**Reducing number of measuring points for estimating reflected spectrum of colorimetric probe**

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*Abstract –* As the world of IoT, and sensor-data gathering is becoming more widespread, reducing the cost of each sensor system is becoming an important factor.In this paper reducing the number of necessary measuring points for estimating a reflected electromagnetic spectrum is presented. In our previous work [1], a machine learning-based method was proven to be superior to Cubic Hermite interpolation in estimating spectrum based on six measured values. Now the new hypothesis is that the number of measuring points could be decreased without the significant loss of spectrum estimation. The output of the system is formed out of thirty-six points in the range of 380-730 nm.



Figure 1. Example of spectrum estimation based on six LED sources.

The spectral radiation power of six proposed LED sources is at 400 nm, 457 nm, 517 nm, 572 nm, 632 nm and 700 nm. In Figure 1. the blue triangles present measured values, blue line estimated spectrum and green line presents spectrum attained from a commercial spectrophotometer.

This paper analyses the usage of different combinations of measuring points and using different machine learning methods with the end goal of significantly reducing the number measuring points, therefore the number of LED sources. The different combinations of measuring points are used as inputs to ANN (Artificial Neural Networks), the network is then trained using dataset generated by spectrophotometer.

Colorimetric capabilities of the different combinations of the measuring points are compared with each other as well as with a commercial spectrophotometer.

REFERENCES

[1] B. Batinić, M. Arbanas, J. Bajić, S. Dedijer, V. Rajs, N. Laković, N. Kulundžić., Using machine learning for improvement of reflected spectrum estimations of colorimetric probe;IEEE Transactions on Instrumentation and Measurement PP(99), August 2020

[2] Haykin, S., Neural Networks: A Comprehensive Foundation, 2nd ed.; Prentice-Hall, Englewood Cliffs, NJ, USA, 1999.