Time Series Forecasting: Arrivals to Australia from Japan(1981–2012)

Forecast and Conclusion

The analysis of Japan's quarterly tourist arrivals to Australia from 1996 to 2012 reveals a **clear seasonal pattern** with two major peaks per year — typically in **Q1 and Q4** due to winter and holiday travel. A moderate **downward trend** is observed, reflecting possible economic or external shocks. Based on the **Holt–Winters additive model**, the most reliable among the tested approaches, the series is projected to **remain relatively stable** over the next year, averaging around **85,000–95,000 arrivals per quarter**. Over the next two years, tourist arrivals are expected to **stay flat or slightly decline**, with persistent seasonal fluctuations but no strong growth momentum.

Methodology

Three forecasting models — **Naïve, Simple Exponential Smoothing (SES), and Holt–Winters additive** — were evaluated using **MAPE** as the primary accuracy metric. The Naïve model performed the weakest because it simply repeats the previous quarter and fails to capture any trend or seasonality. SES provided smoother forecasts but still could not model the strong seasonal structure in the data. In contrast, the Holt–Winters additive model successfully captured both the long-term downward trend and the recurring seasonal peaks, achieving the lowest MAPE of about **7.6%**. Based on these results, **Holt–Winters** is the most reliable model among the three.

Data and Exploration Insights

The dataset was obtained from the **fpp2 R package**, representing **quarterly tourist arrivals to Japan (in thousands)**. Exploratory data analysis showed strong quarterly cyclicality, with consistent peaks in Q1 and Q4 and dips in Q2–Q3. The time series decomposition confirmed an **additive seasonal structure**, as seasonal amplitude remained stable across time. Summary statistics indicated moderate variability (mean ≈153, range 53–228), reflecting a steady but fluctuating tourism pattern.

Limitations and Recommendations

The analysis is limited by the dataset's historical time span (ending in 2012) and the lack of economic or global event factors. Future improvements could include extending the dataset to recent years and incorporating external regressors such as GDP or travel restrictions. Exploring more advanced forecasting approaches—such as additional ETS variations or machine-learning-based models— also enhance predictive performance.