**Project 10: Product Demand Analysis**

**PHASE 4: DEVELOPMENT PART 2**

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**DEVELOPMENT PART 2**

**1. Feature Engineering:**

Feature engineering involves selecting, transforming, and creating relevant features that can improve your model's predictive performance. Some common techniques include one-hot encoding, scaling, and creating new features from existing data.

**Pythn code:**

import pandas as pd

data = pd.read\_csv('your\_dataset.csv')

data = pd.get\_dummies(data, columns=['product\_category'])

from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()

data['price'] = scaler.fit\_transform(data[['price']])

data['total\_sales'] = data['quantity\_sold'] \* data['price']

**2. Model Training:**

Choose an appropriate machine learning model for your task and train it using your feature-engineered dataset. Here's an example of training a simple linear regression model using Python and scikit-learn:

**Python code:**

from sklearn.model\_selection import train\_test\_split

from sklearn.linear\_model import LinearRegression

from sklearn.metrics import mean\_squared\_error

X = data.drop('demand', axis=1)

y = data['demand']

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2, random\_state=42)

model = LinearRegression()

model.fit(X\_train, y\_train)

**3. Evaluation:**

Evaluate the performance of your model using appropriate evaluation metrics. For demand prediction, you might use metrics like Mean Absolute Error (MAE) or Root Mean Squared Error (RMSE).

**Python code:**

y\_pred = model.predict(X\_test)

mae = mean\_absolute\_error(y\_test, y\_pred)

rmse = mean\_squared\_error(y\_test, y\_pred, squared=False)

print(f'Mean Absolute Error: {mae}')

print(f'Root Mean Squared Error: {rmse}')

**Conclusion**

In this product demand prediction project, feature engineering plays a pivotal role in enhancing data quality and model predictive power. Tasks like one-hot encoding, scaling, and creating new features from existing data are essential for capturing complex relationships. Model training involves selecting an appropriate machine learning algorithm, splitting data for training and testing, and adjusting model parameters. While we used a simple linear regression example, various algorithms can be explored. Evaluation is the final step, where metrics like MAE and RMSE are used to quantify model accuracy. Continuous improvement and domain expertise are critical for maintaining a reliable predictive model.