```
from google.colab import files
uploaded = files.upload()
```

Choose Files DATASET.zip

- **DATASET.zip**(application/zip) - 3524213 bytes, last modified: 5/7/2025 - 100% done

```
Saving DATASET.zip to DATASET.zip
```

```
import zipfile

with zipfile.ZipFile("DATASET.zip", 'r') as zip_ref:
    zip_ref.extractall("DATASET")  # Extracts into a folder named DATASET
```

Load and Explore the Data

We'll read the extracted CSV files and prepare the data for modeling.

```
import pandas as pd

train = pd.read_csv("DATASET/train.csv")
train.head()
```

	Store	Dept	Date	Weekly_Sales	IsHoliday
0	1	1	2010-02-05	24924.50	False
1	1	1	2010-02-12	46039.49	True
2	1	1	2010-02-19	41595.55	False
3	1	1	2010-02-26	19403.54	False
4	1	1	2010-03-05	21827.90	False

```
# Convert to datetime and extract time features
train['Date'] = pd.to_datetime(train['Date'])
train['Year'] = train['Date'].dt.year
train['Month'] = train['Date'].dt.month
train['Week'] = train['Date'].dt.isocalendar().week
train['IsHoliday'] = train['IsHoliday'].astype(int)
train.drop('Date', axis=1, inplace=True)
train.head()
```

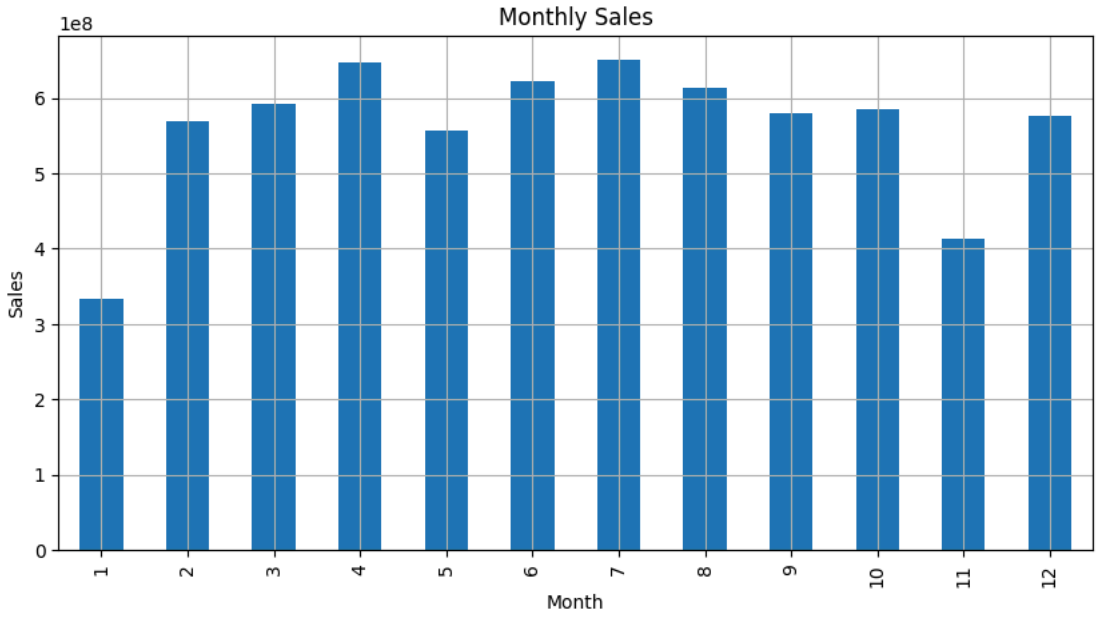
	Store	Dept	Weekly_Sales	IsHoliday	Year	Month	Week
0	1	1	24924.50	0	2010	2	5
1	1	1	46039.49	1	2010	2	6
2	1	1	41595.55	0	2010	2	7
3	1	1	19403.54	0	2010	2	8
4	1	1	21827.90	0	2010	3	9

Sales Trends Visualization

Let's explore seasonal sales patterns and holiday impact.

```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(10,5))
train.groupby('Month')['Weekly_Sales'].sum().plot(kind='bar', title='Monthly Sales')
plt.ylabel("Sales")
plt.xlabel("Month")
plt.grid(True)
plt.show()
```



Building a Regression Model

We'll use Random Forest Regressor to predict Weekly Sales

```
from sklearn.model_selection import train_test_split

X = train[['Store', 'Dept', 'Year', 'Month', 'Week', 'IsHoliday']]
y = train['Weekly_Sales']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
from sklearn.ensemble import RandomForestRegressor

model = RandomForestRegressor(n_estimators=100, random_state=42)
model.fit(X_train, y_train)
```

```
RandomForestRegressor
RandomForestRegressor(random_state=42)
```

```
from sklearn.metrics import mean_absolute_error, mean_squared_error
import numpy as np

y_pred = model.predict(X_test)

mae = mean_absolute_error(y_test, y_pred)
rmse = np.sqrt(mean_squared_error(y_test, y_pred))

print(f"MAE: {mae:.2f}")
print(f"RMSE: {rmse:.2f}")
```

```
MAE: 1431.76
RMSE: 4011.00
```

```
# Example prediction for Store 1, Dept 1 in November
sample = pd.DataFrame({
    'Store': [1],
    'Dept': [1],
    'Year': [2012],
    'Month': [11],
    'Week': [45],
    'IsHoliday': [1]
})

pred = model.predict(sample)
print(f"Predicted Weekly Sales: ${pred[0]:.2f}")
```

```
Predicted Weekly Sales: $19273.31
```

Conclusion

- We successfully built a retail sales forecasting model.
- Used Random Forest on engineered features from time/date and store info.
- Model can be used to plan inventory, schedule promotions, and manage resources.

MAE and RMSE indicate the average and root mean errors in weekly sales prediction.