

**PERAMALAN HARGA BATUBARA ACUAN
MENGUNAKAN METODE PSOSVR DAN IPSOSVR**

SKRIPSI

Diajukan untuk Memenuhi Sebagian dari Syarat untuk memperoleh
gelar Sarjana Matematika



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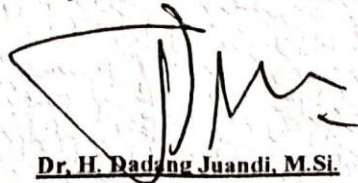
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PERAMALAN HARGA BATUBARA ACUAN MENGUNAKAN METODE PSOSVR DAN IPSOSVR

ABSTRAK

Batubara adalah salah satu jenis bahan bakar fosil yang sering dimanfaatkan oleh perusahaan industri. Fluktuasi harga batubara mengakibatkan perusahaan industri sulit untuk memperkirakan harga batubara. Dengan demikian dibutuhkan alokasi anggaran dana berupa perkiraan harga batubara. Sebuah model prediksi harga batubara acuan untuk melihat harga batubara acuan di masa yang akan datang sangat diperlukan, sehingga perusahaan industri dapat mengalokasikan dana dengan tepat untuk memaksimalkan keuntungan dan meminimumkan biaya produksi. Terdapat beberapa studi yang membahas tentang prediksi harga batubara acuan menggunakan *machine learning* yang salah satunya yaitu menggunakan *support vector regression* (SVR). Namun, metode tersebut masih memiliki kekurangan pada penentuan nilai parameter yang tepat. Diperlukan algoritma optimasi untuk membantu menentukan nilai parameter yang tepat. Oleh karena itu, pada penelitian ini bertujuan untuk melakukan peramalan harga batubara acuan menggunakan data historis periode bulan Januari 2009 sampai dengan bulan Oktober 2019, dengan menggunakan metode *support vector regression* (SVR) yang dioptimasi dengan *particle swarm optimization* (PSO) dan *improved-particle swarm optimization* (IPSO), yang dievaluasi hasil peramalannya menggunakan MAPE. Berdasarkan penelitian yang telah dilakukan, prediksi harga batubara acuan menggunakan metode PSOSVR menghasilkan nilai MAPE sebesar 3,911% dan metode IPSOSVR menghasilkan nilai MAPE sebesar 3,916%. Sedangkan untuk prediksi menggunakan parameter SVR yang tidak dioptimasi menghasilkan nilai MAPE sebesar 13,388%.

Kata Kunci : Peramalan, Harga Batubara Acuan, *Support Vector Regression*, *Particle Swarm Optimization*, *Improved-Particle Swarm Optimization*, *Mean Absolute Percentage Error*.

FORECASTING COAL PRICE REFERENCE USING PSOSVR AND IPSOSVR METHODS

ABSTRACT

Coal is a type of fossil fuel that is often used by industrial companies. Fluctuations in coal prices make it difficult for industrial companies to estimate coal prices. Thus the budget allocation of funds is needed in the form of coal price estimates. A prediction model of coal prices index to see future coal prices is needed, so that industrial companies can allocate funds appropriately to maximize profits and minimize production costs. There are several studies that discuss the prediction of reference coal prices using machine learning, one of which is using support vector regression (SVR). However, this method still has shortcomings in determining the correct parameter values. An optimization algorithm is needed to help determine the right parameter value. Therefore, this study aims to forecast reference coal prices using historical data for the period January 2009 to October 2019, using the support vector regression (SVR) method that is optimized with particle swarm optimization (PSO) and improved-particle swarm optimization (IPSO), which is evaluated using the MAPE forecasting results. Based on research that has been done, the prediction of reference coal prices using the PSOSVR method produces a MAPE value of 3.911% and the IPSOSVR method produces a MAPE value of 3.916%. Whereas the prediction using SVR parameters that is not optimized produces a MAPE value of 13.388%.

Keywords: Forecasting, Coal Price Index, Support Vector Regression, Particle Swarm Optimization, Improved-Particle Swarm Optimization, Mean Absolute Percentage Error.

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