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Real time Hotel Booking Demand Optimization

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Abstract: *The significance of having proper revenue management and convenient operations in hotels rely on accurate daily demand. The main challenges that are being tackled conventionally are the forecasting of the number of cancellations and the calculation of the Average Daily Rate (ADR). One of the distinct characteristics of the hotel industry being so unstable is to adopt proactive strategies by dealing with a lot of external changes such as pandemics, disasters caused by nature, and economic fluctuations around the world. Booking cancellations are instrumental in helping hotel managers to optimise resources and inventory while ADR forecasting offers them equally essential projections concerning anticipated profit or loss margins. This research relies on several data modelling steps, including time series aggregation and decision merging, which are later followed by decomposition and model selection. SARIMAX and LSTM models are adopted for future traffic flow modelling, which demonstrates better forecasting performances. Binary classification is employed for feature engineering techniques together with model selection methods. Binary Classification is performed with a number of experiments with machine learning algorithms, AdaBoost turned out to be the best model which surpassed CART , KNN , Random Forest, Gradient boosting algorithms , and Light Gradient Boosting algorithms. The results of this are of great help to the hotel management for taking better decisions which are connected to the changing situations of the market*

Keywords: Daily Rate (ADR), Forecasting, Booking cancellations, SARIMAX, Long short-term memory (LSTM), Binary classification, K-nearest neighbours algorithm (KNN), Random Forest, AdaBoost, Gradient boosting algorithms, and Light Gradient Boosting algorithms