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# A Comparison of Hourly Typhoon Rainfall Forecasting Models Based on Support Vector Machines and Random Forests with Different Predictor Sets

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Typhoons with heavy rainfall and strong wind often cause severe floods and losses in Taiwan, which motivates the development of rainfall forecasting models as part of an early warning system. Thus, this study aims to develop rainfall forecasting models based on two machine learning methods, support vector machines (SVMs) and random forests (RFs), and investigate the performances of the models with different predictor sets for searching the optimal predictor set in forecasting. Four predictor sets were used: (1) antecedent rainfalls, (2) antecedent rainfalls and typhoon characteristics, (3) antecedent rainfalls and meteorological factors, and (4) antecedent rainfalls, typhoon characteristics and meteorological factors to construct for 1- to 6-hour ahead rainfall forecasting. An application to three rainfall stations in Yilan River basin, northeastern Taiwan, was conducted. Firstly, the performance of the SVMs-based forecasting model with predictor set #1 was analyzed. The results show that the accuracy of the models for 2- to 6-hour ahead forecasting decrease rapidly as compared to the accuracy of the model for 1-hour ahead forecasting which is acceptable. For improving the model performance, each predictor set was further examined in the SVMs-based forecasting model. The results reveal that the SVMs-based model using predictor set #4 as input variables performs better than the other sets and a significant improvement of model performance is found especially for the long lead time forecasting. Lastly, the performance of the SVMs-based model using predictor set #4 as input variables was compared with the performance of the RFs-based model using predictor set #4 as input variables. It is found that the RFs-based model is superior to the SVMs-based model in hourly typhoon rainfall forecasting.

Keywords: hourly typhoon rainfall forecasting, predictor selection, support vector machines, random forests