**ANALISIS PENGARUH RUANG WARNA TERHADAP AKURASI PENGUKURAN KADAR PIGMEN FOTOSINTESIS DENGAN MENGGUNAKAN CNN TERHADAP PERMASALAHAN *COLOR CONSTANCY***

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**Abstrak**

Estimasi nilai kadar pigmen fotosintesis dari daun dapat dilakukan dengan menggunakan metode konvesional menggunakan alat laboratorium seperti spektrofotometer dan menggunakan pengolahan citra digital dari citra daun dengan suatu model komputasi. Pada metode pengolahan citra digital, model yang digunakan bermacam-macam seperti *neural network,* CNN, dan regresi linear. Pengukuran kadar pigmen fotosintesis dengan metode pengolahan citra menggunakan data nilai warna dari data citra sebagai masukan terhadap model yang digunakan.

Dalam penelitian ini akan dianalisa pengaruh berbagai macam jenis ruang warna dan setelan *preprocessing* *inpaint* terhadap akurasi model CNN dalam mengukur kadar pigmen fotosintesis daun. Jenis ruang warna yang dujicobakan adalah 4 ruang warna tunggal RGB, HSV, LAB, dan YCbCr, serta 6 ruang warna kombinasi RGB+HSV, RGB+LAB, RGB+YCbCr, HSV+LAB, HSV+YCbCr, dan LAB+YCbCr. Pemilihan jenis ruang warna mempertimbangkan fenomena *color constancy* dan karakteristik ruang warna terhadap elemen pencahayaan. Selain itu data citra dibagi menjadi dua jenis yaitu melalui *preprocessing inpaint* dan tidak, sehingga total terdapat 20 jenis data masukan.

Setelah proses pelatihan model CNN dengan berbagai macam jenis ruang warna dan setelan *preprocessing* berbeda sebagai data masukan, dilakukan pengamatan terhadap nilai akurasi yaitu MAE latih dan MAE validasi dari tiap model. Dari 20 jenis data masukan, didapatkan 3 jenis data masukan yang direkomendasikan sebagai data masukan yang memberikan nilai akurasi model terbaik berdasarkan MAE validasi dengan nilai 0.08761, 0.09252, dan 0.09288. Tiga data masukan yang direkomendasikan dari urutan nilai akurasi tersebut adalah RGB+LAB tanpa *inpaint*, RGB dengan *inpaint*, dan LAB+YCbCr tanpa *inpaint*.

Kata kunci: *Estimasi Pigmen Fotosintesis, CNN, Color Constancy, Color Space, Inpaint, P3Net.*

**THE EFFECT OF COLOR SPACE ON PHOTOSYNTHESIS PIGMENT MEASUREMENT ACCURACY USING CNN WITH RESPECT TO COLOR CONSTANCY PROBLEM**

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**Abstract**

The photosynthesis pigment value estimation of a leaf can be done by using the conventional method with laboratory instruments such as spectrophotometer and digital image processing from leaf digital image using a certain computational model. On the digital image processing method, there various methods that are used such as neural network, CNN, and linear regression. The measurement of photosynthesis pigment with a digital image processing method uses color value data of image data as an input value of the model which is used to do the measurement.

In this research, the effect of various types of color spaces and inpaint preprocessing configuration on CNN model’s accuracy in measuring the value of leaf’s photosynthesis pigment will be analyzed. The types of color space which will be experimented on are 4 single color spaces which are RGB, HSV, LAB and YCbCr, and 6 combination color spaces which are RGB+HSV, RGB+LAB, RGB+YCbCr, HSV+LAB, HSV+YCbCr, dan LAB+YCbCr. The selection of color space type is based on consideration regarding color constancy phenomenon and the characteristic of color space on illumination element. Furthermore, the image data is classified into 2 types which are image data that have been through inpaint preprocessing and the opposite, which makes the total of input data types are 20.

After the training process of CNN model with various types of color spaces and different preprocessing configuration as input data, an observation on accuracy value, which are train MAE and validation MAE of each model is done. From 20 types of input data, there are 3 types of input data which are recommended as input data that produce the best model accuracy value based on MAE validation with value 0.08761, 0.09252, and 0.09288. Three input data that are recommended from the order of the accuracy values mentioned before are RGB+LAB without inpaint, RGB with inpaint, and LAB+YCbCr without inpaint.

Keywords : *CNN, Color Constancy, Color Space, Inpaint, P3Net, Photosynthesis Pigment Value Estimation.*