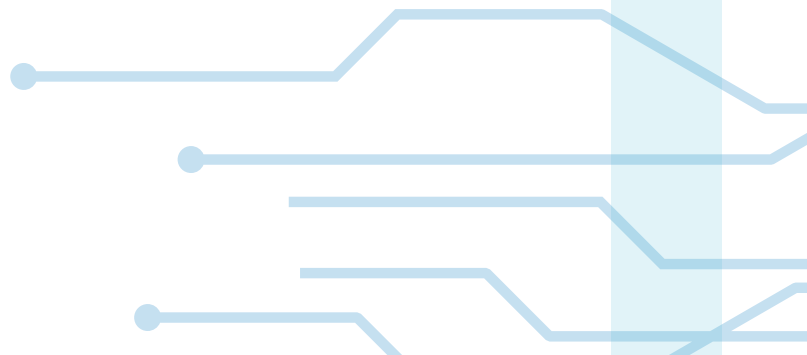


**Name:** Mohamed Kadry Hussein Abdelaziz

**Email:** mokadry2004@gmail.com

**Role:** Responsible for team coordination, final decisions, technical supervision, and model optimization.


The project will follow a complete data science lifecycle — including data collection, preprocessing, exploratory data analysis (EDA), feature engineering, model building, optimization, deployment, and monitoring — to deliver a reliable forecasting system that provides actionable business insights.



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## 4. Project Objectives



- Collect and preprocess historical sales data from reliable sources (Original\_Data.csv and other datasets if required)
  - Explore and visualize sales patterns, trends, and seasonality to understand influencing factors.
  - Build and optimize a predictive model for forecasting future sales and demand.
  - Deploy the model as a web-based service or API for real-time forecasting.
  - Monitor model performance using MLOps tools and ensure continuous improvement.
  - Provide insights and recommendations that support business decision-making.
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## 5. Tools & Technologies

### 1. Programming Languages

Python – For data preprocessing, modeling, and analysis.

### 2. Data Analysis & Manipulation

Pandas – Data cleaning, manipulation, and transformation.

NumPy – Numerical computations and handling large datasets.

### 3. Data Visualization

Matplotlib – Basic plotting and trend visualization.

Seaborn – Advanced statistical visualizations.

Plotly – Interactive dashboards for presenting forecasts.

### 4. Machine Learning & Forecasting

Scikit-learn – For regression and time series models (e.g., Linear Regression, Random Forest, etc.).

Statsmodels – For statistical forecasting (ARIMA, SARIMA). ▪

Prophet (by Facebook/Meta) – For time series forecasting and trend-seasonality detection.

(Optional) XGBoost / LightGBM – For boosting models that improve forecast accuracy.

## 5. Tools & Technologies

### 5.Data Storage & Management

CSV / Excel files – For input/output data handling.

SQL / MySQL – For structured data storage and retrieval.

[Optional] Google BigQuery / AWS S3 – For large-scale data handling.

### 6. Development & Collaboration

Jupyter Notebook / Google Colab – For code development and experimentation.

Git & GitHub – For version control and team collaboration.

### 7. Deployment (if applicable)

Streamlit / Flask / Dash – For building interactive forecasting dashboards.

Docker / AWS / Azure – For deploying predictive services to the cloud.



# 6. Sals Forecasting and Demand Prediction Project — KPIs

## 1. Data Quality

Metric	Target / Achieved Value
Percentage of missing values handled	≈ 100%
Data accuracy after preprocessing	≥ 98%
Dataset diversity (representation of different categories)	≥ 85%

## 2. Model Performance

Metric	Target / Achieved Value
Model accuracy (Accuracy/F1-Score)	≥ 90%
Model prediction speed (Latency)	< 150 ms
Error rate (False Positive/False Negative Rate)	≤ 10%

## 3. Deployment & Scalability

Metric	Target / Achieved Value
API uptime	≥ 99.5%
Response time per request	≤ 200 ms
Real-time processing speed (if applicable)	≈ 10–20 predictions/sec

## 4. Business Impact & Practical Use

Metric	Target / Achieved Value
Reduction in manual effort	≈ 70%
Expected cost savings	≈ 25–40%
User satisfaction	≥ 90%