



REVENUE AT RISK

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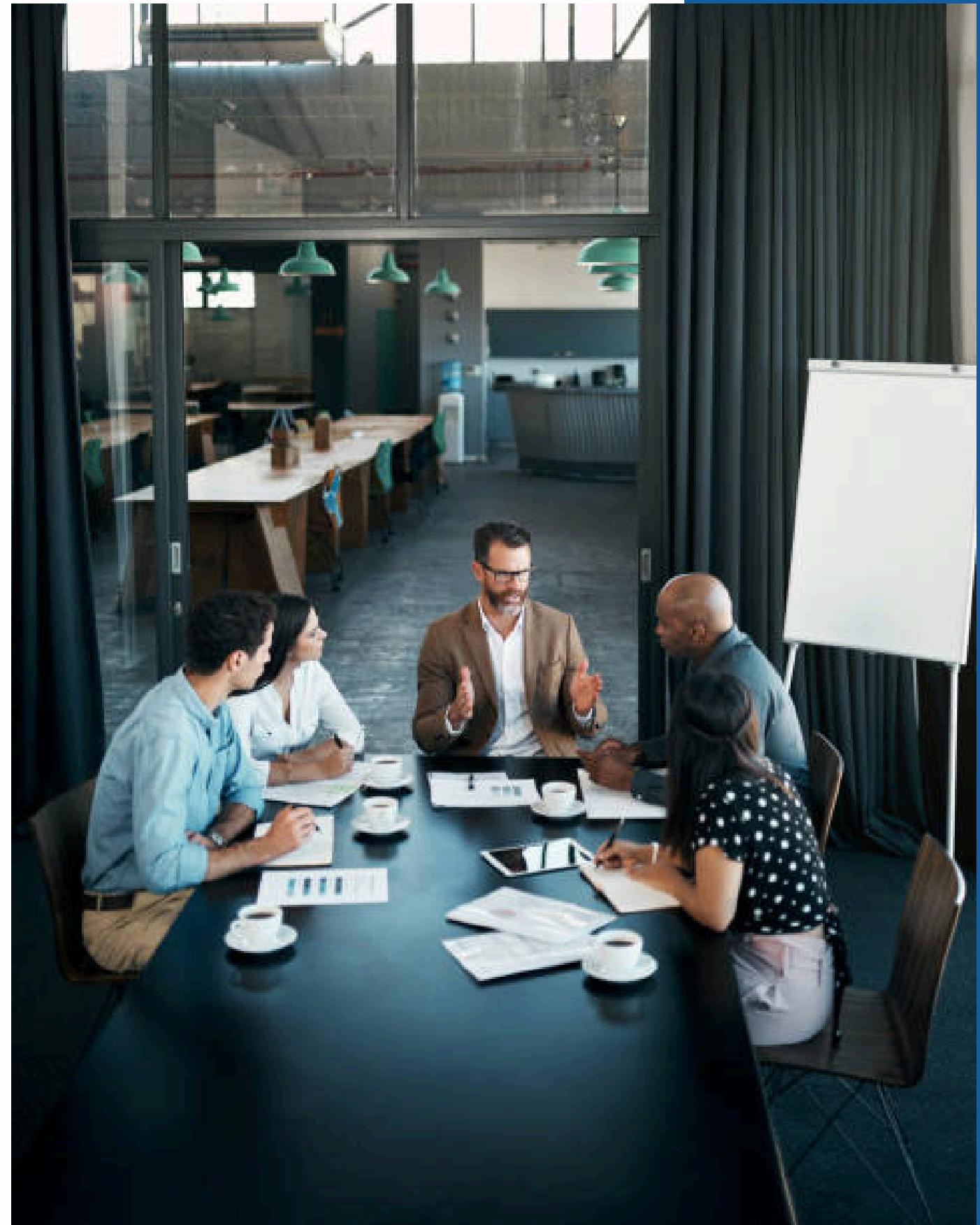
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Introduction

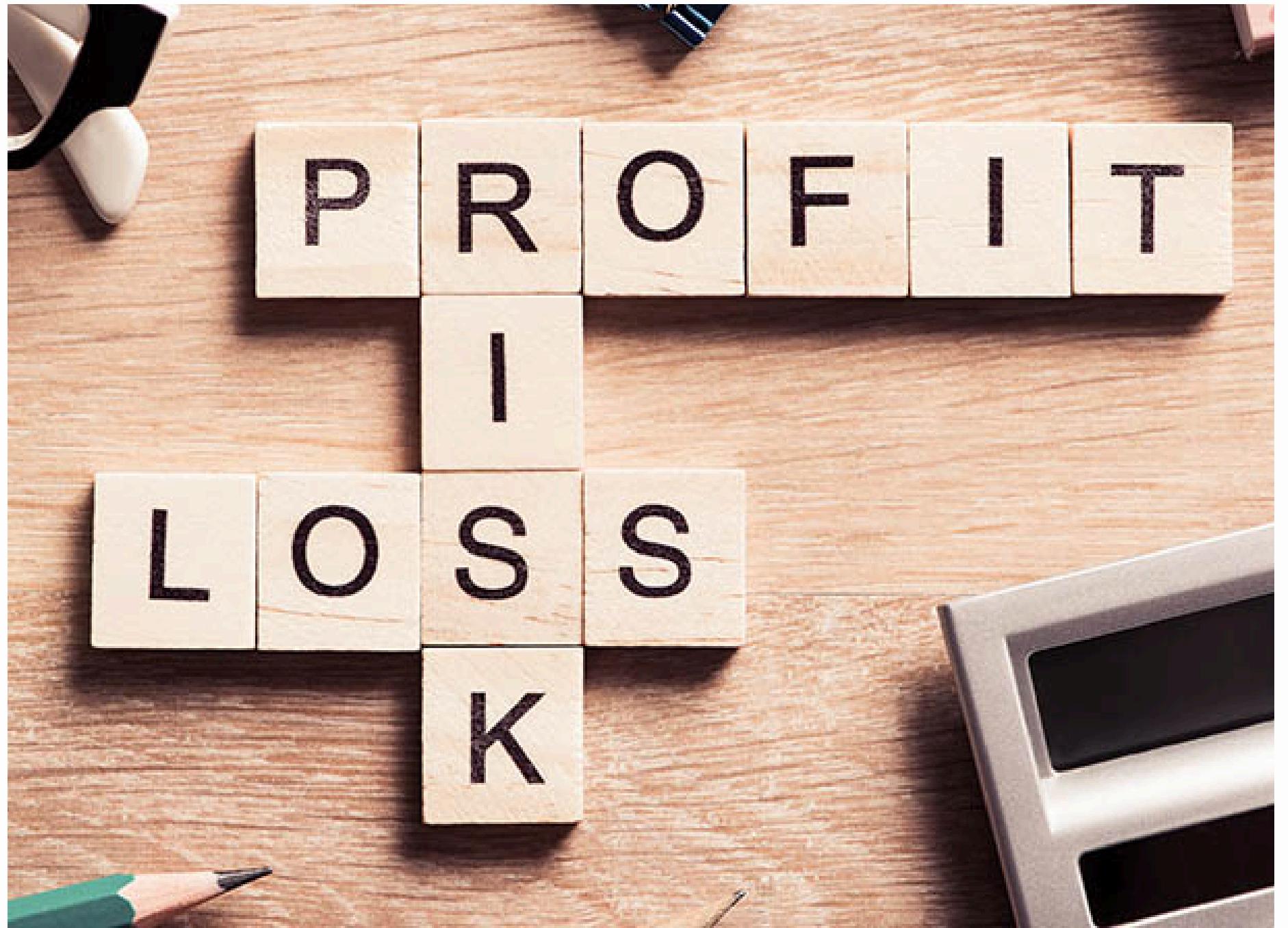
In today's dynamic supply chain landscape, managing revenue is crucial due to disruptions, demand fluctuations, and inventory challenges.

This project aims to analyze and predict revenue by focusing on Demand, Inventory, and Supply. We classify revenue as "Confirmed" or "At Risk," providing insights to improve decision-making and operational efficiency.

Project Overview

Project Goal: Build a machine learning model to classify revenue status as "Confirmed" or "At Risk" based on supply chain factors like demand, inventory, and supply readiness.

Objective: Assist businesses in managing their supply chain efficiently by providing insights into potential revenue risks. This will help in optimizing inventory, resolving supply issues, and improving demand forecasts.



Project Planning

Define Goals

The key goal is to use machine learning to predict revenue status based on historical supply chain data.

Success Criteria

The project will be considered successful if the model achieves high accuracy in predicting revenue status and provides actionable insights for supply chain management.

Data Requirements

Data on demand forecasts, current inventory, and supply readiness will be collected. Historical revenue status data will be used to train and evaluate the model.

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Data Collection and Preprocessing

01

Data Collection: The dataset will include features like Demand Forecast, Current Inventory, Supply Readiness, and Revenue Status from historical supply chain operations.

02

Data Cleaning: Address missing values by using imputation techniques, handle outliers by capping/extending limits, and ensure consistency in units and formats.

03

Feature Engineering: Create new features such as:
i) Inventory_to_Demand_Ratio: Ratio of current inventory to the demand forecast.
ii) Inventory_Demand_Difference: Difference between current inventory and demandforecast.

04

Target Variable: The model will predict Revenue_Status, which is binary—either "Confirmed" or "At Risk."

Model Development

Algorithm

Random Forest Classifier:

A powerful ensemble learning method that builds multiple decision trees and merges them to improve accuracy and control overfitting. Handles both classification and regression tasks, works well with large datasets, reduces the risk of overfitting by averaging multiple trees, and provides feature importance insights.

Hyperparameter Tuning

Use GridSearchCV to tune Random Forest parameters like:

- i) n_estimators: Number of trees in the forest.
- ii) max_depth: Maximum depth of the trees.
- iii) min_samples_split: Minimum number of samples required to split a node.
- iv) min_samples_leaf: Minimum number of samples required to be at a leaf node.
- v) max_features: The number of features to consider when looking for the best split.

Cross-Validation

5-fold cross-validation is used to assess model performance. The data is divided into five parts, with the model trained on four and tested on the fifth part. This process repeats five times, enhancing reliability and reducing overfitting.

Train-Test Split

The dataset is split into 70% training and 30% testing data. The training set is used to build and tune the model, while the testing set provides an unbiased evaluation of the model's ability to generalize to unseen data.

Model Evaluation



Accuracy & Metrics

Measure the accuracy of the model on the test set and compute other metrics such as precision, recall, and F1-score to assess the model's classification performance.

Feature Importance

Analyze which features contribute most to the model's predictions. This can provide insights into the key drivers of "Confirmed" and "At Risk" revenue statuses.

Model Refinement

Based on performance metrics, refine the model by adjusting hyperparameters or adding/removing features.

User Interface

User Interface: Develop a user-friendly web interface using Streamlit where users can input key parameters like demand forecast, current inventory, and supply readiness.

Real-time Predictions: Once the user provides input, the app will display real-time predictions of whether the revenue is "Confirmed" or "At Risk."

Visualizations: Incorporate visualizations such as bar charts to compare total demand and inventory levels. This will make it easier for users to understand the input and prediction results.

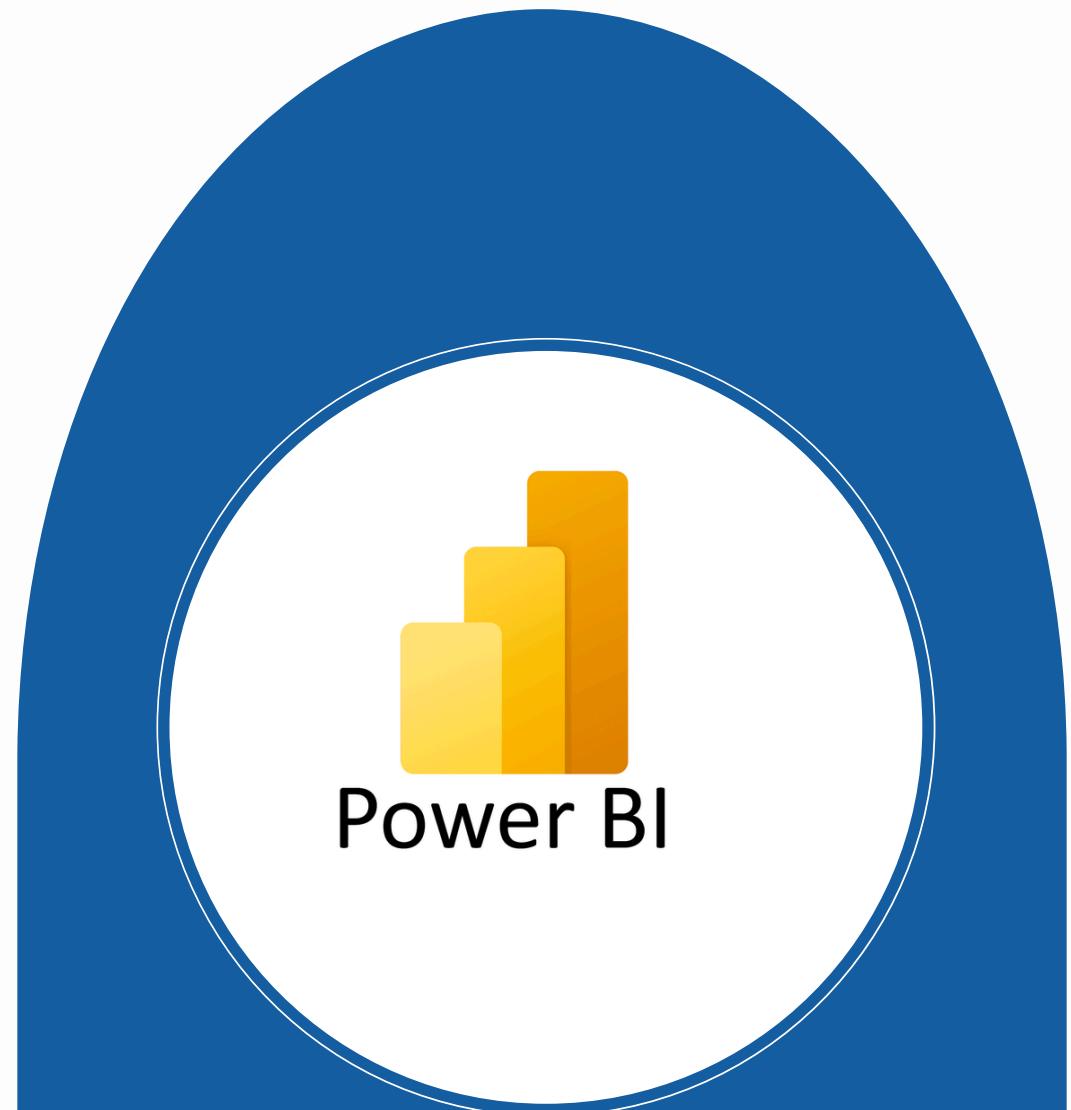


Power BI Analysis

This Power BI analysis provides an interactive view of current inventory levels, demand forecasts, and revenue analysis for different engine types (Bus, Motorcycle, and Truck Engines).

Key Visuals and Insights:

- Bar Charts:
 - Display monthly demand forecasts vs. current inventory levels for each engine type.
- Tree Map Visualization:
 - Shows the overall distribution of current inventory among the different engine categories.
- Pie Chart:
 - Visualizes the percentage of confirmed revenue and revenue at risk for each engine type, highlighting key contributors and risks.
- Table:
 - Displays monthly revenue at risk and confirmed revenue by engine type, offering a detailed time-based view.



CONCLUSION

This project developed a machine learning model to predict supply chain revenue status as either "Confirmed" or "At Risk."

By analyzing key factors such as demand forecasts, current inventory, and supply readiness, the model helps businesses identify revenue risks early.

The model underwent data preprocessing, feature engineering, and hyperparameter tuning to ensure accuracy and robustness.

Deployed via a Streamlit app, it allows users to input real-time data and receive actionable predictions.

This solution aids in optimizing supply chain operations, enabling proactive decisions to mitigate risks and enhance business performance.



THANK YOU!

