

## **Multi-layer color QR code dynamic decoder framework with fuzzy color recovery**

### **ABSTRACT**

In this paper, we proposed a dynamic framework for a multi-layer color QR code decoder. The proposed decoder framework shows the general steps to decode color QR code. It contains a configuration setting standard that allows other researchers to refer in order to decode their color QR code based on the colors used in the encoder. The framework starts with color QR code detection, then search for color reference. This is followed by fuzzy sets selection based on the color QR code. Color enhancement for the QR code is implemented based on the fuzzy set decision. Next, is color de-multiplexing to get Black and White (B/W) QR code. The de-multiplexing process is based on a configuration file, for the QR code color setting. Finally, is the decoding and merging of the results for the B/W QR code to obtain the original file. We use two datasets with color reference to evaluate our framework. The first dataset used is generated by Yang et al., 2018 encoder and we obtained 83% success rate for the detection and color de-multiplexing. The second dataset is generated from our encoder and produced 90% decoding success rate. The experiment shows the framework can successfully work with different sizes of color QR code.

**Keyword:** Fuzzy; Color QR code; Decoder; Framework; Color enhancement