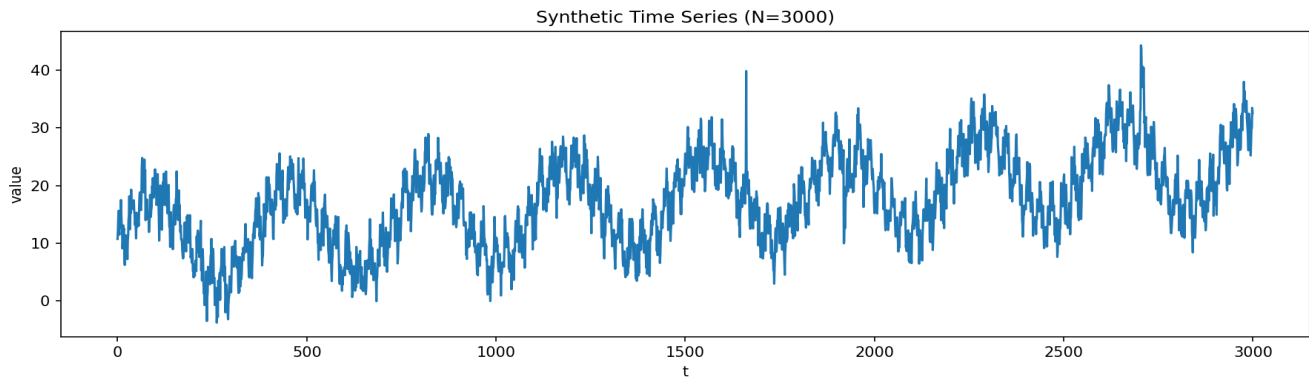


Time Series Forecasting Project - Output Report

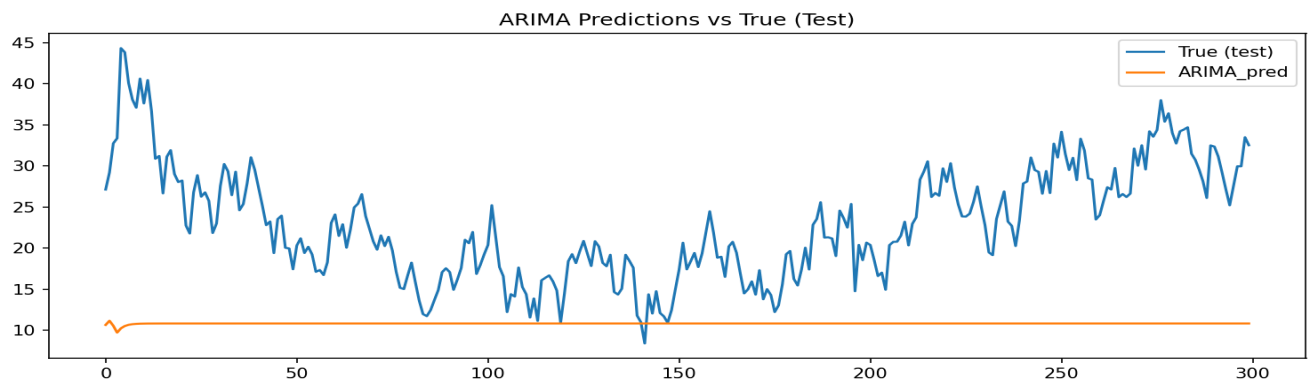
1. Dataset

Synthetic time series with trend, multiple seasonalities, nonlinear cycles and random shocks. N=3000



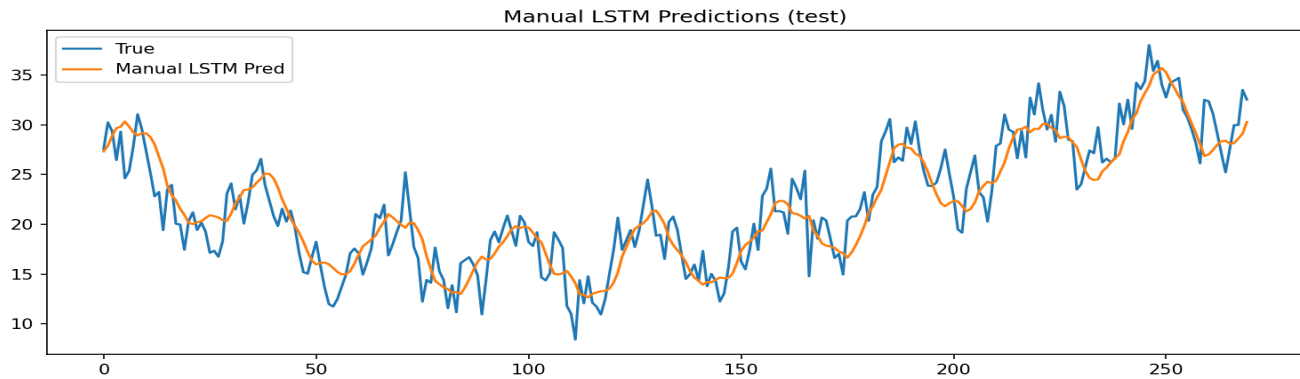
2. ARIMA Baseline

ARIMA metrics: RMSE=13.9473, MAE=12.1561



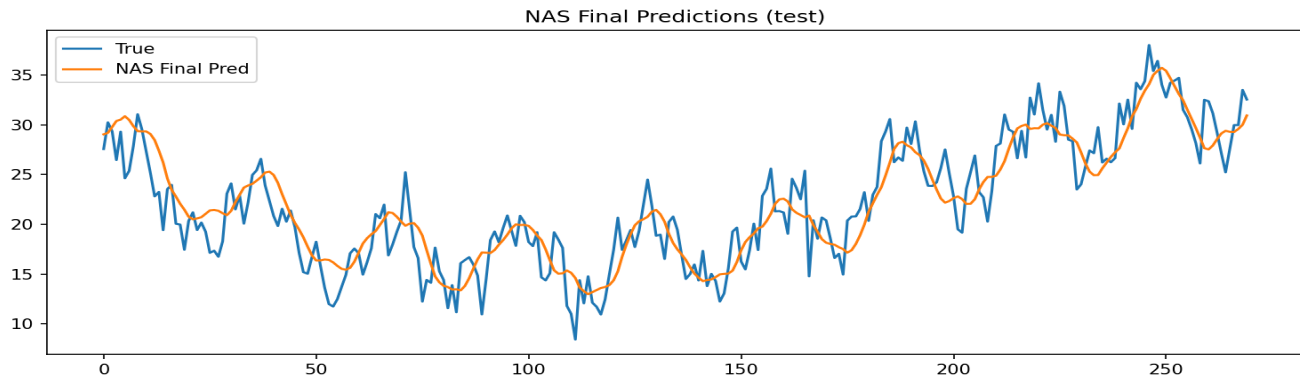
3. Manual LSTM

Manual LSTM metrics: RMSE=2.5777, MAE=2.1041



4. NAS-optimized LSTM

NAS Final metrics: RMSE=2.6165, MAE=2.1436



5. Comparison

Model RMSE MAE ARIMA 13.947280 12.156139 Manual_LSTM 2.577742 2.104092 NAS_LSTM 2.616474 2.143642

6. Best NAS Architecture (validation):

```
{'layers': 2, 'units': 64, 'dropout': 0.2, 'batch_size': 64, 'lr': 0.001, 'val_rmse': np.float64(2.505108708896808), 'val_mae': 2.0322904113065414}
```

7. Conclusion

Conclusion:

- ARIMA RMSE=13.9473, MAE=12.1561
- Manual LSTM RMSE=2.5777, MAE=2.1041
- NAS-optimized LSTM RMSE=2.6165, MAE=2.1436

The NAS-optimized LSTM performs best on RMSE and MAE. NAS improved error vs Manual LSTM by

approx -1.50% on RMSE.

Reason: the NAS found a better combination of depth/width/dropout/learning rate that fits the synthetic series' non-linear patterns while regularizing noise.