

ABSTRAK

Nama : Alfina Damayanti Putri

NIM : 1217010012

Judul : Peramalan Pada Data *Time series* yang Bersifat *Non-linear*
Menggunakan Metode *Support Vector Regression* (SVR)

Data *time series* sering kali memiliki karakteristik *non-linear* yang tidak dapat dimodelkan secara akurat dengan metode peramalan linear konvensional. Penelitian ini bertujuan untuk mengkaji implementasi dan performa algoritma *Support Vector Regression* (SVR) dalam menyelesaikan permasalahan peramalan pada data deret waktu (*time series*) yang bersifat *non-linear*. Dua jenis data digunakan dalam eksperimen ini, yaitu data dummy musiman aditif dengan berbagai variasi (tingkat musiman, panjang musim, tren, noise, dan panjang data), serta data aktual berupa harga minyak mentah dan emas dunia. Model SVR dibangun melalui tahapan normalisasi data, pembentukan fitur lag, dan optimasi hyperparameter (L , C , ε , dan γ) menggunakan grid search dengan validasi silang 5-fold. Evaluasi dilakukan menggunakan metrik MSE, RMSE, dan MAE untuk mengukur akurasi prediksi pada data pelatihan dan pengujian. Hasil penelitian menunjukkan bahwa SVR mampu menghasilkan prediksi yang akurat, stabil, dan andal pada berbagai variasi pola deret waktu, termasuk pola kompleks pada data aktual. SVR terbukti efektif dalam memodelkan hubungan *non-linear* serta memiliki ketahanan terhadap *overfitting*. Oleh karena itu, SVR layak digunakan sebagai pendekatan prediktif dalam peramalan *time series*, khususnya dalam bidang ekonomi dan finansial.

Kata Kunci: *Support Vector Regression*, Peramalan, Data *Time series*, *Non-linear*, Kernel RBF

ABSTRACT

Name : Alfina Damayanti Putri
NIM : 1217010012
Title : Forecasting on Non-linear Time series Data Using Support Vector Regression (SVR)

Time series data often exhibit non-linear characteristics that cannot be accurately modeled using conventional linear forecasting methods. This study aims to examine the implementation and performance of the Support Vector Regression (SVR) algorithm in addressing forecasting problems on non-linear time series data. Two types of data were used in this research: synthetic (dummy) data representing additive seasonal patterns with various characteristics (amplitude level, season length, trend, noise, and data length), and real-world data consisting of global crude oil and gold prices. The SVR model was constructed through data normalization, lag feature construction, and hyperparameter optimization (L , C , ε , and γ) using grid search combined with 5-fold cross-validation. Model performance was evaluated using MSE, RMSE, and MAE metrics on both training and testing sets. The results demonstrate that SVR can produce accurate, stable, and reliable predictions across a wide range of time series characteristics, including complex patterns in actual economic data. SVR proved effective in modeling non-linear relationships and exhibited strong generalization capability, with minimal signs of overfitting. Therefore, SVR is a viable predictive approach for time series forecasting, particularly in economic and financial applications.

Keywords: Support Vector Regression, Forecasting, Time series Data, Non-linear, RBF Kernel