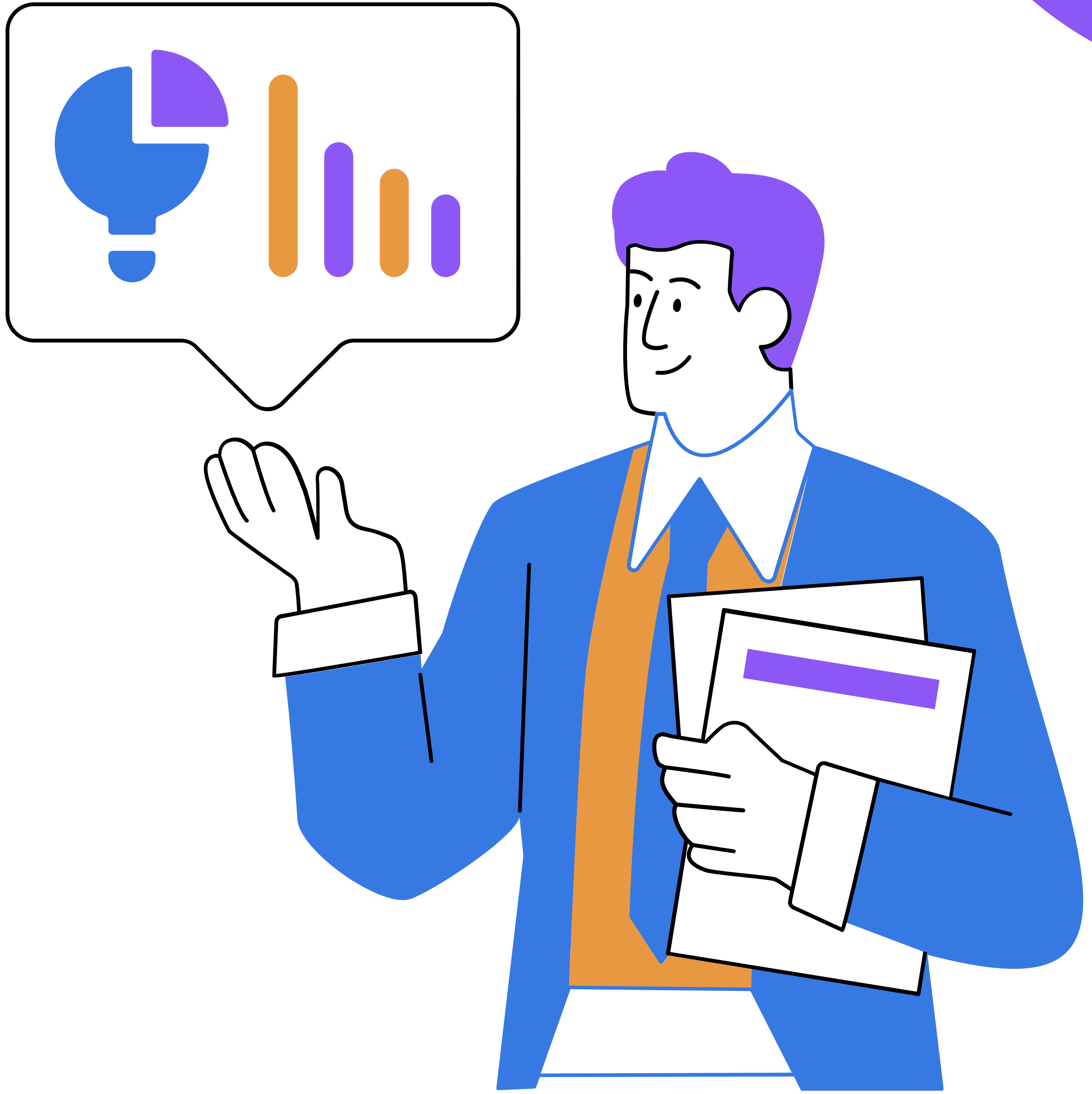
WALMART WEEKLY SALES FORECASTING



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Dataset Overview

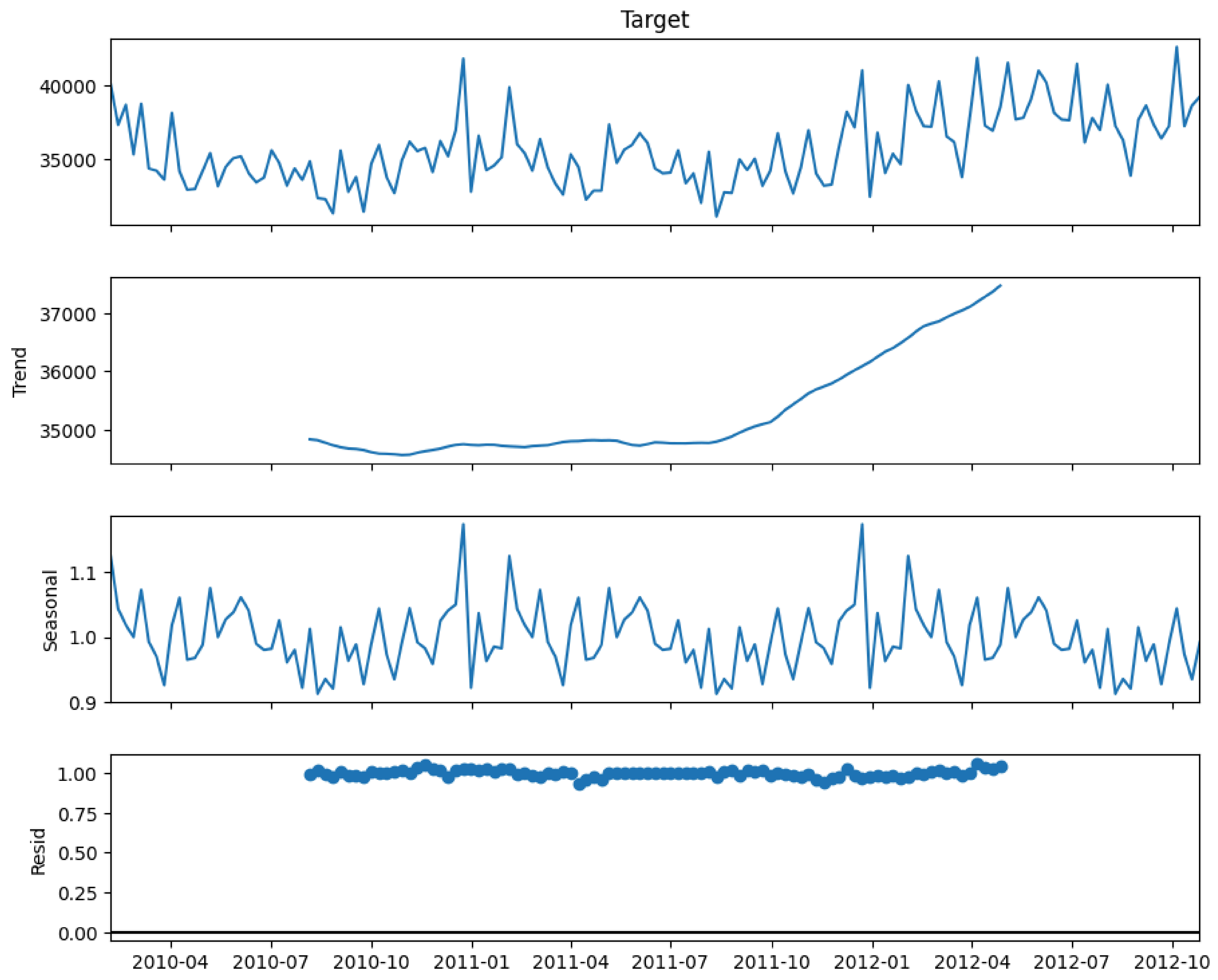
Source: Cleaned Walmart Weekly Sales dataset

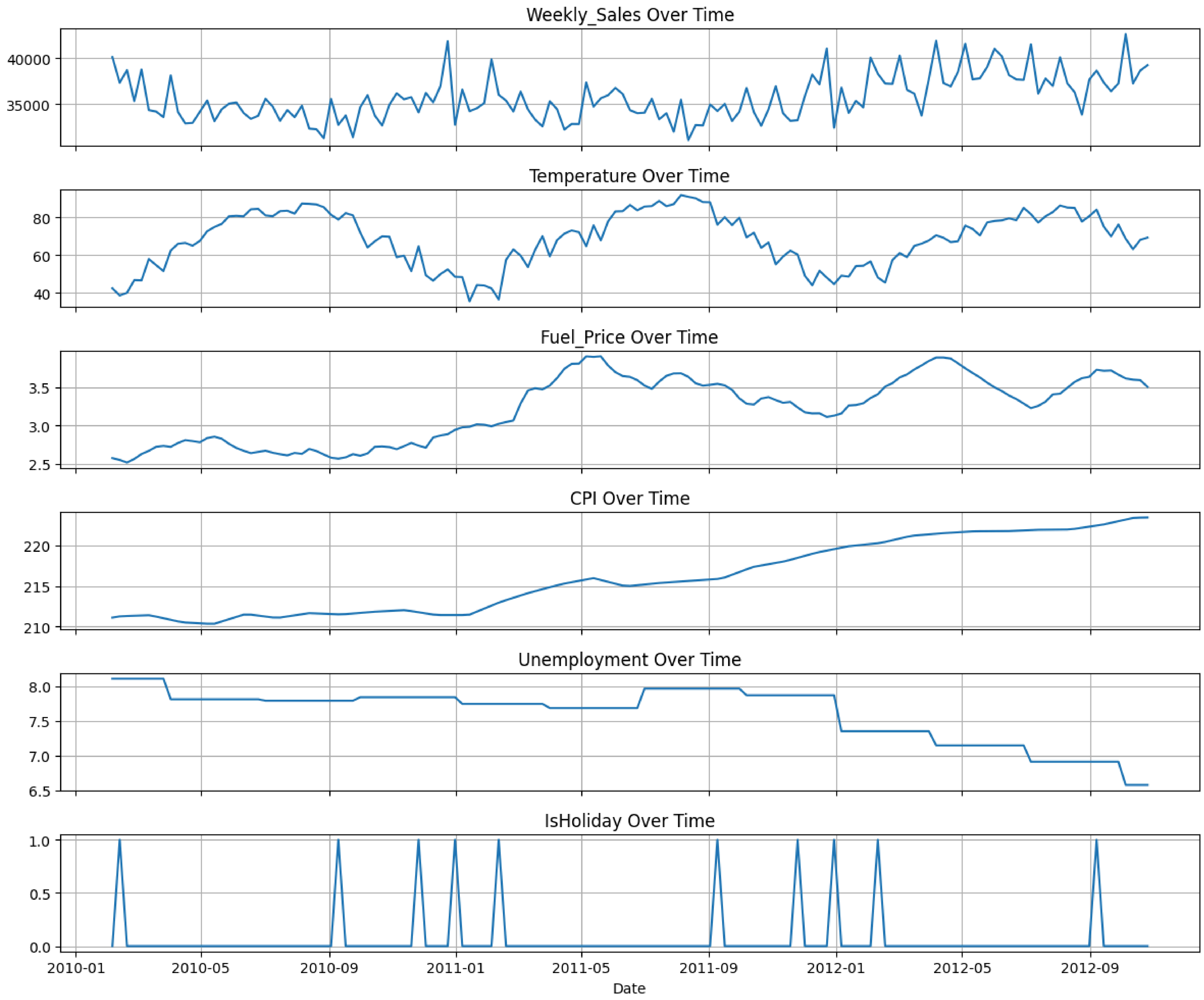
Focus: Department ID 8

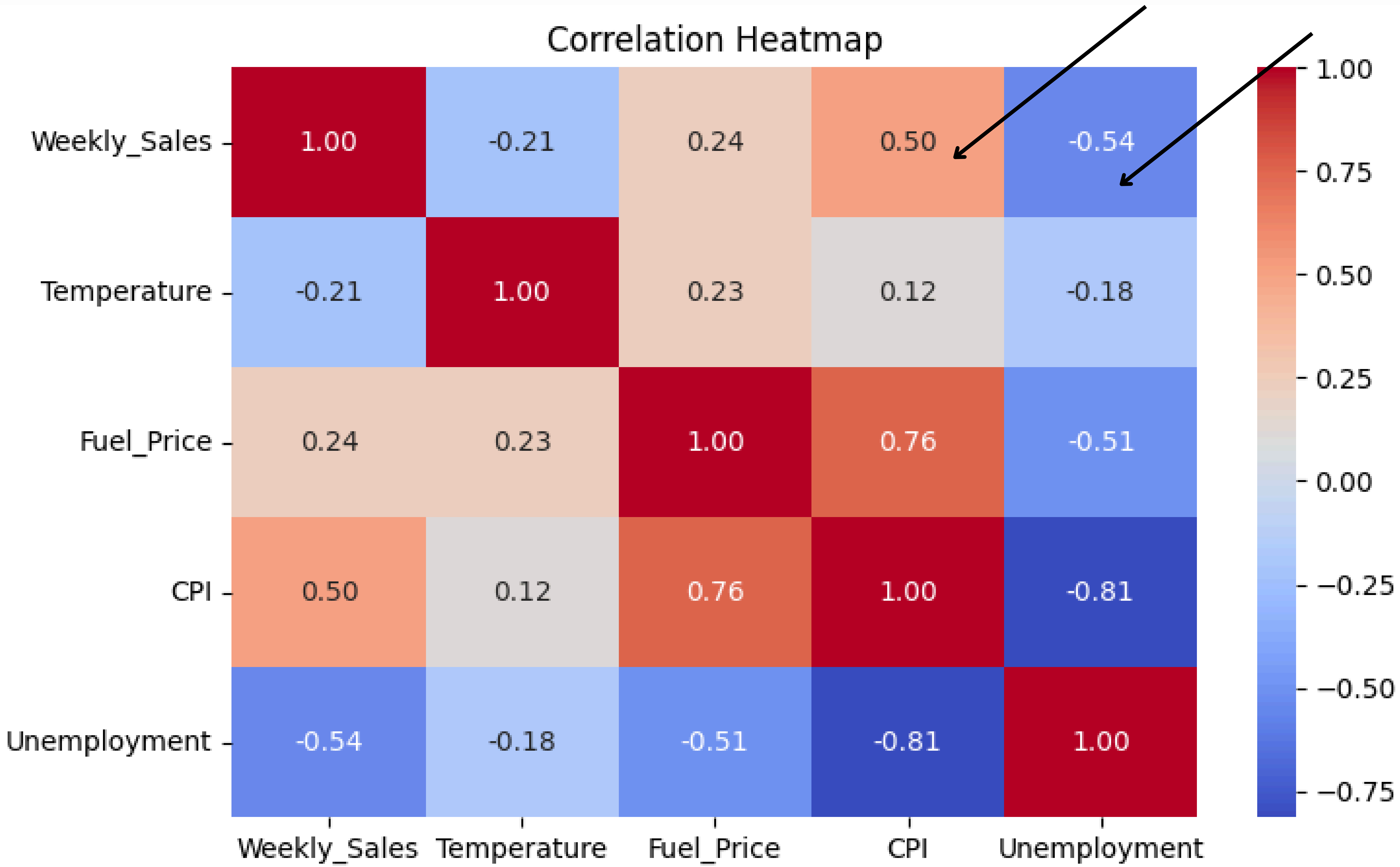
Time Span: February 2010 – November 2012

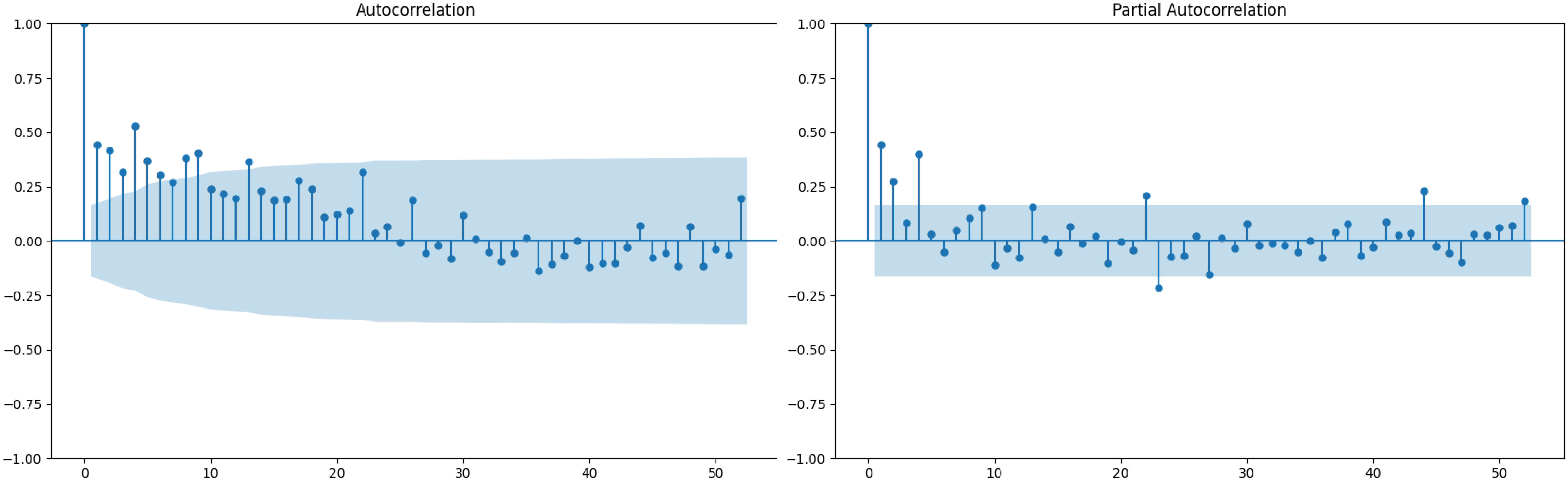
Records: 143 weekly observations

Time Series Analysis




Weekly_Sales Over Time
40000
35000
Temperature Over Time
80
60
40
Fuel_Price Over Time
3.5
3.0
2.5
CPI Over Time
220
215
210
Unemployment Over Time
8.0
7.5
7.0
6.5
IsHoliday Over Time
1.0
0.5
0.0
2010-01
2010-05
2010-09
2011-01
2011-05
2011-09
2012-01
2012-05
2012-09
Date

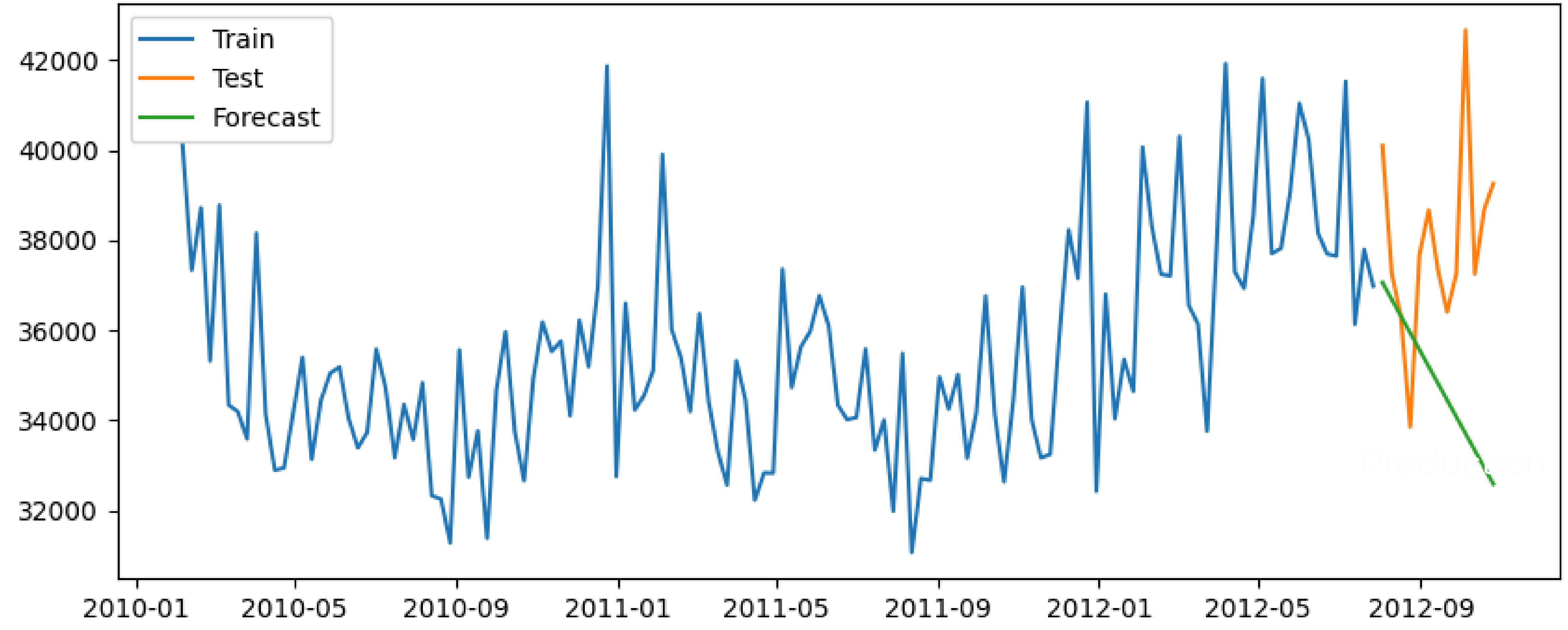

Correlation Heatmap
Weekly_Sales
Temperature
Fuel_Price
CPI
Unemployment
1.00 -0.21 0.24 0.50 -0.54
-0.21 1.00 0.23 0.12 -0.18
0.24 0.23 1.00 0.76 -0.51
0.50 0.12 0.76 1.00 -0.81
-0.54 -0.18 -0.51 -0.81 1.00
Weekly_Sales
Temperature
Fuel_Price
CPI
Unemployment
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75


Autocorrelation
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
10
20
30
40
50
Partial Autocorrelation
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
10
20
30
40
50

Holt-Winters

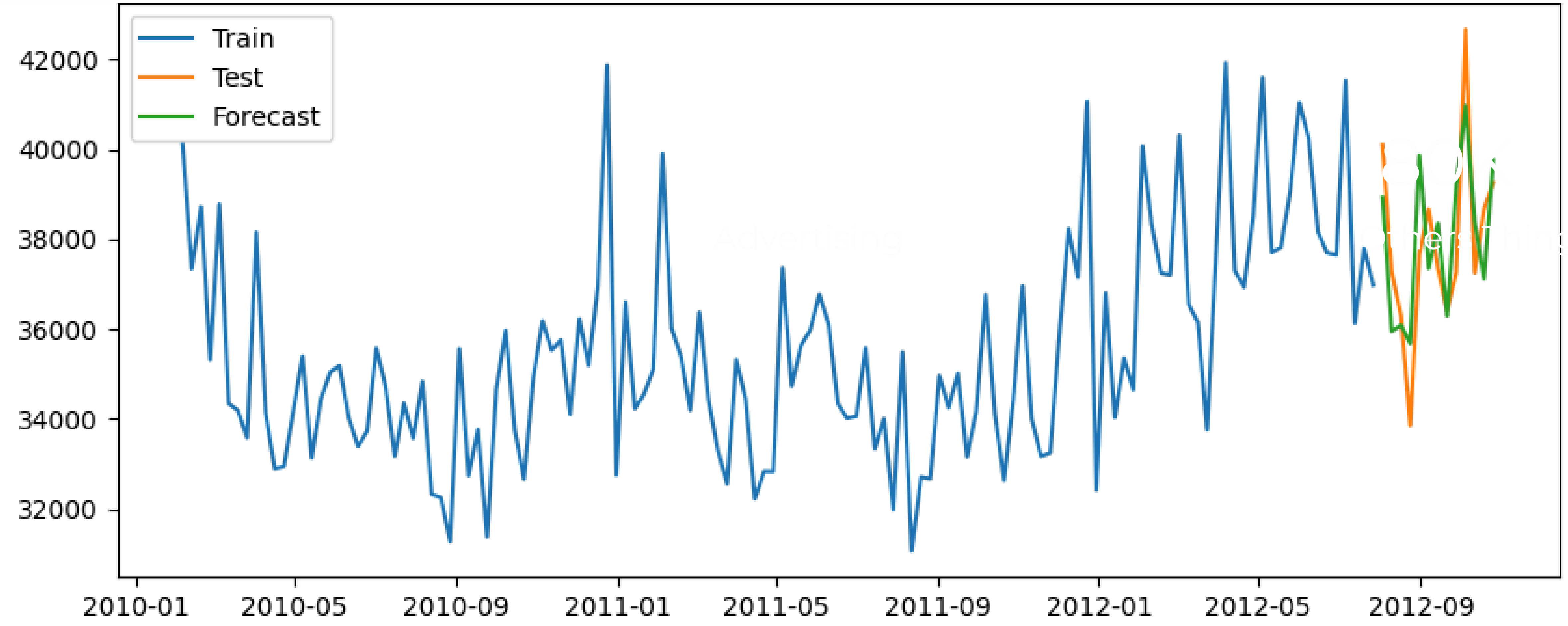
Trend only

The MAPE is 8.76 %



Trend and Seosonality

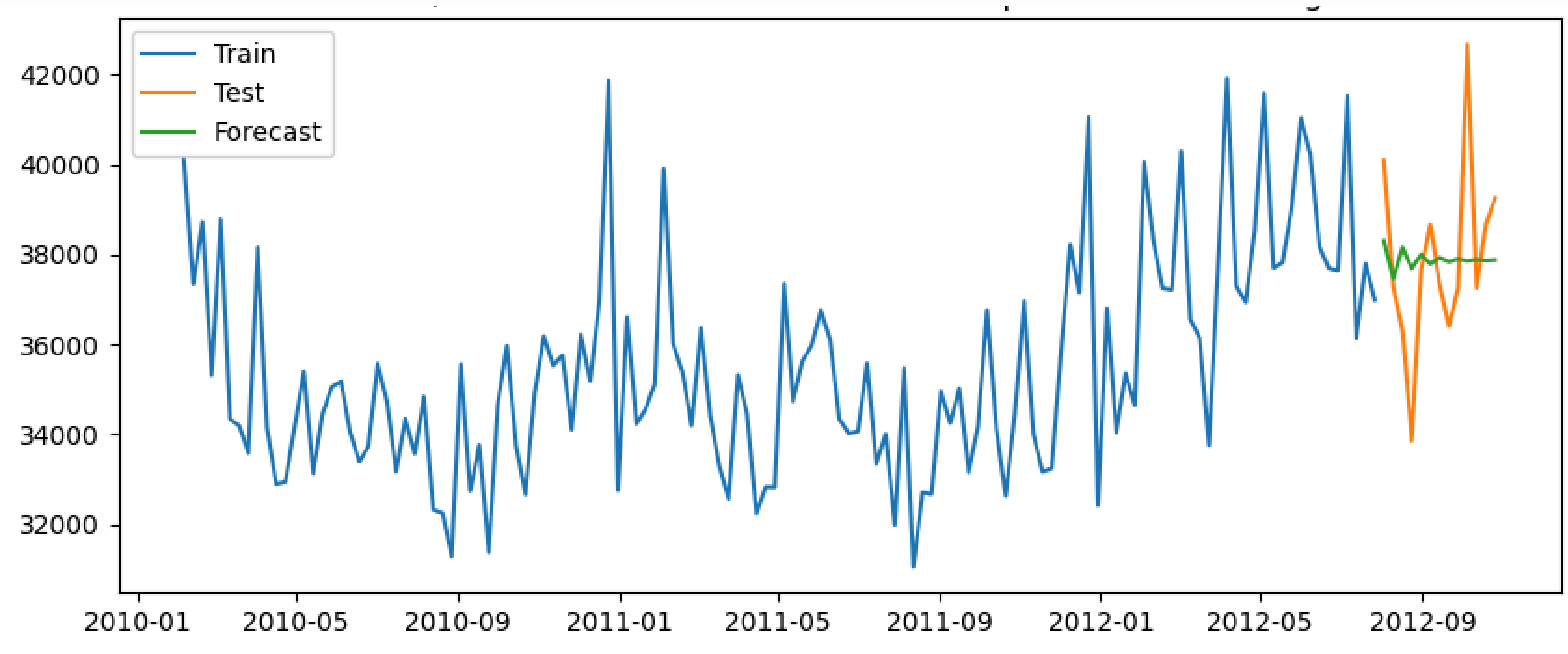
The MAPE is 3.24 %



ARIMA, SARIMA, SARIMAX.

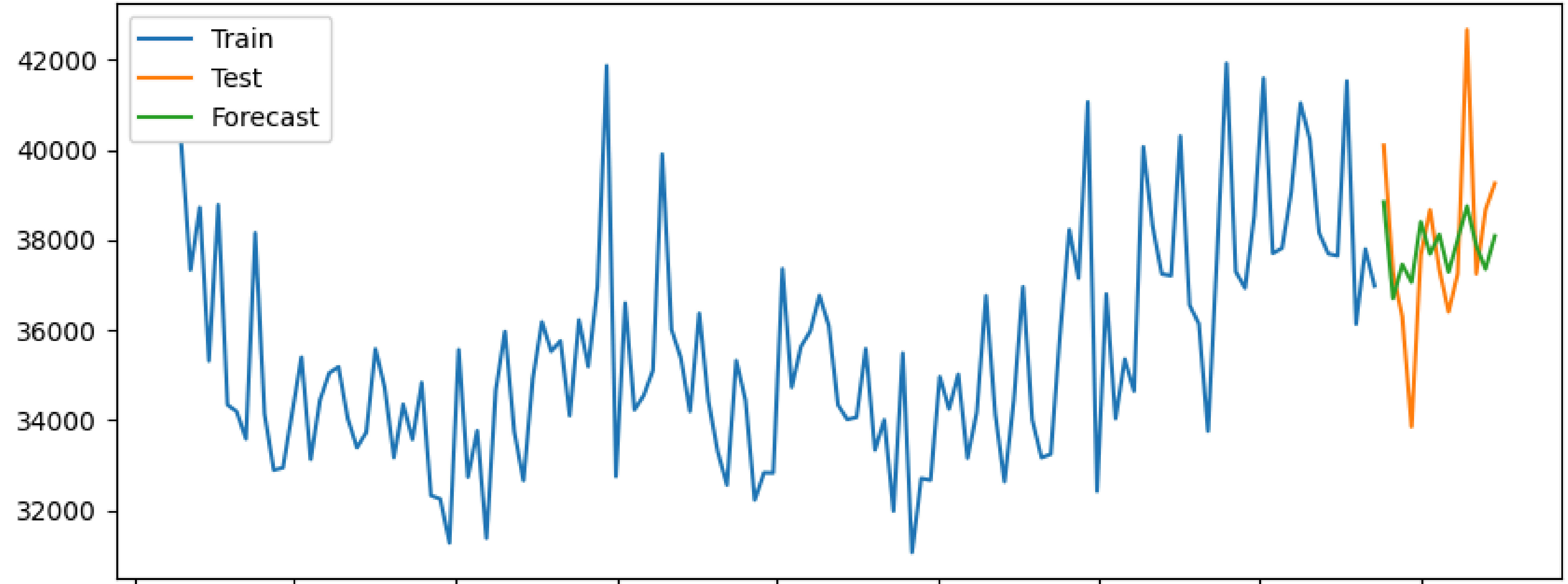
ARIMA

The MAPE is 3.88 %



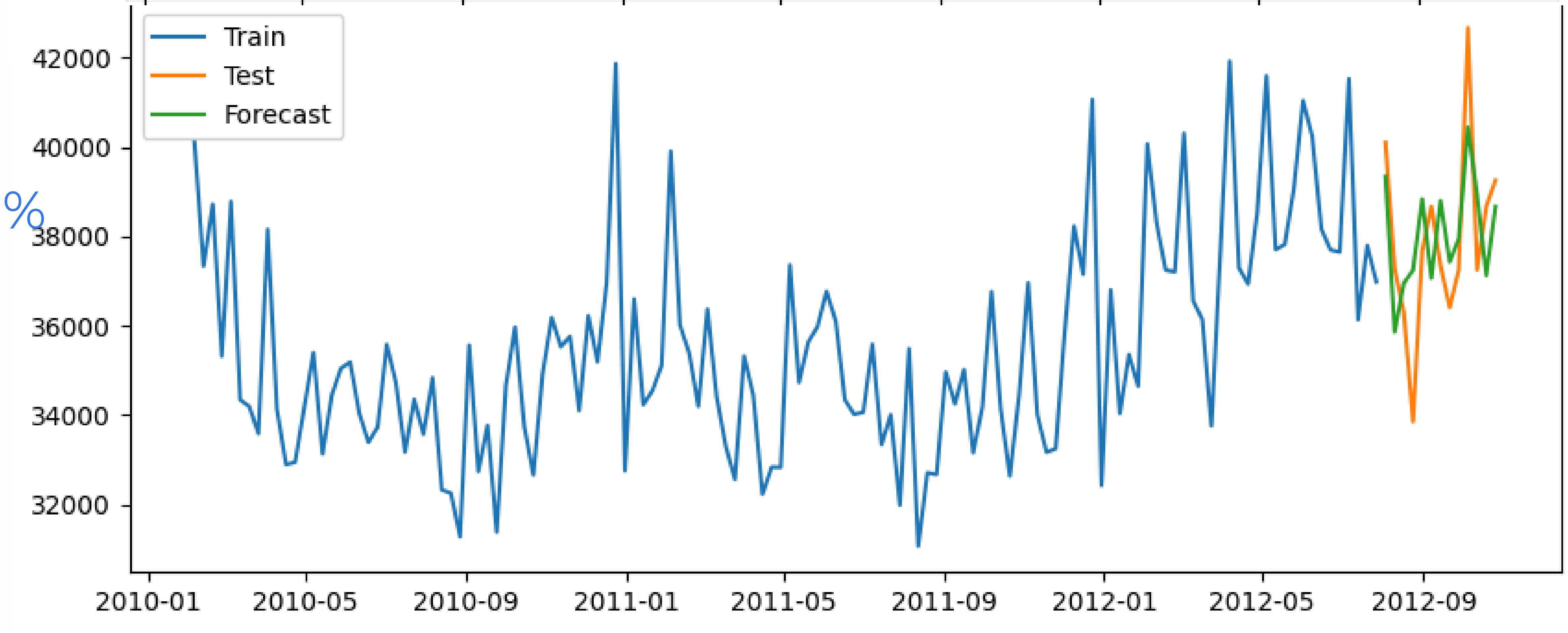
SARIMA

The MAPE is 3.51 %



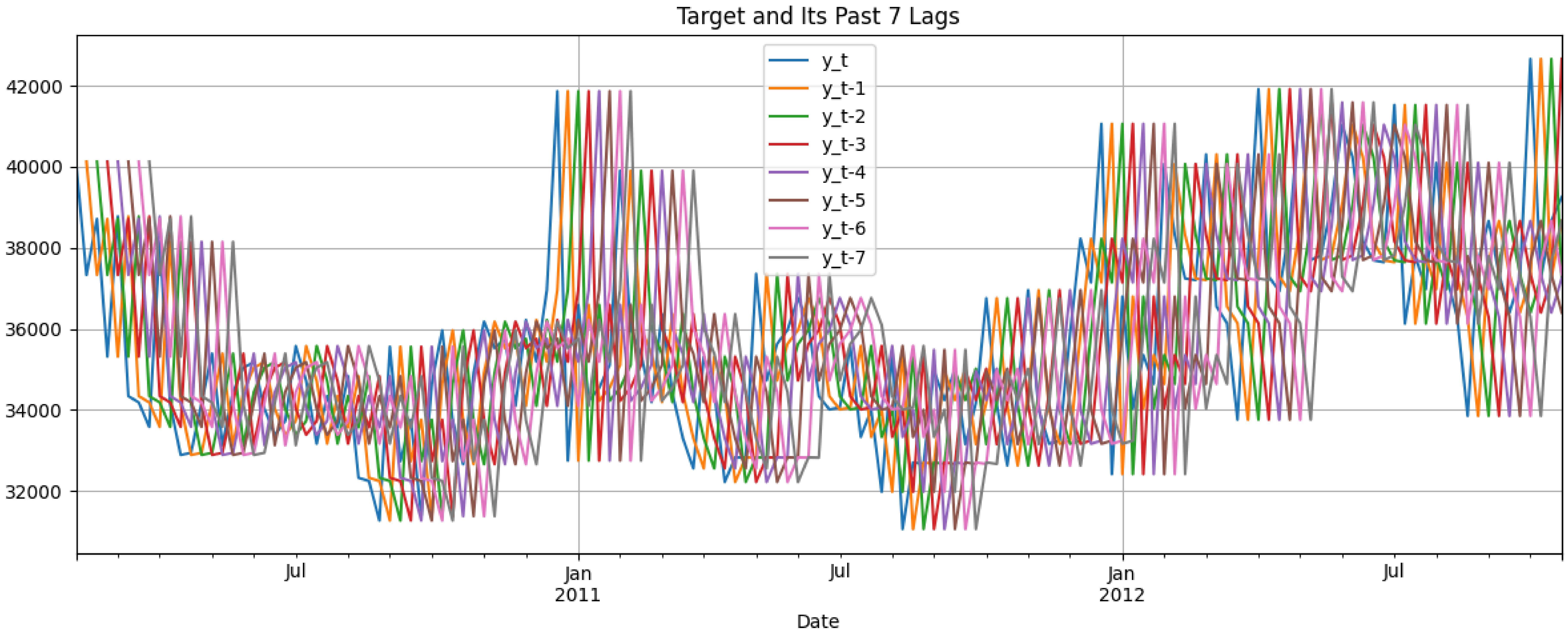
SARIMAX

The MAPE is 3.73 %



Machine Learning Models

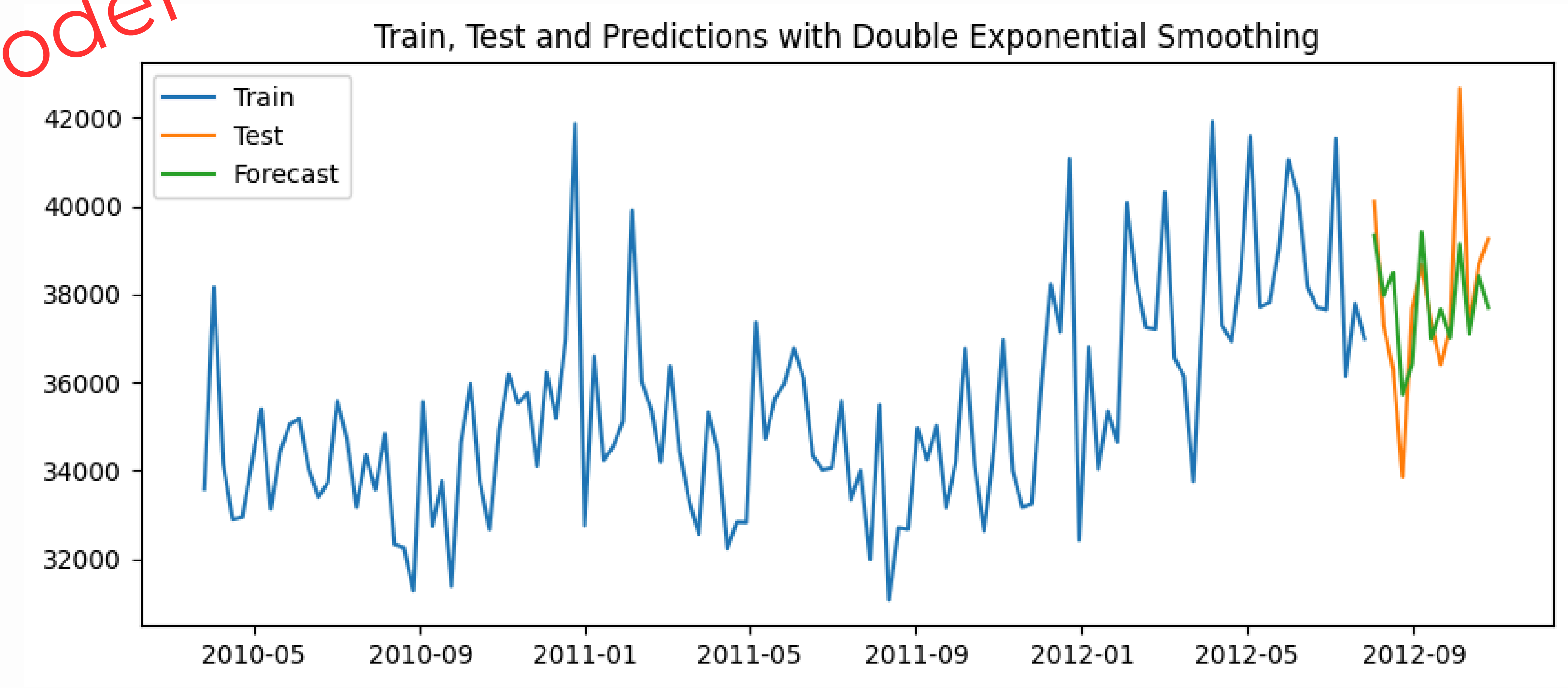
7 lags according to PACF



Random Forest

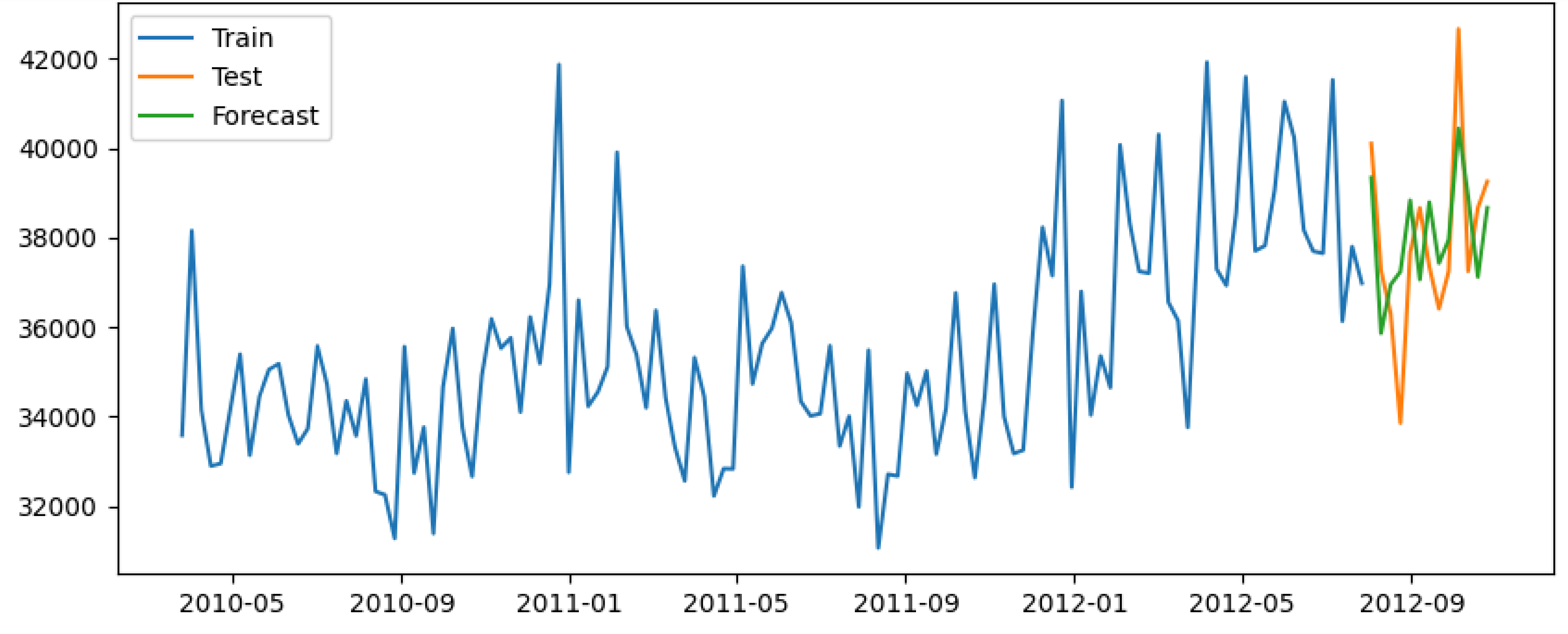
The MAPE is 3.00 %

Best Model



XGBoost

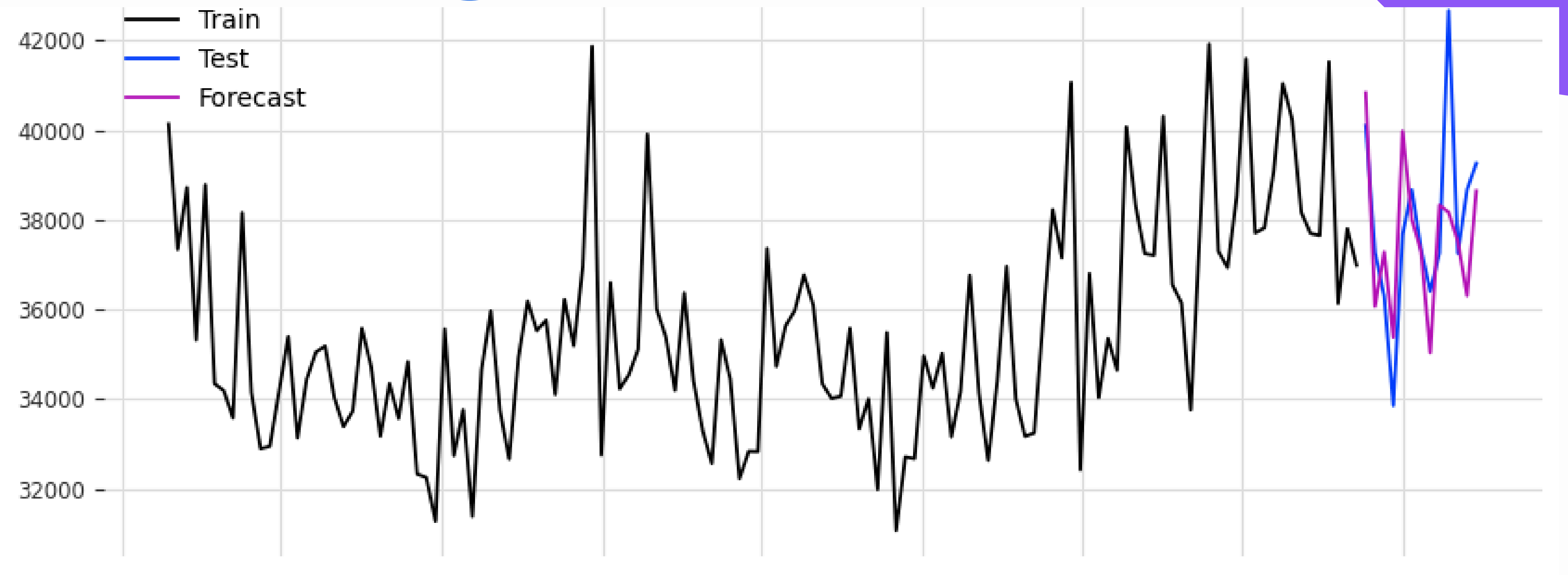
The MAPE is 3.73 %



Deep Learning Models

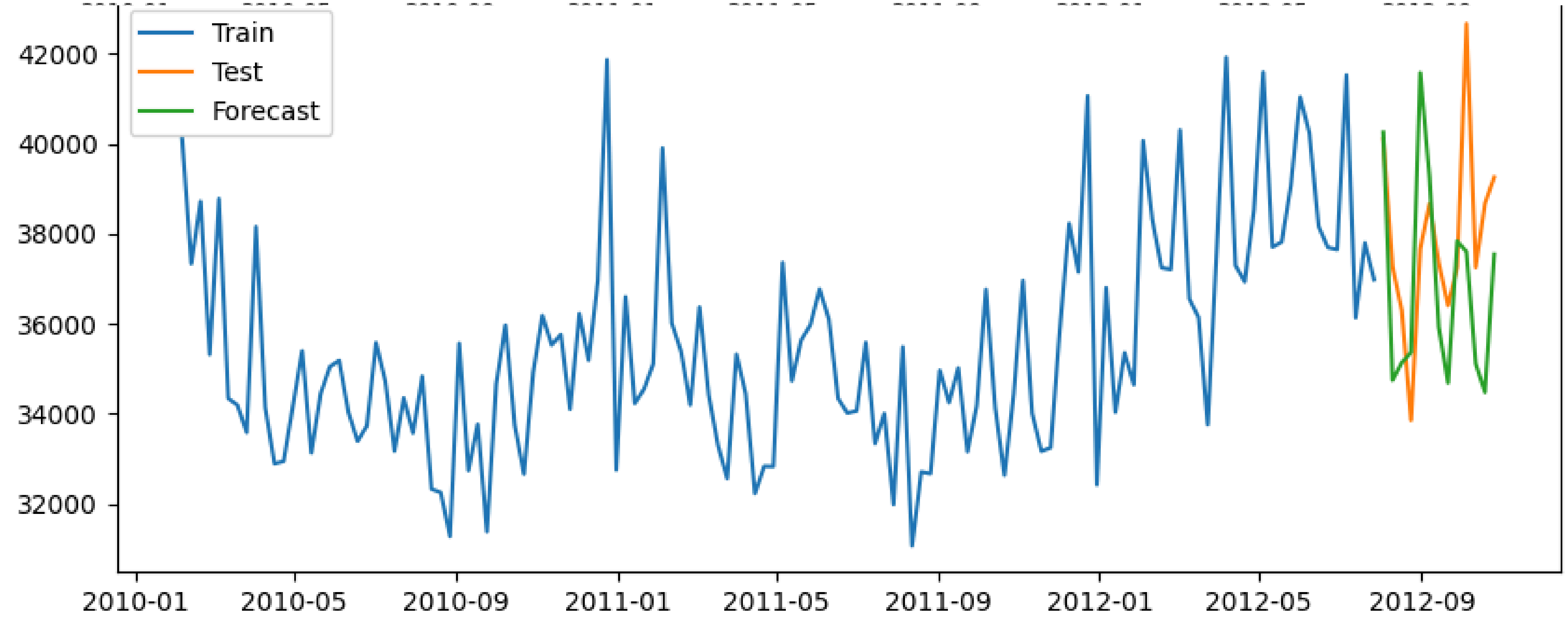
RNN

The MAPE is 3.52 %



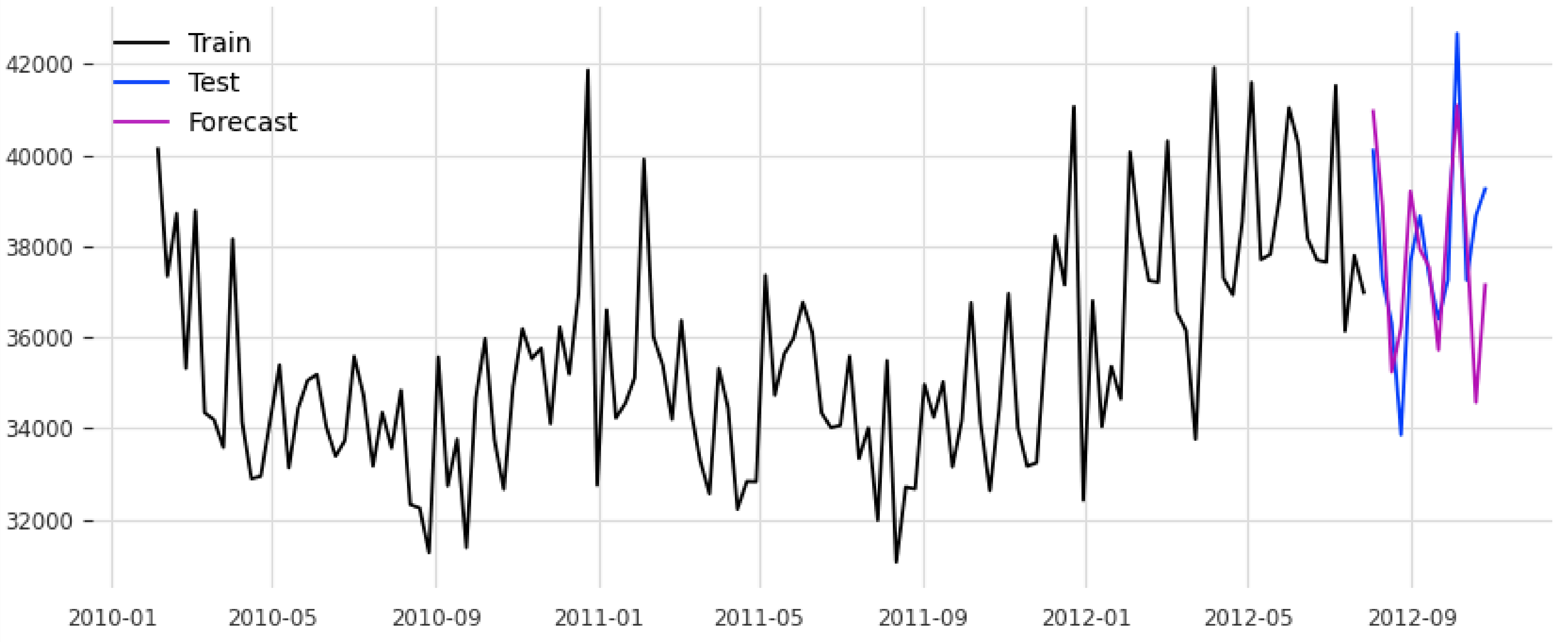
CNN

The MAPE is 5.35 %



ANN

The MAPE is 3.90 %



Prophet Forecasting

Best Params:

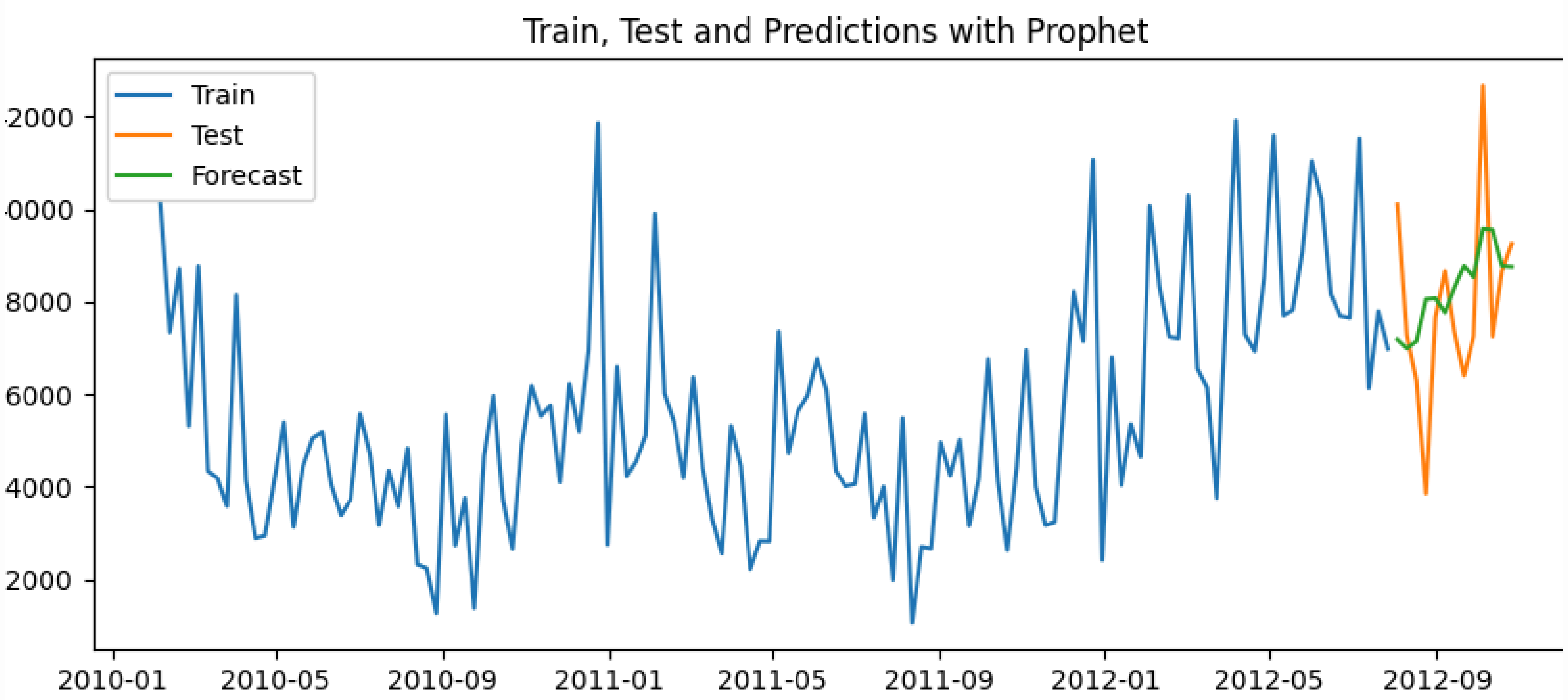
'changepoint_prior_scale': 0.5,

'seasonality_prior_scale': 10,

'holidays_prior_scale': 10,

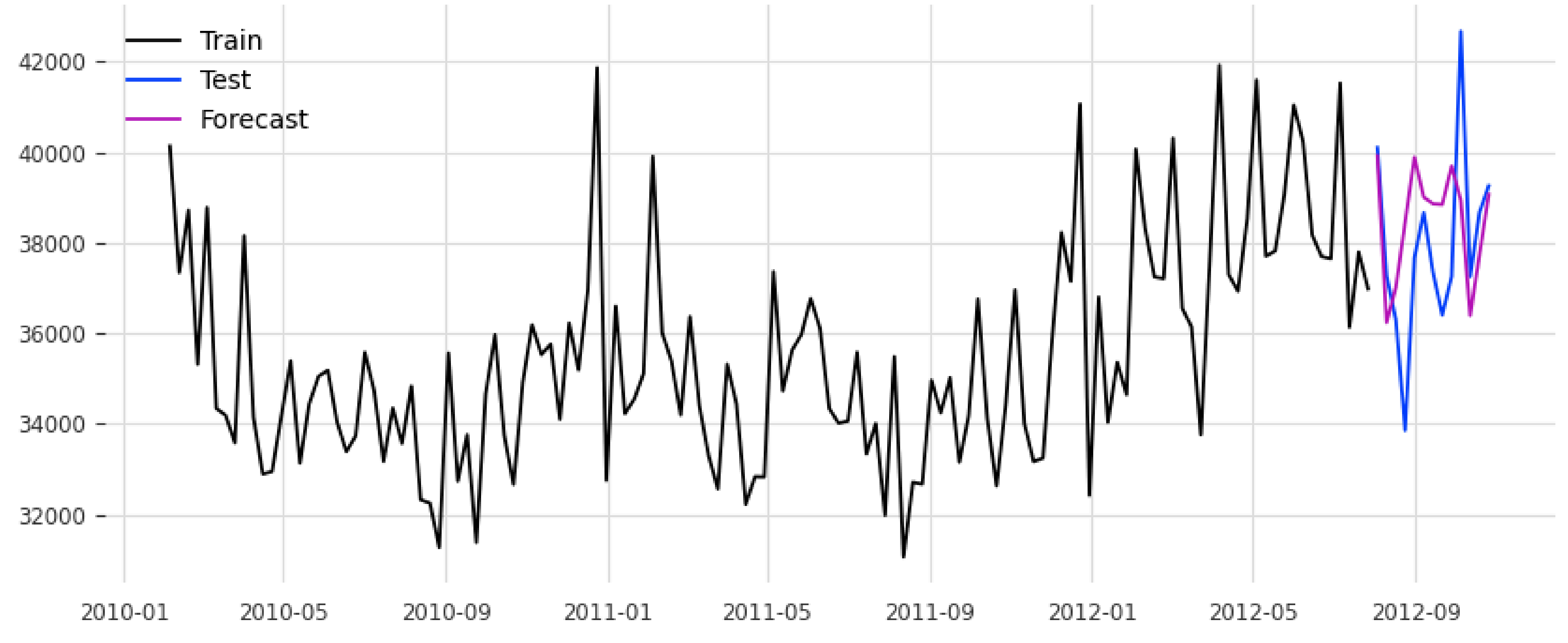
'seasonality_mode': 'multiplicative'

Lowest RMSE: 1980.51The MAPE is 4.13 %



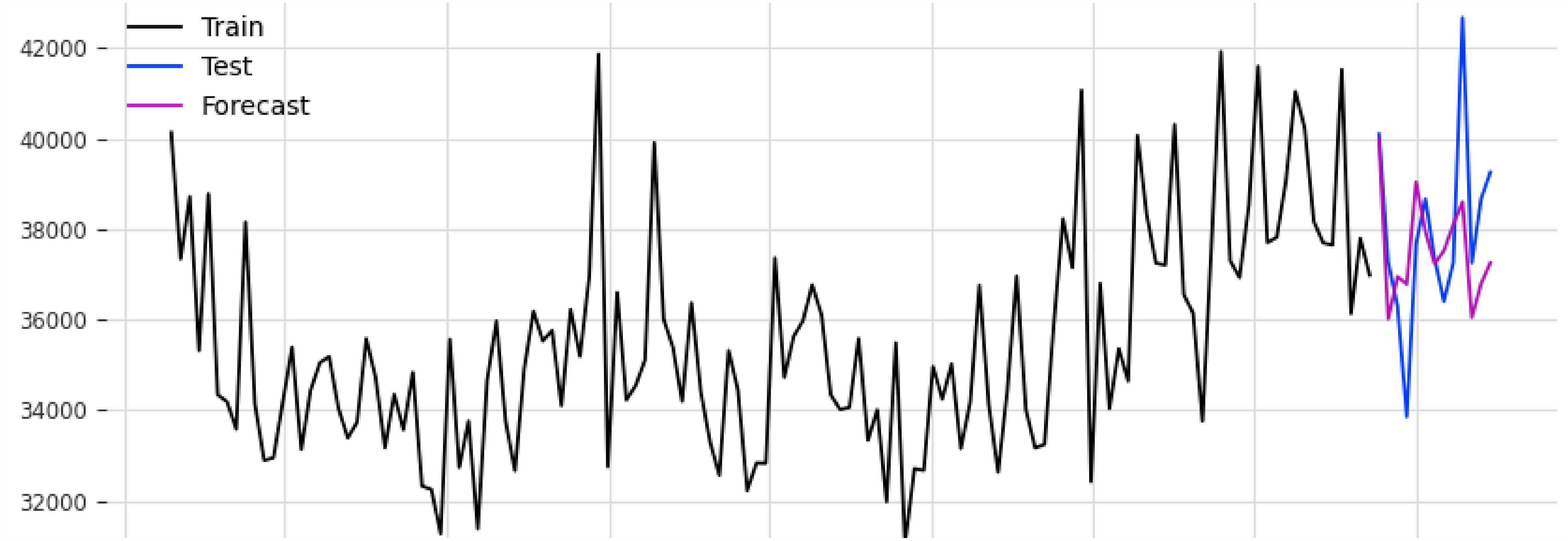
N-BEATS

The MAPE is 4.37 %



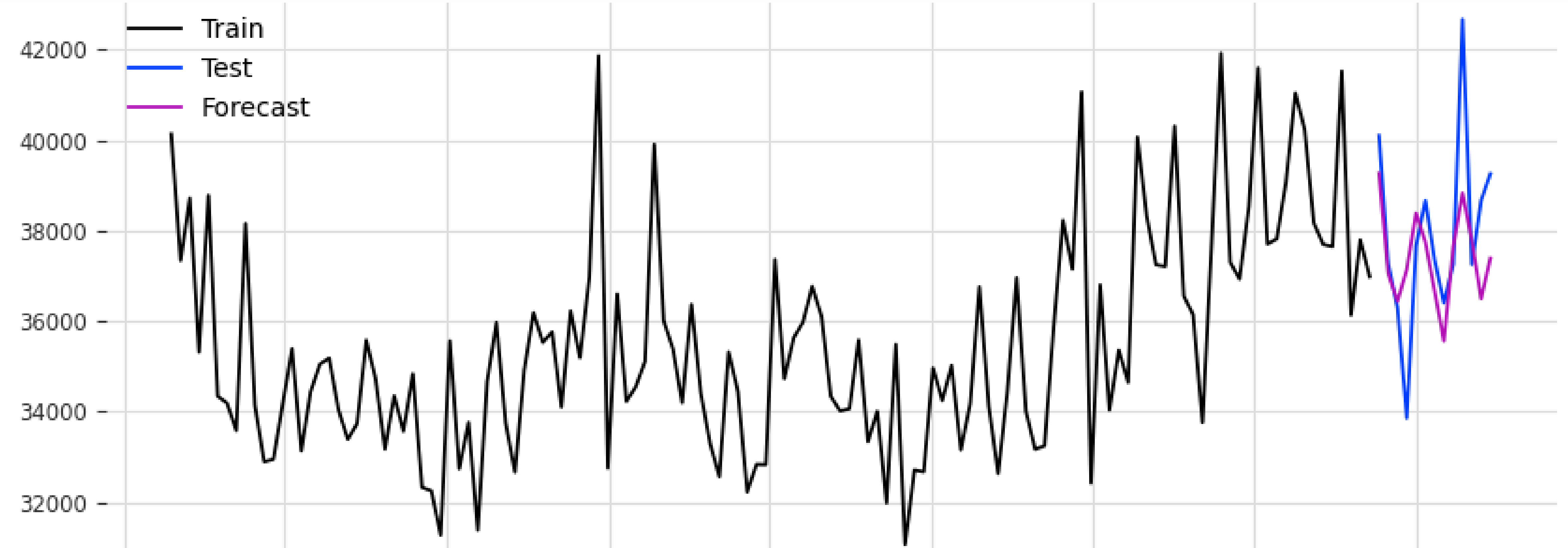
Multi-step RNN

The MAPE is 3.69 %

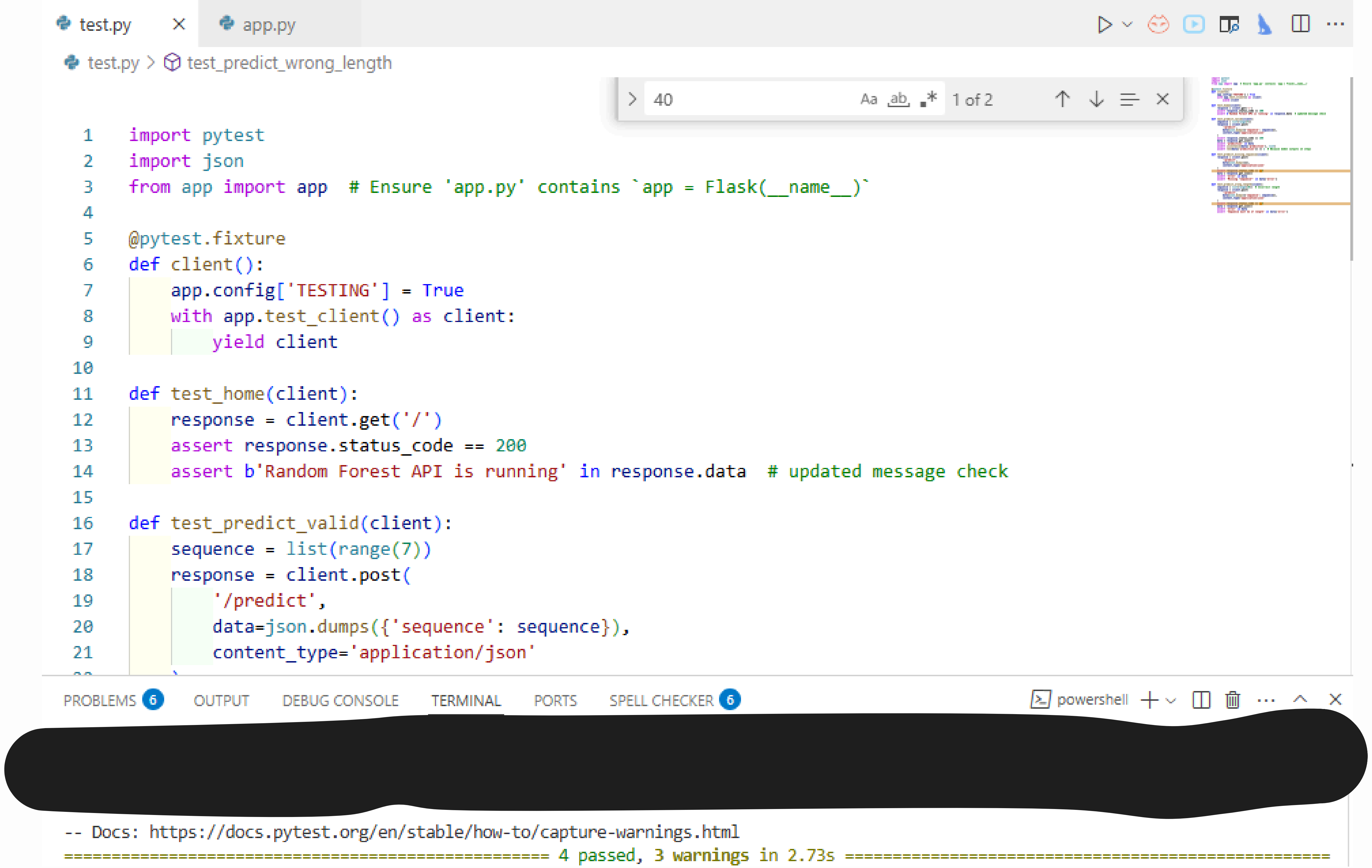


Multi-Output RNN

The MAPE is 3.62 %



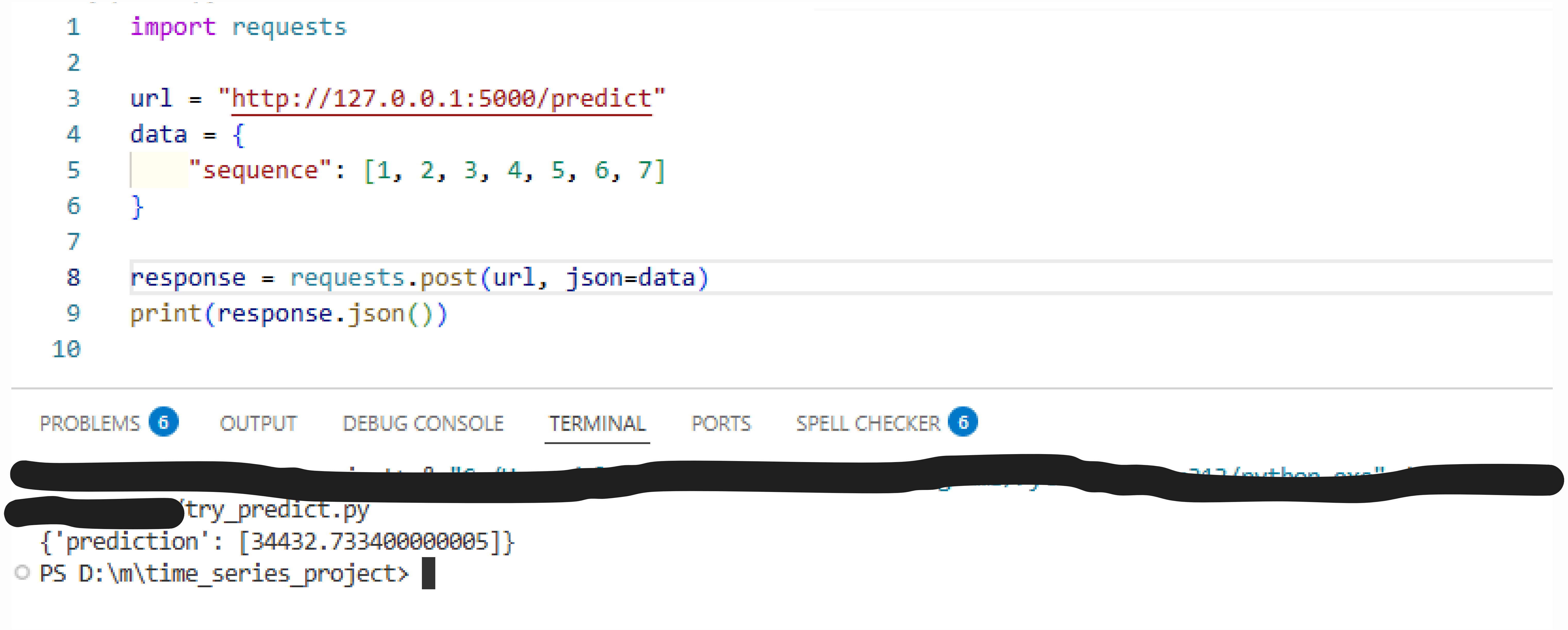
Deployment



```python
import pytest
import json
from app import app  # Ensure 'app.py' contains `app = Flask(__name__)`

@pytest.fixture
def client():
    app.config['TESTING'] = True
    with app.test_client() as client:
        yield client

def test_home(client):
    response = client.get('/')
    assert response.status_code == 200
    assert b'Random Forest API is running' in response.data  # updated message check

def test_predict_valid(client):
    sequence = list(range(7))
    response = client.post(
        '/predict',
        data=json.dumps({'sequence': sequence}),
        content_type='application/json'
```

[redacted]

```
-- Docs: https://docs.pytest.org/en/stable/how-to/capture-warnings.html
=================================================== 4 passed, 3 warnings in 2.73s ===================================================
```



```python
import requests

url = "http://127.0.0.1:5000/predict"
data = {
    "sequence": [1, 2, 3, 4, 5, 6, 7]
}

response = requests.post(url, json=data)
print(response.json())

```

```
[redacted]
[redacted]try_predict.py
{'prediction': [34432.733400000005]}
PS D:\m\time_series_project>
```

THANK YOU

For Your Attention