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| **EX.N0 : 7** | **Implement program for decomposing time series data into trend and seasonality.** |
| **DATE : 24/03/2025** |

**AIM:**

# Implement program for decomposing time series data into trend and seasonality.

# ALGORITHM:

# Step 1: Import Libraries Step 2: Load the Dataset Step 3: Preprocess the Data Step 4: Decompose the Time Series Step 5: Plot Decomposition Results

# PROGRAM:

# Step 1: Import Libraries

import pandas as pd

import matplotlib.pyplot as plt

from statsmodels.tsa.seasonal import seasonal\_decompose

# Step 2: Load the Dataset

file\_path = '/mnt/data/climate\_change\_data.csv' # Update path if needed

df = pd.read\_csv(file\_path)

# Step 3: Preprocess the Data

df.columns = [col.strip() for col in df.columns]

date\_col = df.columns[0]

df[date\_col] = pd.to\_datetime(df[date\_col], errors='coerce')

df.set\_index(date\_col, inplace=True)

# Drop non-numeric columns

df\_numeric = df.select\_dtypes(include='number')

# Ensure we have numeric data

if df\_numeric.empty:

raise ValueError("No numeric columns found!")

# Select first numeric column for decomposition

value\_col = df\_numeric.columns[0]

data = df\_numeric[value\_col].dropna()

# Step 4: Decompose the Time Series

# Assumes monthly data, adjust `period` accordingly (e.g., 12 for monthly, 4 for quarterly)

decomposition = seasonal\_decompose(data, model='additive', period=12)

# Step 5: Plot Decomposition Results

plt.figure(figsize=(14, 10))

plt.subplot(411)

plt.plot(data, label='Original')

plt.legend(loc='upper left')

plt.subplot(412)

plt.plot(decomposition.trend, label='Trend', color='orange')

plt.legend(loc='upper left')

plt.subplot(413)

plt.plot(decomposition.seasonal, label='Seasonality', color='green')

plt.legend(loc='upper left')

plt.subplot(414)

plt.plot(decomposition.resid, label='Residuals', color='red')

plt.legend(loc='upper left')

plt.tight\_layout()

plt.show()

**OUTPUT:**

A group of colorful lines

AI-generated content may be incorrect.

# RESULT:

Thus, the program for Implement programs for a time series data is executed successfully.