**PRODUCT DEMAND PREDICTION WITH MACHINE LEARNINGS**

**SUBMITTED BY :**

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1. Data Collection and Preparation:

Gather historical data on product sales, relevant features (e.g., marketing spend, seasonality, economic indicators), and any other relevant data that could influence demand.

2. Data Cleaning and Preprocessing:

Clean the data, handle missing values, remove outliers, and preprocess features (e.g., scaling, encoding categorical variables) to prepare it for model training.

3. Feature Engineering:

Create new features or modify existing ones to enhance the predictive power of the model. For example, derive features like moving averages, trend indicators, or lag features.

4 Model Selection :

Choose an appropriate machine learning model for demand prediction, such as regression, time series models (e.g., ARIMA, SARIMA), or more advanced models like decision trees, random forests, or neural networks

5. Model Training:

Train the chosen model using a portion of the dataset, typically using techniques like cross-validation to ensure the model's performance and prevent overfitting.

6. Model Evaluation:

Evaluate the model's performance using appropriate metrics (e.g., Mean Absolute Error, Root Mean Squared Error) on a separate validation or test set to assess its accuracy and effectiveness in predicting demand.

7. Hyperparameter Tuning:

Optimize the model's hyperparameters to improve its performance further. This can be done through techniques like grid search or random search.

8. Deployment:

Once the model is trained and evaluated, deploy it to a production environment where it can be integrated into systems for real-time demand prediction. This may involve API creation or model serialization for ease of use.

9. Monitoring and Maintenance:

Continuously monitor the model's performance in the production environment, retrain or update it as needed to adapt to changing patterns or new data, and refine the model to improve its accuracy and relevance over time.