| EX:No.8<br><br>DATE:12/04/25 | **Create an ARIMA model for time series forecasting** |
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**AIM:**

To develop an ARIMA (AutoRegressive Integrated Moving Average) model for forecasting future values in a time series using the provided dataset.

**ALGORITHM:**

Step 1: Import necessary libraries and load the dataset.

Step 2: Convert the date column (saledate) to datetime format and set it as the index.

Step 3: Resample the data to a monthly frequency and handle missing values using interpolation.

Step 4: Plot the original time series to visualize trends and seasonality.

Step 5: Define and fit the ARIMA model with specified parameters (p, d, q).

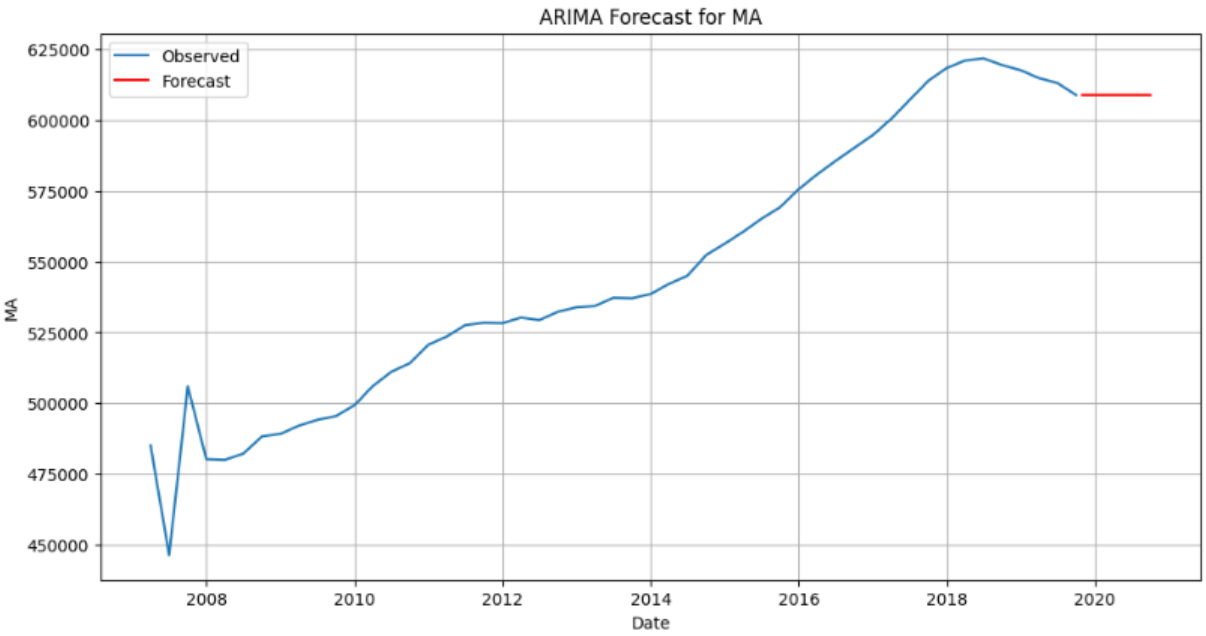
Step 6: Plot the observed values and forecasted results to visualize the prediction performance.

**CODE AND DESCRIPTION:**

```
import pandas as pd
import matplotlib.pyplot as plt
from statsmodels.tsa.arima.model import ARIMA
import warnings
warnings.filterwarnings("ignore")

# Load the dataset
file_path = "/content/ma_lga_12345.csv"
df = pd.read_csv(file_path)

# Convert 'saledate' to datetime format and set as index
df['saledate'] = pd.to_datetime(df['saledate'], format="%d/%m/%Y")
df.set_index('saledate', inplace=True)
```

```
# Resample data monthly and interpolate missing values
monthly_df = df['MA'].resample('ME').mean().interpolate()

# Plot the time series
plt.figure(figsize=(12, 6))
plt.plot(monthly_df, label='Monthly Mean of MA')
plt.title('Monthly MA Time Series')
plt.xlabel('Date')
plt.ylabel('MA')
plt.legend()
plt.grid(True)
plt.show()

# Fit ARIMA model (parameters p=1, d=1, q=1 as an example)
model = ARIMA(monthly_df, order=(1, 1, 1))
model_fit = model.fit()

# Forecast future values
forecast = model_fit.forecast(steps=12)

# Plot the forecast
plt.figure(figsize=(12, 6))
plt.plot(monthly_df, label='Observed')
plt.plot(forecast.index, forecast, label='Forecast', color='red')
plt.title('ARIMA Forecast for MA')
plt.xlabel('Date')
plt.ylabel('MA')
plt.legend()
plt.grid(True)
plt.show()

# Print model summary
print(model_fit.summary())
```

**OUTPUT**




**RESULT:**

Thus, the program has been completed and verified successfully.