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Prediction of Domestic Passengers at Kualanamu International Airport Using Long Short Term Memory Network

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Abstract— Domestic passenger forecasting provides key input into decisions of daily operation management and infrastructure planning of airports and air navigation services and for aircraft ordering and design. Planning for the future is one of the most important keys to success, forecasting is the way.

The goal of this study to predict the number of domestic passengers at Kualanamu International Airport. The time-series data were employed from Badan Pusat Statistik (BPS). The result is then discussed in the context of the potential use of the proposed for a new perspective for the predicting of domestic passengers at Kualanamu International Airport, Indonesia.

The machine learning approach using long short term memory (LSTM) presents a useful way of observing the domestic passenger predict the passenger time series.
Keywords—passenger, LSTM, machine learning Introduction The airport operations departments are also using it as a guide to doing the resource planning such as check-in counters to be opened and manpower required to man these counters [1].

However, from the initial analysis, we have identified that the passenger load varied largely due to factors such as type of airlines, aircraft type, destinations, etc [2]. In this paper, we are going to analyze the domestic passenger at Kualanamu international airport the past historical pattern and develop a predictive model using long short term memory to forecast the passenger based on certain criteria.

The model is being tested against the actual data given for a particular month is observed for all the airlines at the airport. It shows the usefulness of the model in the real-world to predict the passenger load which will be useful to do the resource planning at the airport for day to day planning [2]–[4].

Finally, a simulation model has been developed using the predicted domestic passenger as an input to compute the optimal number of check-in counters required to meet the service level agreement. Related Work Several approaches exist to obtain the predicting or forecasting of the passenger at airport recordings. The most prominent methods for estimating the current value to the predicted value of passenger had been calculated [5], the computation using the machine learning approach. A new method to predict the passenger was obtainable by [6], [7], where the time series of passenger data is lifted into the graph.

A common technique for passenger analysis of airport using machine learning had been generated on LSTM was able to clearly and simultaneously which time series. In most cases, the prediction of the passenger is conjointly estimated from the passenger data

as a time series [2], [3], [8]. We propose to predict the time series of a passenger at Kualanamu International airport for 2013 to 2019 based on the machine learning approach using LSTM.

Data and Methods Data Preprocessing The data were employed from BPS from September 2013 to September 2019. In fig.1 show the graph of the total of a domestic passenger at Kualanamu International Airport. _ Fig. 1. The Number of domestic passenger at Kualanamu International Airport Method This research is using the Long Short Term Memory (LSTM) as one method and special kind of RNN, capable of learning long-term dependencies. They were introduced by [6] and were refined and popularized by many researchers in different contexts.

We compute the passenger based on the LSTM model as described of [9]–[13] . In Fig. 1 design the proposed methodology process for forecasting LSTM as depicted. It is processed can be seen as a framework of three processing components, explicitly, data preparation and processing component, the machine learning based on the LSTM model and LSTM validation component. Fig. 1.

A general methods system Result and Discussion The resulting in predicting domestic passengers at Kualanmu International Airport based on LSTM has produced the training detail score is 12.94 and the test score detail is 21.73 with 100 epochs. In this section, the performance of time series of a domestic passenger which records from real observed in a at Kualanamu International airport had been processed.

_ Figure 1. Prediction Domestic Passenger for 100 epochs Fig.1 shows the prediction of a domestic passenger at Kualanamu International Airport. The result of this study with 100 epochs indicate the blue line is a real data, and the yellow line indicates the prediction. _ Fig. 2. Prediction domestic passenger for 1000 epochs The result of fig 2 indicates the train and tests score was smaller than fig 1.

It means that the training and testing data is better to predict the domestic passenger at the International Airport of Kualanamu. The train score 12.75 and the test score 18.29 in 1000 epochs. Table 1. The Train and Test Score for Domestic Passenger Data No _Train Score _Test Score _Epoch _ _1 _12.94 _21.73 _100 _ _2 _12.75 _18.29 _1000 _ _ Table 1 indicates the computation of the train and test of a domestic passenger at Kualanamu International Airport for September 2013 to September 2019.

Conclussion In this study, the forecasting of airline domestic passengers is crucial to strategic decision making by the promoters and investors of airlines. In this paper, we have proposed a system for forecasting a number of airline passengers using LSTM

based recurrent neural networks. Results obtained indicate that the proposed scheme performs better than the other existing schemes.

In the future, the proposed work can further be extended by incorporating convolution layers in the architecture and by trying to make the model even deeper using multiple LSTM layers. Acknowledgment We would like to thank ATKP Medan, Kualanamu International Airport and BPS for making the domestic passenger data available. References [1] "Aviation Department - Port Authority of New York and New Jersey Aviation Planning Division Version 3 Disclaimer," no. September, 2018. [2] M. N.

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