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Time series forecasting models for air temperature at Katunayake

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Air temperature is one of the most important parameters for various human activities in many fields. Therefore accurate predictions of short-term and seasonal changes of the air temperature are very important. This paper presents the results of a study carried out to develop prediction models for the monthly means of daily maximum and minimum air temperatures in Katunayake area.

For this study Katunayake area was selected as it is one of the main industrialized zones in Sri Lanka and there is an international airport. There are a large number of productions, for which some chemical reactions that heavily depend on air temperature are required. So, the knowledge of future fluctuation of the air temperature can be very important to plan the production. Also airliners depend heavily on the information about the changes in air temperature and the knowledge of future fluctuations can be very useful. This study is focused on the above topic as there is a lack of statistical models to predict air temperature in this area.

Monthly means of the daily maximum and minimum temperatures collected at Katunayake weather station from January 1971 to December 2003 are used for this study. Classical decomposition method and Box-Jenkins method are the main statistical forecasting methods used in this study. The models are fitted on the assumption that future values can be predicted from its past history. Additive decomposition model and seasonal autoregressive integrated moving average (SARIMA) model are identified as suitable models to predict the monthly means of daily maximum and minimum air temperature. In common Box-Jenkins notation, the fitted models for both monthly means of the daily maximum and minimum temperatures can be written as ARIMA$(1,1,1)(0,1,1)_{12}$. Using several statistical model comparison criteria, both the models are found to provide accurate predictions.

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