ABSTRACT

IDENTIFICATION OF SOIL MACRO NUTRIENTS WITH CONVOLUTIONAL NEURAL NETWORK AND SUPPORT VECTOR REGRESSION DIGITAL IMAGE-BASED

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Soil fertility can be seen from the ability of soil in supplying nutrients, both macro and micro, to support the growth and production of plants. The presence of macronutrients is needed in large quantities because it helps the growth of plants. Therefore, it is necessary to take measurements of macronutrients to determine the fertility rate of good soil before planting. There is a degree of difficulty in representing soil fertility characteristics for soil image extraction, and through laboratory tests that require cost and time, so research is conducted to identify soil macronutrients Nitrogen (N), phosphorus (P), Potassium (K) using Artificial Neural Networks and Convolutional Support. Vector Regression. The dataset used was the previous research dataset [1], which was 350 images from 10 ground image sampling locations, with a spread of 80% of training data and 20% of test data. Model test results showed predictive accuracy of N values of 95,09%, P 46,93%, and K 63,46%, with a compute time of 0,22 seconds. Thus it can be concluded that the CNNSVR method can recognize the unique characteristics of soil imagery even though the accuracy of forecasting has not been optimal.

Keywords—*Macronutrients (Nitrogen (N), Phosphorus (P), Potassium (K)), CNN-SVR, Identification, Feature extraction, Prediction*

IDENTIFIKASI UNSUR HARA MSAKRO TANAH DENGAN CONVOLUTIONAL NEURAL NETWORK DAN SUPPORT VECTOR REGRESSION BERBASIS CITRA DIGITAL

INTISARI

Kesuburan tanah dapat ditinjau dari kemampuan tanah menyuplai unsur hara, baik makro maupun mikro untuk pendukung pertumbuhan dan produksi tanaman. Keberadaan unsur hara makro dibutuhkan dalam jumlah besar, karena membantu pertumbuhan tanaman. Oleh karena itu, perlu dilakukan pengukuran kandungan unsur hara makro untuk mengetahui seberapa baik kondisi kesuburan tanah sebelum masa tanam lahan. Adanya tingkat kesulitan dalam merepresentasikan ciri kesuburan tanah untuk ekstraksi fitur pada citra tanah, dan melalui uji laboratorium yang membutuhkan biaya dan waktu, sehingga penelitian dilakukan untuk mengidentifikasi unsur hara makro *Nitrogen* (N*)*, *Fosfor* (P), *Kalium* (K) dalam tanah dengan menggunakan *Convolutional Neural Network* dan *Support Vector Regression*. Data set yang digunakan adalah data set penelitian sebelumnya (Sumiharto dan Hardiyanto, 2018), yaitu 350 citra dari 10 lokasi pengambilan sampel citra tanah, dengan pembagian 80% data *training* dan 20% data *testing*. Hasil pengujian model menunjukkan akurasi prediksi nilai **N 95,09%**, **P 46,93%**, dan **K 63,46%**, dengan waktu komputasi **0,22** detik. Dapat disimpulkan bawah metode CNNSVR mampu mengenali fitur-fitur unik pada citra tanah meskipun hasil akurasi prediksi belum optimal.

Kata kunci : Unsur hara makro (*Nitrogen* (N), *Fosfor* (P), *Kalium* (K)), CNN-SVR, *Identifikasi*, *Ekstraksi fitur*, *Prediksi.*