Tecnológico de Monterrey

Instituto Tecnológico y de Estudios Superiores de Monterrey

A7-Introducción a series de tiempo. Series estacionarias

Profesores:

Ivan Mauricio Amaya Contreras

Blanca Rosa Ruiz Hernandez

Antonio Carlos Bento

Frumencio Olivas Alvarez

Hugo Terashima Marín

Julian Lawrence Gil Soares - A00832272

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In [ ]:
```
import numpy as np
import pandas as pd

data = {
    'Semana': list(range(1, 13)),
    'Galones': [17, 21, 19, 23, 18, 16, 20, 18, 22, 20, 15, 22]
}

df = pd.DataFrame(data)


def ma(data, window):
    return data['Galones'].rolling(window=window).mean()

def wma(data, weights):
    result = []
    for i in range(len(data)):
        if i < len(weights):
            result.append(np.mean(data['Galones'][:i+1]))
        else:
            result.append(np.sum(data['Galones'][i-len(weights):i] * weights))
    return result

def es(data, alpha):
    forecast = [data['Galones'][0], data['Galones'][0]]
    for i in range(2, len(data)):
        forecast.append(alpha * data['Galones'][i - 1] + (1 - alpha) * forecast[i -
    return forecast

#MSE
def mseT(y_true, y_pred):
    return np.mean((y_true - y_pred) ** 2)

# Promedios móviles
ma_window = 3
df['MA'] = ma(df, ma_window)

# Promedios móviles ponderados
weights = [1/3, 2/3]
df['WMA'] = wma(df, weights)

# Suavizamiento exponencial
alpha_values = np.linspace(0, 1, 101)
best_alpha = None
best_mse = float('inf')

for alpha in alpha_values:
    forecast = es(df, alpha)
    mse = mseT(df['Galones'][2:], forecast[2:])
    if mse < best_mse:
        best_mse = mse
        best_alpha = alpha

df['ES'] = es(df, best_alpha)
```

```
# Find the best forecasting method
methods = ['MA', 'WMA', 'ES']
best_method = min(methods, key=lambda method: mseT(df['Galones'][2:], df[method][2:

last_week_sales = df['Galones'].iloc[-1]
if best_method == 'MA':
    forecast_week_13 = df['MA'].iloc[-1]
elif best_method == 'WMA':
    forecast_week_13 = df['WMA'].iloc[-1]
else:
    forecast_week_13 = df['ES'].iloc[-1]

print("Best Method:", best_method)
print("Week 13:", forecast_week_13)
```

```
Best Method: MA
Week 13: 19.0
```