PROJECT DEMAND PREDICTION WITH MACHINE LEARNING

M.Prapakar(Regno:911721104306)

Phase 2: Innovation

Introduction:

Demand prediction, powered by machine learning innovation, has become a critical component of modern businesses across various industries. It involves the use of advanced data analysis and predictive algorithms to forecast future customer demand for products or services. This innovative approach to demand prediction has transformed the way organizations plan, optimize inventory, and meet customer needs. Here's an introduction to this evolving field.

Importance of Demand Prediction:

Accurate demand prediction is at the core of efficient inventory management, production planning, and supply chain optimization. It enables businesses to reduce carrying costs, minimize stockouts, and enhance customer satisfaction by ensuring products are readily available when needed.

Machine Learning and Innovation:

Machine learning innovation has revolutionized the way we approach demand prediction. Traditional statistical methods are being complemented and, in many cases, replaced by sophisticated machine learning models. These models can handle complex, high-dimensional data, adapt to changing market dynamics, and provide more accurate forecasts.

Steps in Demand Prediction:

Define the Problem:

Clearly define the problem and set specific goals. Decide what products to forecast and the desired time horizon for forecasts.

Data Collection:

Gather historical sales data and external factors data.

Collect data such as date, product ID, quantity sold, and external factors like seasonality, promotions, and economic indicators.

Data Preprocessing:

Clean the data by handling missing values and outliers.

Convert date/time data into suitable formats.

Aggregate data based on the chosen time granularity (e.g., daily, weekly).

Encode categorical variables into numerical features using techniques like one-hot encoding.

Feature Engineering:

Create additional features that may influence demand, like lag features, rolling averages, and time-related features.

Calculate statistical features for historical sales data.

Data Splitting:

Split the data into training, validation, and test sets. The training set will be used for model training, validation for hyperparameter tuning, and test for final evaluation.

Model Selection:

Choose a suitable forecasting model, such as ARIMA, Exponential Smoothing, LSTM, or other machine learning models.

Model Training:

Train the selected model using the training data. Tune hyperparameters for optimal performance.

Model Evaluation:

Evaluate the model's performance using the validation set and appropriate metrics like MAE, MSE, or RMSE.

Implement cross-validation techniques for robust evaluation.

Hyperparameter Tuning:

Optimize model hyperparameters to improve forecasting accuracy.

Final Model Selection:

Choose the best-performing model based on validation results.

Testing and Deployment:

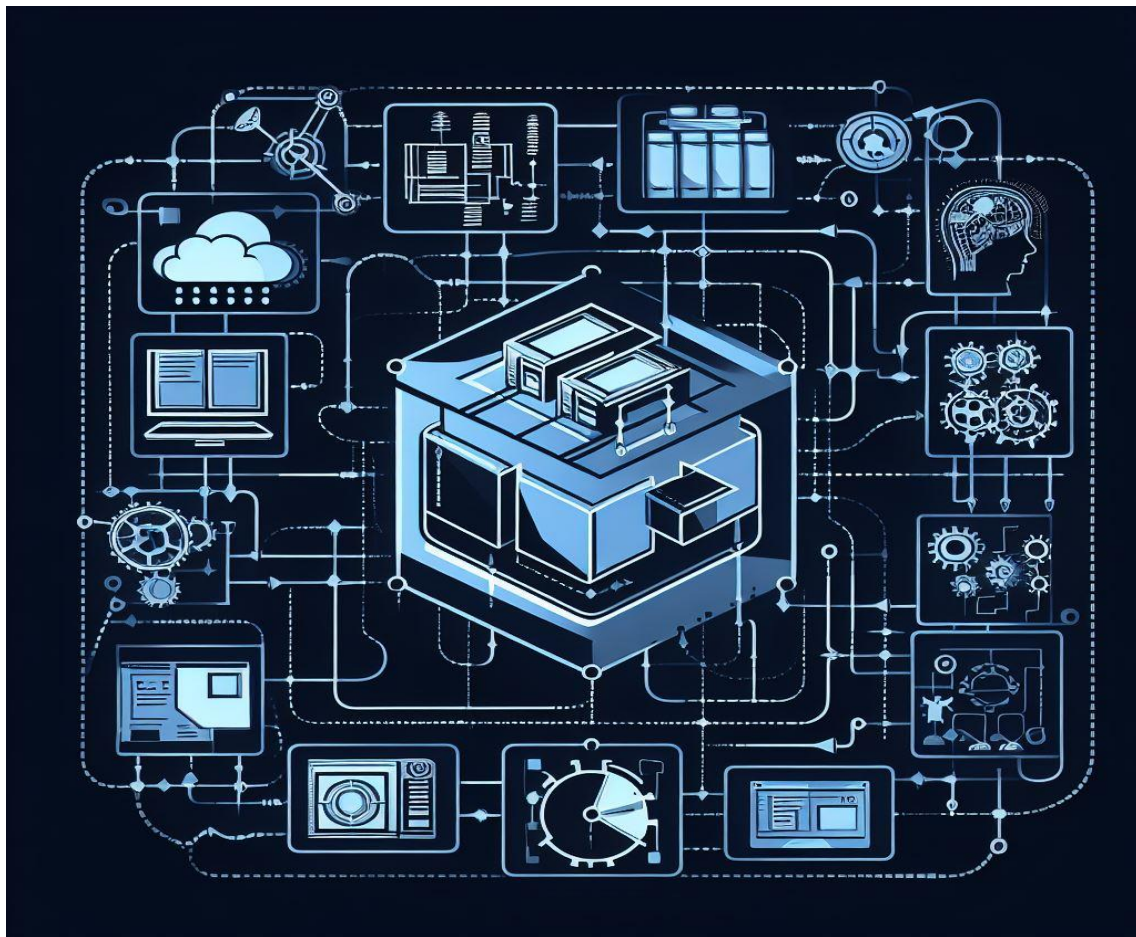Test the final model on the test dataset to ensure it generalizes well.

Deploy the model in a production environment where it can make real-time or batch forecasts.

Continuous Monitoring and Maintenance:

Regularly monitor the model's performance and retrain it with new data.

Keep external factors and data up-to-date to maintain accuracy.

Diagram

Conclusion:

This flowchart provides a visual representation of the step-by-step process to create a machine learning model for demand forecasting, helping businesses optimize inventory management and production planning.

Thank you..