Machine Learning & Deep Learning Model Building
Retail Forecasting Case

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Agenda

Executive Summary

Problem Statement

Model Building and Forecast

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Executive Summary

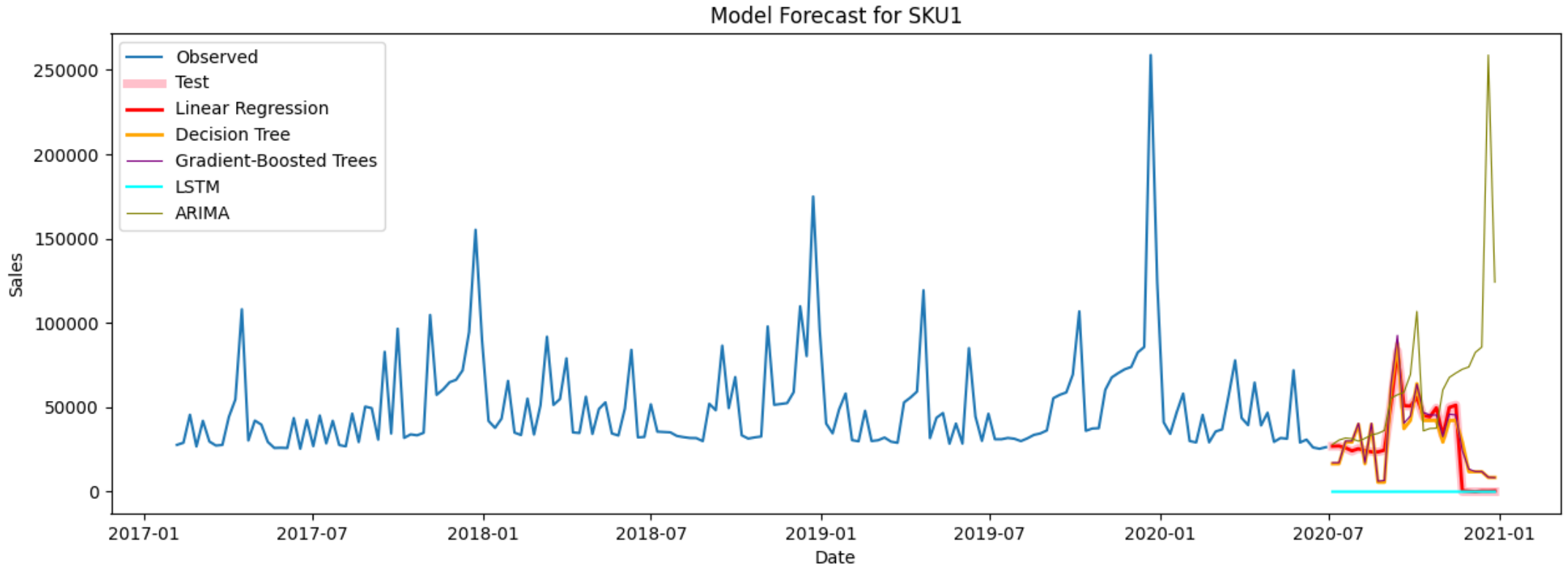
- The large company that is into the beverages business in Australia. They sell their products through various super-markets and also engage in heavy promotions throughout the year. Their demand is also influenced by various factors like holiday, seasonality. They needed forecast of each of products at item level every week in weekly buckets.

- This initiative is driven by the need to analyze historical time series data, incorporating various factors that influence demand, to forecast the quantity of items required by customers each week.

Problem of Statement

- The primary challenge is to develop multivariate forecasting models, utilizing machine learning or deep learning techniques, to accurately predict weekly demand for their products.

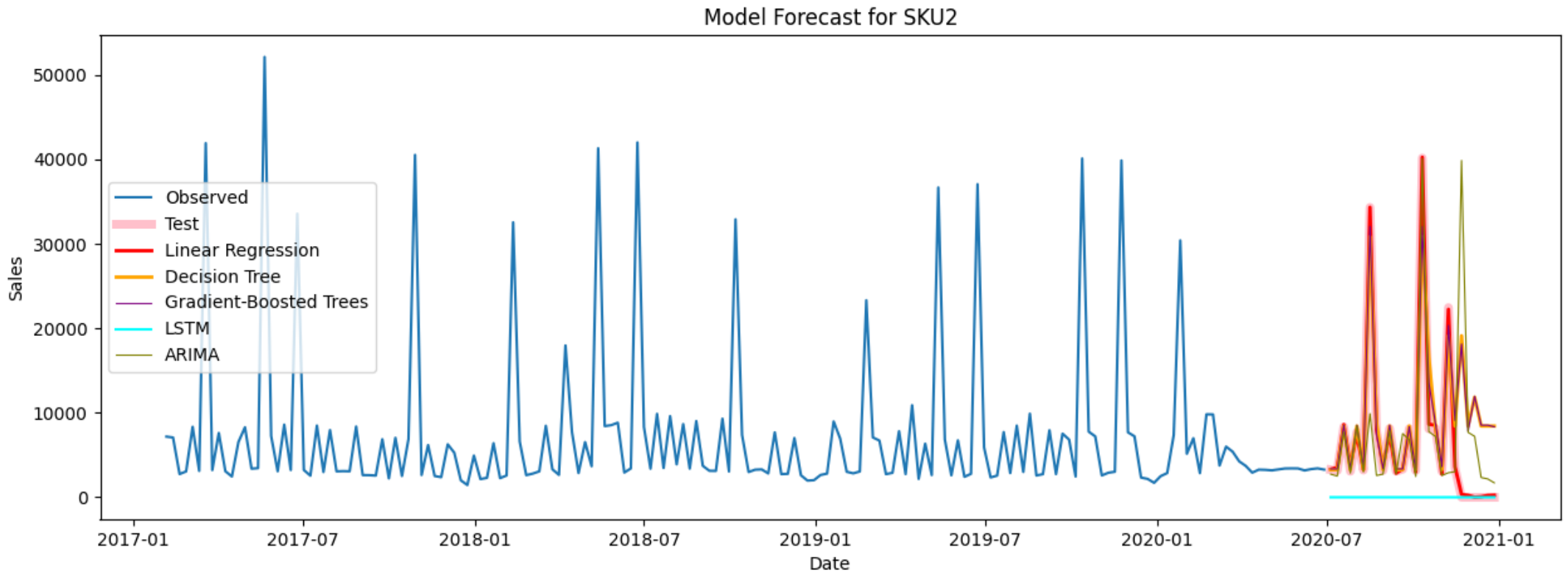
Model Forecast for SKU1



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	-0.2110
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

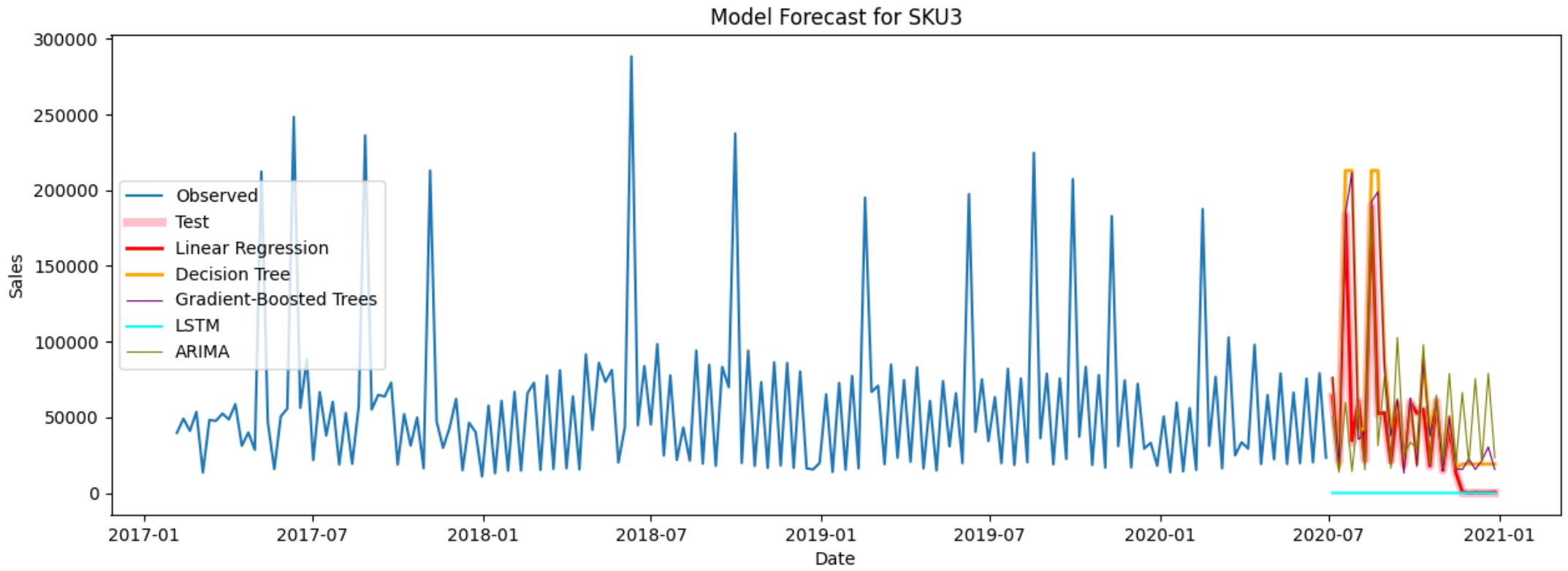
Model Forecast for SKU2



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	0.3383
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

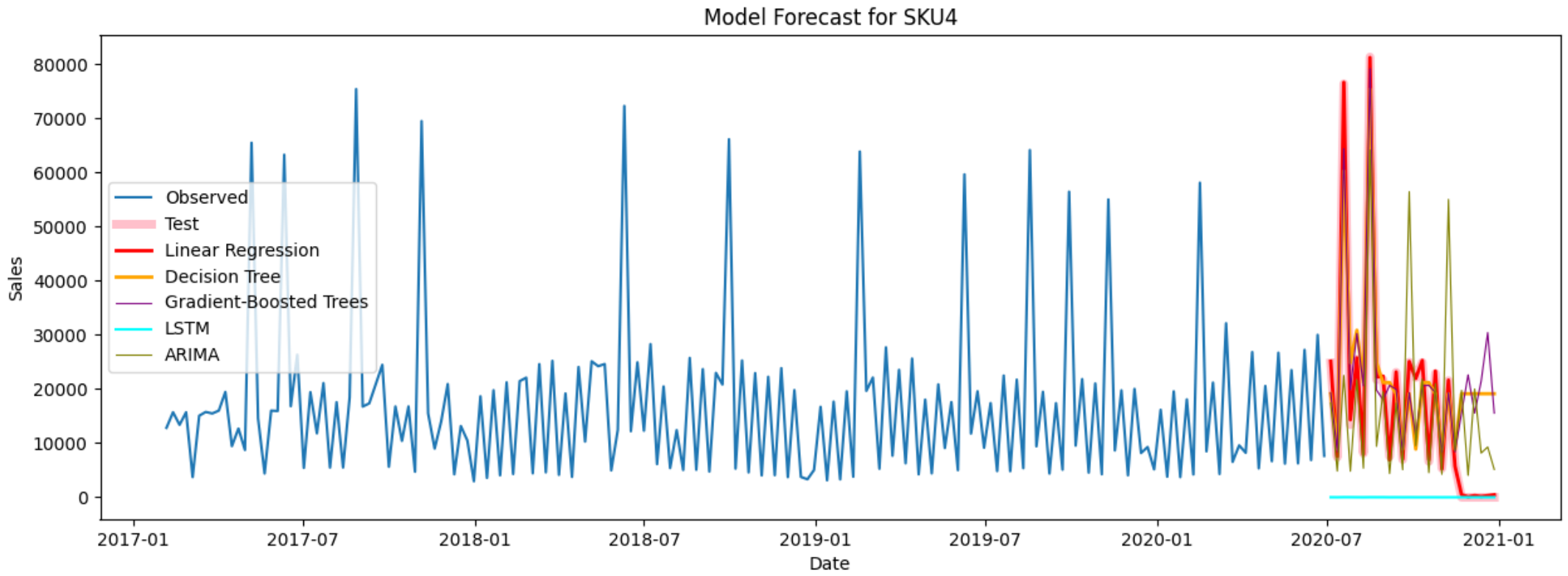
Model Forecast for SKU3



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	0.3504
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

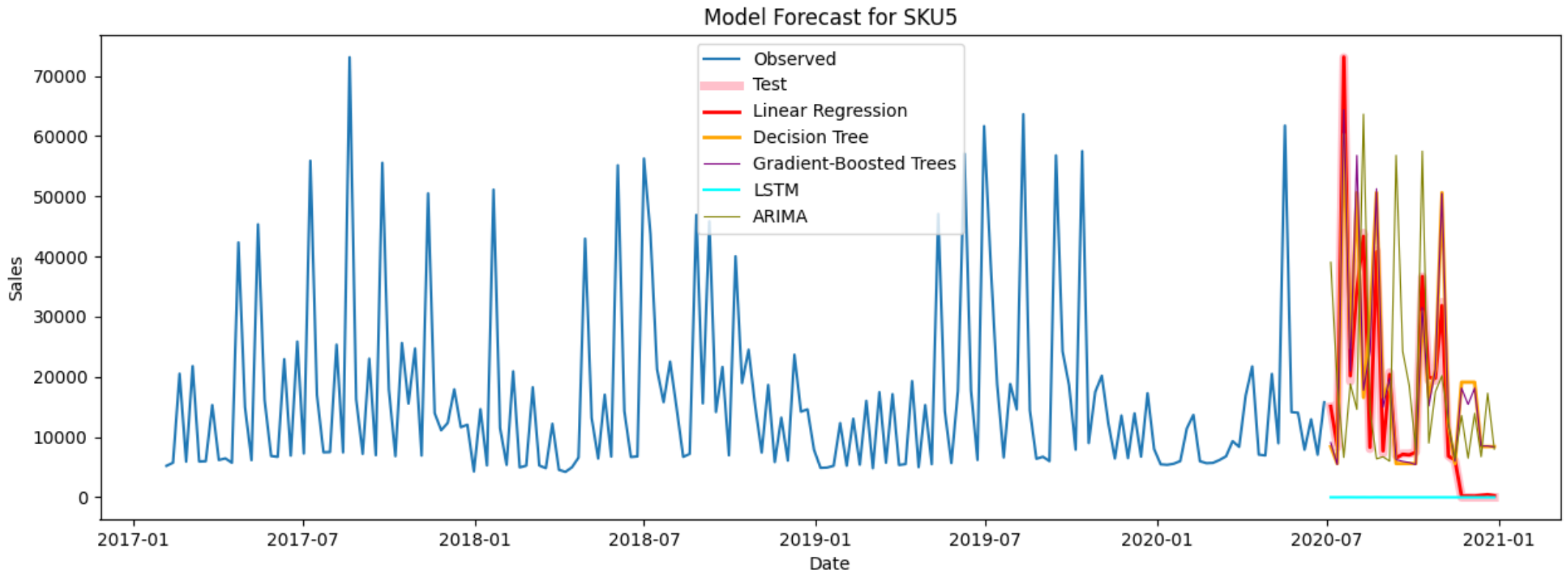
Model Forecast for SKU4



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	0.3893
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

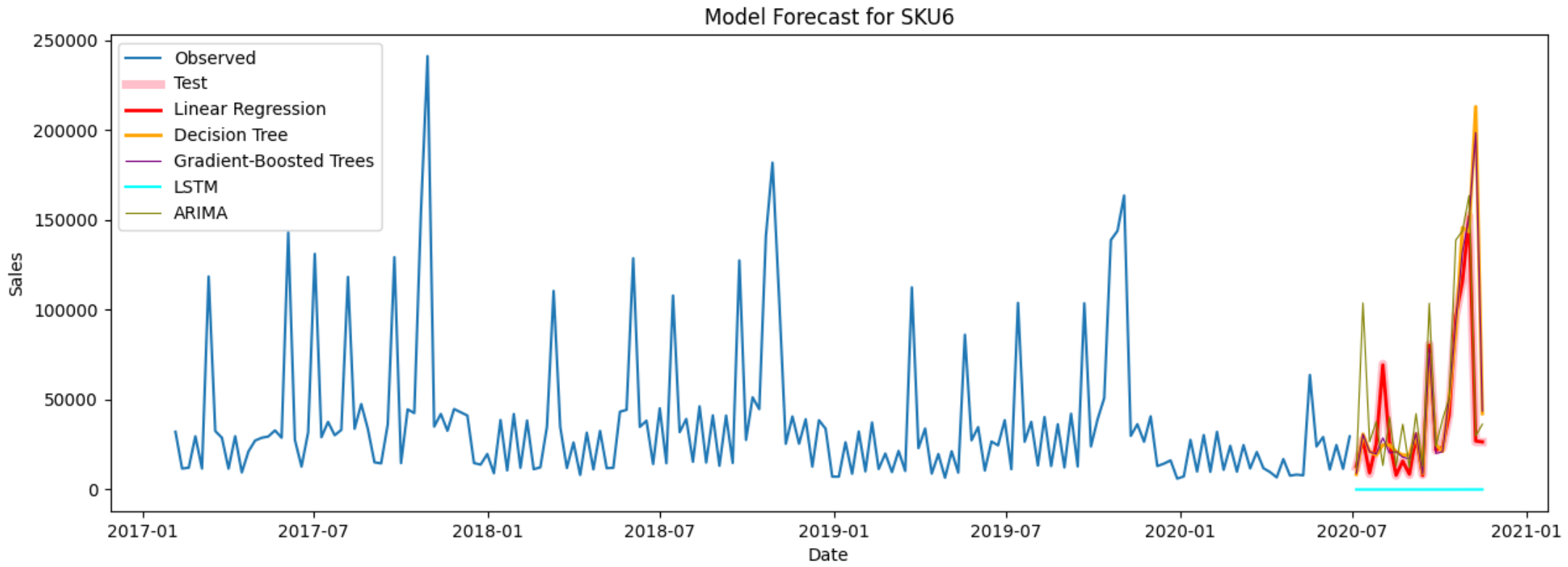
Model Forecast for SKU5



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	0.0660
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

Model Forecast for SKU6



Model	Accuracy	Model	Accuracy	Model	Accuracy
Linear Regression	0.9881	Gradient-Boosted Trees	0.5270	ARIMA	0.5515
Decision Tree	0.4843	LSTM	0.0001		

Best Forecast Model: Linear Regression

Conclusion & Recommendation

- **Linear Regression Dominance:** The Linear Regression model consistently outperforms other models across all SKUs with an accuracy around 0.9881, which suggests that the relationships between the predictive factors and the outcomes are well-approximated by a linear model in this case.

- **Poor Performance of Advanced Models:** More complex models did not perform as well, with particularly low accuracy for LSTM and varying degrees of success with ARIMA. This could indicate overfitting, or that these models may not have been optimally tuned or were not suitable for the type of data or problem statement.

On the basis of above points,
we recommend using Linear Regression Model to forecast the demand of the product every week

Thank You