Forecasting Nike's Annual Revenue

ECO 5740 - Forecasting and Time Series Models (Fall 2023)

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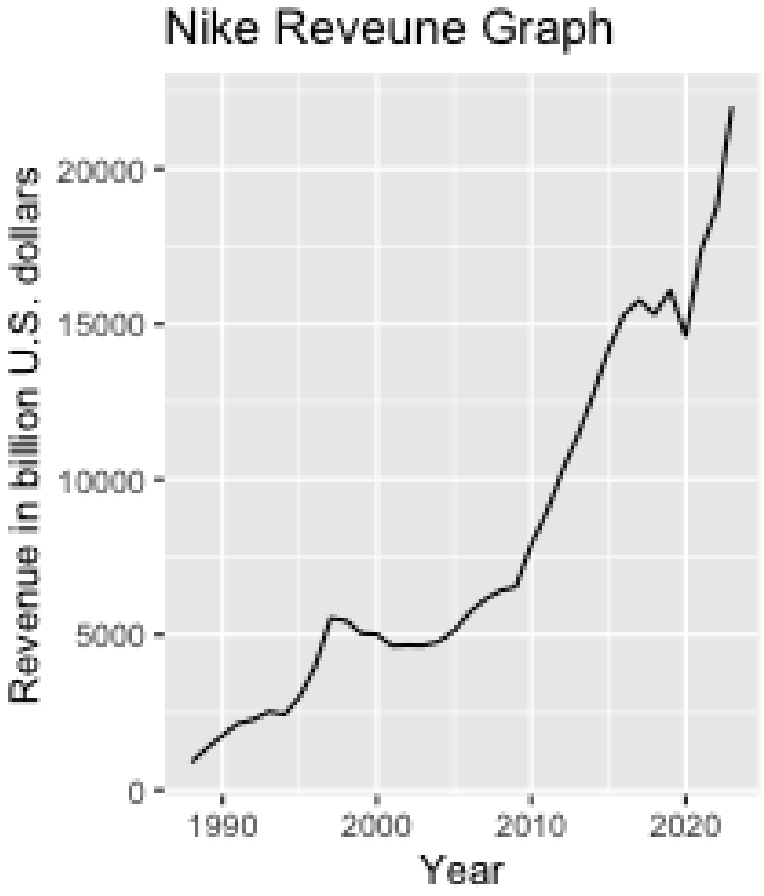
Introduction

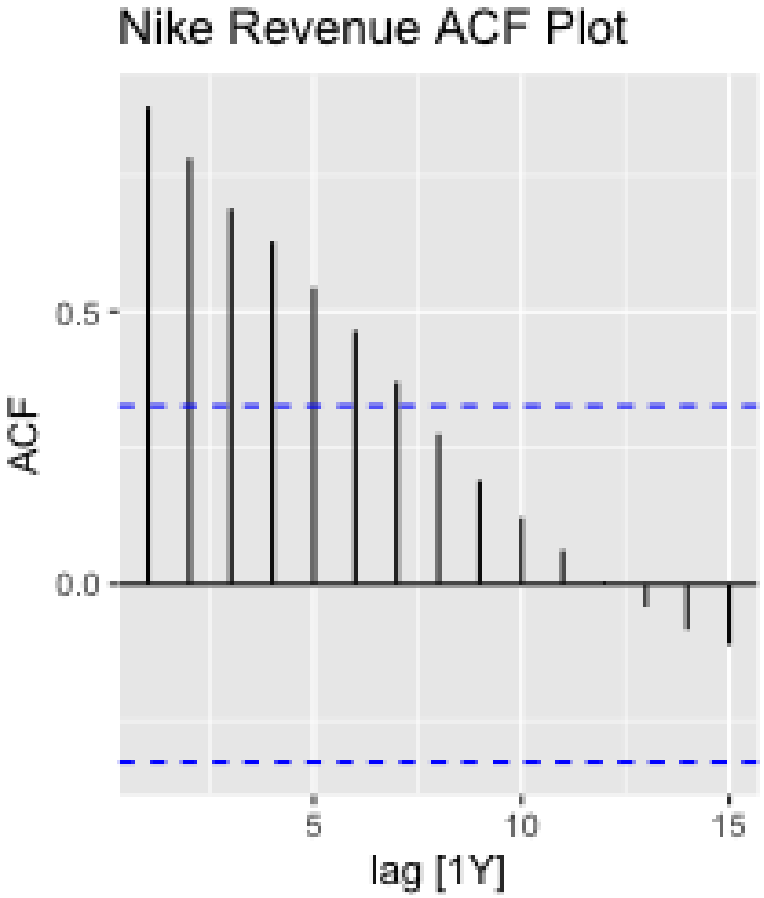
- Time Series Forecasting:
  - Predicting Nike's future annual revenue based on historical sales data (1988-2023).
- Project Goals:
  - Accurately predict Nike's future revenue trends using the best forecasting model.
- Practical Importance:
  - Crucial for informed decisions in resource allocation, strategic planning, and talent acquisition at Nike. Helps devise effective business strategies amidst uncertainties.

Dataset

- Overview: Nike's annual revenue dataset (1988-2023) depicts the company's financial performance.
- Time Range: Annual revenue data from 1988 to 2023.
- Key Characteristics:
  - Illustrates Nike's revenue trends in billions of dollars.
  - Upward trajectory observed with notable fluctuations.
  - Notable surge in revenue from 2015 to 2020, indicating growth phases.
  - Lack of significant autocorrelation, resembling characteristics of white noise as per statistical tests.

Data Exploration





- Trend is the only pattern we see in the data

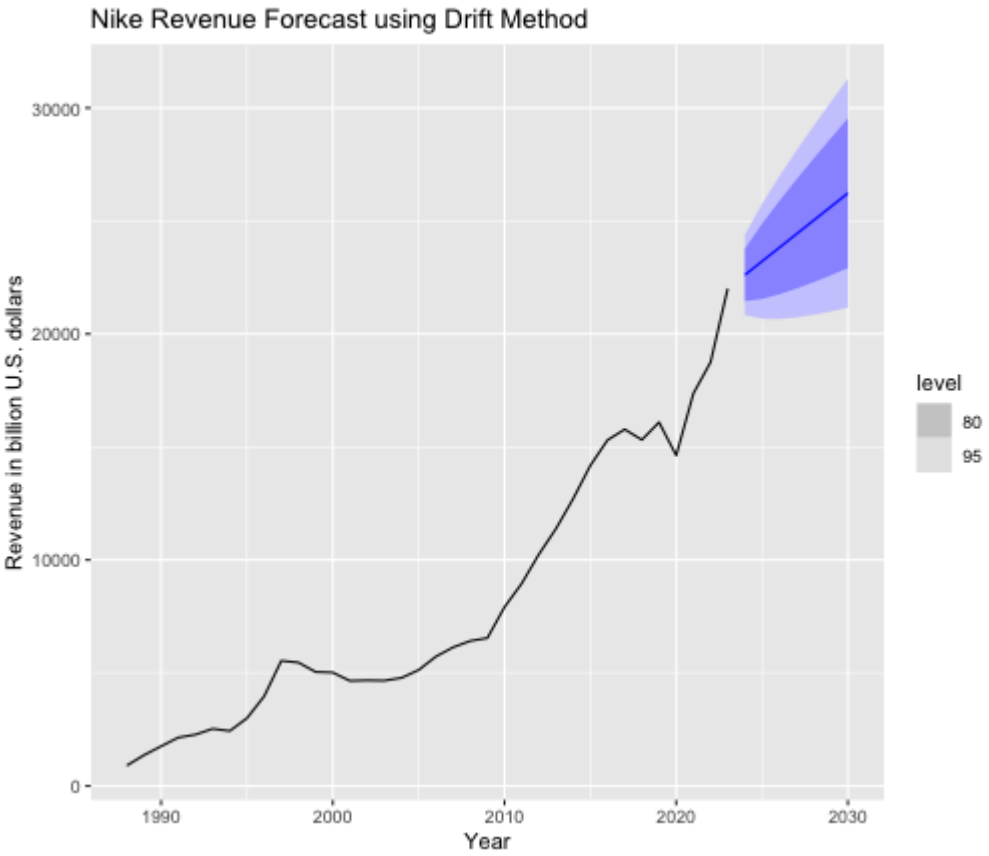
Model Training and Selection

- Training Set: 1988 to 2016
- Explored fundamental benchmarks like average, naive, and drift models.
- Chose drift model as initial benchmark due to RMSE of 1652.515, setting a baseline for comparison.
- Employed a diverse set of advanced models (regression, Holt, Holt-Damped, ETS, SES, theta, ARIMA, dynamic regression, neural networks).
- Tested each model using a separate test set, calculating RMSE for accuracy comparison against the Drift model, aiming to enhance forecasting precision.

Accuracy Evaluation

- RMSE and MASE used for model accuracy comparison.
- Drift model RMSE: 1652.51533, MASE: 2.07986064.
- Drift model emerged as most accurate for Nike's revenue forecast.
- Observed deviations from expected normal distribution.
- Residuals centered around zero, resembling white noise.
- Minimal autocorrelation seen in ACF plot.
- Ljung-Box test p-value: 0.3990961, lacking significant autocorrelation.

Forecast and Insights



- 2030 Revenue should be about $26 billion

Challenges and Limitations

- Market Instability and Post-COVID Demand are challenges
- Adaptive Planning and Market Diversification are strategies to overcome
- Enhanced Forecasting Techniques and more variables could help improve the forecast
- Ensemble methods (Drift, Dynamic Regression, ARIMA, and Holt Damped)

Conclusion

- Forecasting:
  - Drift Model Accuracy: Drift model most accurate for Nike's revenue prediction.
  - Robustness: Residual deviations resemble to white noise, suitable for forecasting.
- Challenges & Solutions:
  - Challenges: Market instability and post-COVID demand slowdown.
  - Solutions: Adaptive planning, diversification, enhanced forecasting.
- Significance:
  - Business Impact: Accurate forecasts support resource allocation and strategic planning.
  - Navigating Uncertainties: Insights crucial amidst market instabilities and post-pandemic fluctuations.

Questions

- Are there any questions?