Project Title	**Retail sales prediction**
Skills take away From This Project	**ML/DL deployment , AWS sagemaker,Time Series Analysis , Predictive Modeling , Data Preprocessing , Feature Engineering , Exploratory Data Analysis (EDA) , Model Evaluation and Validation , Impact Analysis of Promotions and Holidays , Data Visualization**
Domain	**Retail industry**

Problem Statement:

The primary goal is to forecast department-wise weekly sales for each store for the following year using historical sales data, which will help make informed business decisions, especially during holiday periods and promotional markdown events.

Business Use Cases:

- Sales Forecasting: Predict future sales to manage inventory effectively and reduce stockouts or overstock situations.
- Promotional Planning: Understand the effectiveness of markdowns and plan future promotional activities.
- Resource Allocation: Allocate resources such as staffing and marketing budget based on predicted sales peaks.
- Holiday Strategy: Optimize holiday-specific strategies to maximize revenue during peak seasons.

Approach:

1. Data Understanding and Preprocessing:
    - Handle missing values and convert date formats.
    - Extract features like year, month, and week number.
    - Normalize or scale numerical data.
2. Exploratory Data Analysis (EDA):
    - Visualize trends, seasonality, and the impact of holidays.

    - Analyze correlations between sales and other features.
3. Feature Engineering:
    - Create new features such as lagged sales, rolling averages, and holiday flags.
    - Encode categorical variables as needed.
4. Model Selection and Training:
    - Split data into training and validation sets.
    - Train various models (e.g., ARIMA, Random Forest, LSTM).
    - Evaluate models using metrics like RMSE and MAE, with a focus on holiday weeks.
5. Markdown Effect Analysis:
    - Simulate sales with and without markdowns.
    - Quantify the impact of markdowns on sales.
6. Recommendations:
    - Provide actionable insights for markdown strategies and holiday planning.
    - Suggest improvements for future data collection.

Results:

1. Sales Forecasts: Accurate weekly sales predictions for each department.
2. Markdown Insights: Quantitative analysis of markdown impacts on sales.
3. Strategic Recommendations: Data-driven suggestions for promotional and holiday strategies to maximize business impact.

Project Evaluation metrics:

- Root Mean Squared Error (RMSE)
- Mean Absolute Error (MAE)
- Weighted Metrics: Higher weights for holiday weeks to reflect their importance.

Technical Tags:

- Time Series Forecasting
- Predictive Analytics
- Promotional Analysis

- Data Preprocessing
- Machine Learning
- Deep Learning

Data Set:

- Source: Provided by the organization.
- Format: Excel Sheets with three tabs: Stores, Features, Sales.
- Variables: Store number, department number, date, weekly sales, temperature, fuel price, markdown data, CPI, unemployment rate, holiday indicator

Data Set Explanation:

You are provided with historical sales data for 45 stores located in different regions - each store contains a number of departments. The company also runs several promotional markdown events throughout the year. These markdowns precede prominent holidays, the four largest of which are the Super Bowl, Labor Day, Thanksgiving, and Christmas. The weeks including these holidays are weighted five times higher in the evaluation than non-holiday weeks.

Within the Excel Sheet, there are 3 Tabs – Stores, Features and Sales

Stores

Anonymized information about the 45 stores, indicating the type and size of store

Features

Contains additional data related to the store, department, and regional activity for the given dates.

- Store - the store number
- Date - the week
- Temperature - average temperature in the region
- Fuel_Price - cost of fuel in the region
- MarkDown1-5 - anonymized data related to promotional markdowns. MarkDown data is only available after Nov 2011, and is not available for all stores all the time. Any missing value is marked with an NA
- CPI - the consumer price index

- Unemployment - the unemployment rate
- IsHoliday - whether the week is a special holiday week

Sales

Historical sales data, which covers to 2010-02-05 to 2012-11-01. Within this tab you will find the following fields:

- Store - the store number
- Dept - the department number
- Date - the week
- Weekly_Sales - sales for the given department in the given store
- IsHoliday - whether the week is a special holiday week

Project Deliverables:

- Source Code: Well-documented codebase with comments and explanations.
- Report: Detailed analysis, methodology, results, and recommendations.
- Presentation: Summary of findings and strategic insights.
- Model Files: Trained models and scripts for future use.

Project Guidelines:

Provide guidelines and best practices for project development, including coding standards and version control usage.

Timeline:

- Phase1-2: Data understanding and preprocessing.
- Phase 3-4: Exploratory Data Analysis and Feature Engineering.
- Phase 5-6: Model Training and Evaluation.
- Phase 7: Markdown Effect Analysis.
- Phase 8: Compilation of results, report writing, and preparation of deliverables.

PROJECT DOUBT CLARIFICATION SESSION (PROJECT AND CLASS DOUBTS)

About Session: The Project Doubt Clarification Session is a helpful resource for resolving questions and concerns about projects and class topics. It provides support in understanding project requirements, addressing code issues, and clarifying class concepts. The session aims to enhance comprehension and provide guidance to overcome challenges effectively.
Note: Book the slot at least before 12:00 Pm on the same day

Timing: Tuesday, Thursday, Saturday (5:00PM to 7:00PM)

Booking link :https://forms.gle/XC553oSbMJ2Gcfug9

LIVE EVALUATION SESSION (CAPSTONE AND FINAL PROJECT)

About Session: The Live Evaluation Session for Capstone and Final Projects allows participants to showcase their projects and receive real-time feedback for improvement. It assesses project quality and provides an opportunity for discussion and evaluation.
Note: This form will Open on Saturday and Sunday Only on Every Week

Timing: Monday-Saturday (11:30PM to 12:30PM)

Booking link : https://forms.gle/1m2Gsro41fLtZurRA