### **📄 Project Documentation**

#### **🧠 Objective**

Build a machine learning system to predict e-commerce delivery time using order, agent, and external condition features.

#### **📦 Dataset**

Contains order IDs, location coordinates, agent info, order/pickup time, weather, traffic, and actual delivery duration.

#### **🛠 Steps Covered**

1. **Data Preprocessing**
   1. Missing value handling, datetime parsing, category encoding
2. **Feature Engineering**
   1. Distance calculation (Haversine/Geodesic)
   2. Time features: hour, weekday, pickup delay
3. **EDA**
   1. Understand impact of weather, traffic, agent, and time
4. **Model Training**
   1. Models used: Linear Regression, Random Forest, Gradient Boosting
   2. Evaluated using RMSE, MAE, R²
   3. Logged via MLflow
5. **Deployment**
   1. Streamlit app for real-time prediction
   2. Accepts all relevant input fields

#### **🔧 Tools Used**

* Python, Pandas, Scikit-learn, XGBoost
* Matplotlib, Seaborn
* MLflow for model tracking
* Streamlit for deployment

#### **📊 Results**

* Gradient Boosting performed best with lowest RMSE
* Insights into how weather and traffic significantly affect delivery time