COMBINE HOLTS WINTER AND SUPPORT VECTOR MACHINES IN
FORECASTING TIME SERIS

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DEDICATION

IN MEMORY OF MY PARENTS

MAY ALLAH HAVE MERCY ON THEM

AMEEN

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ABSTRACT

This study proposes on a combine methodology that exploits the Holts-Winter (HW) model and the Support Vector Machines (SVM) model in forecasting time series. Problems of forecasting using time series data have been and still being addressed at every sphere of research using different approaches. The performance of the forecast was compared among the three models, the HW model, the SVM model and the combine model (HW and SVM). Four different data sets namely, airline passengers' data, machinery industry production data, clothing industry data and sugar production data were considered in the study. The statistical measures such as mean squared error (MSE), mean average error (MAE) and correlation coefficient, R, were used to evaluate the performance of the propose model. The result of this study indicated that the combine model shows an improvement of 149.3% over HW model and 35.9% improvement over the SVM model for the airline passengers' data. The result of the machinery industry presented that the combine model shows an improvement of 93.3% over HW model and 42.8% improvement over the SVM model. In the case of the clothing industry the result shows the combine model gives an improvement of 61.6% over HW model and 12.0% improvement over SVM model. Lastly, with respect to the sugar production, the result shows that the combine model indicated an improvement of 34.4% over HW model and 25.1% improvement over SVM model. Therefore the results of the experiments suggest that the proposed combine model is more reliable in time series when compared with the individual models.

ABSTRAK

Kajian ini mencadangkan satu gabungan kaedah yang mengeksploitasi model Holts – Winter (HW) dan model *Support Vector Machines* (SVM) dalam peramalan siri masa. Masalah ramalan menggunakan data siri masa telah dan masih ditangani di setiap bidang penyelidikan yang menggunakan pendekatan yang berbeza. Prestasi ramalan telah dibandingkan antara tiga model, model HW, model SVM dan model gabungan (HW dan SVM). Empat set data yang berbeza iaitu, data penumpang syarikat penerbangan, data pengeluaran industri jentera, data industri pakaian dan data pengeluaran gula telah dipertimbangkan dalam kajian. Pengukuran statistik seperti min ralat kuasa dua (MSE), min ralat purata (MAE) dan pekali korelasi, R, digunakan untuk menilai keupayaan model yang dicadangkan. Hasil kajian ini menunjukkan bahawa gabungan model menunjukkan peningkatan sebanyak 149.3% berbanding model HW dan peningkatan 35.9% berbanding model SVM untuk penumpang syarikat penerbangan. Hasil daripada industri jenteramendapati model gabungan menunjukkan peningkatan sebanyak 93.3% berbanding model HW dan peningkatan 42.8% berbanding model SVM. Dalam kes industri pakaian, hasil kaj ian menunjukkan bahawa model gabungan memberikan peningkatan sebanyak 61.6% berbanding model HW dan peningkatan 12.0% berbanding model SVM. Akhir sekali, berkaitan dengan pengeluaran gula, hasilnya menunjukkan bahawa model gabungan menunjukkan peningkatan sebanyak 34.4% berbanding model HW dan peningkatan 25.1% berbanding model SVM. Oleh itu, keputusan kajian menunjukkan bahawa model gabungan yang dicadangkan adalah lebih dipercayai dalam siri masa berbanding dengan model individu.