WEATHER DATA INTELLIGENCE

Comprehensive Data Engineering, In-Depth Analysis on Historical Data, and Forecasting on Real-Time Weather Data

GROUP 30

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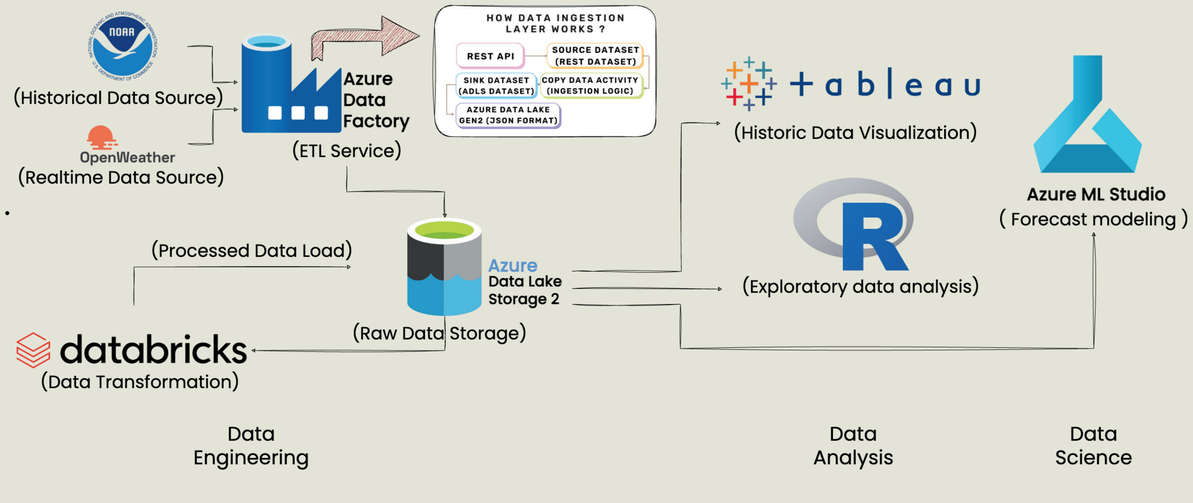
INTRODUCTION

This cloud-based weather forecasting system uses Azure tools to process data, develop dashboard, and predict temperatures with SARIMA and LSTM models. It showcases scalability, accuracy, and insights into seasonal trends for real-world applications.

OBJECTIVE

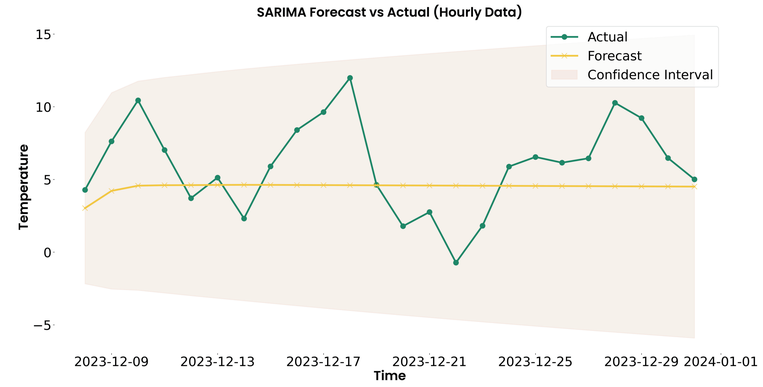
Develop a scalable, cloud-based weather system and gain hands-on experience with advanced analytics and ML models.

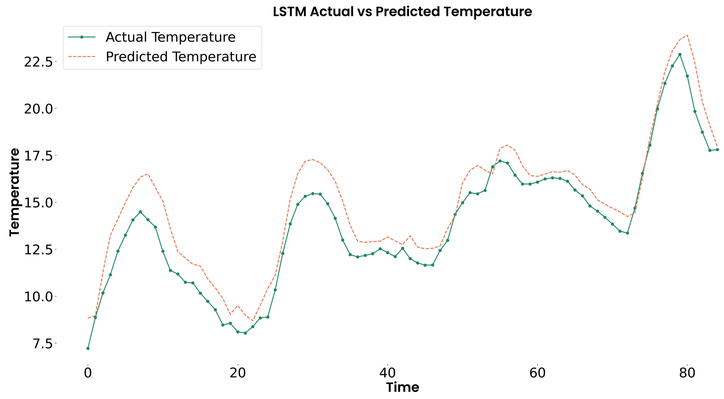
METHODOLOGY



RESULTS

SARIMA didn't capture the general temperature trend effectively, and with a higher MAE, it struggled to model complex, non-linear patterns compared to multivariate models like LSTM.





The LSTM model effectively captured complex patterns in the multivariate weather data, demonstrating accurate temperature predictions with low error rates.

COMPARISON

	SARIMA	LSTM	GFS
Model Type	Statistical	Deep Learning	Numerical Model
Input	Single Feature	Multiple Features	Live Sensor Data
MAE	~3.37°C	~0.83°C	Comparable
Strength	Captures Seasonality	Models Non-Linear Trends	Global-Scale Accuracy
Limitation	Univariate Only	High Computational Needs	High Resource Requirements

FUTURE WORK

- **Develop a Global Model:** Expand the system by integrating data from multiple locations worldwide, combining real-time and historical data for comprehensive forecasts.
- **Enhance Feature Set:** Focus on precipitation scalability, precise weather condition tracking, and cleaner, sensor-based data integration to improve forecast accuracy and detail.

CONCLUSION

The project delivers a scalable cloud-based weather forecasting system using LSTM, outperforming SARIMA and nearing GFS accuracy. Interactive dashboard offer actionable insights. Future plans include global data integration and sensor-based precision enhancements.

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