

Nowadays, 2D barcodes have been widely used as an interface to connect potential customers and advertisement contents. However, the appearance of a conventional 2D barcode pattern is often too obtrusive for integrating into an aesthetically designed advertisement. Besides, no human readable information is provided before the barcode is successfully decoded. This paper proposes a new picture-embedding 2D barcode, called PiCode, which mitigates these two limitations by equipping a scannable 2D barcode with a picturesque appearance. PiCode is designed with careful considerations on both the perceptual quality of the embedded image and the decoding robustness of the encoded message. Comparisons with the existing beautified 2D barcodes show that PiCode achieves one of the best perceptual qualities for the embedded image, and maintains a better tradeoff between image quality and decoding robustness in various application conditions. PiCode has been implemented in the MATLAB on a PC and some key building blocks have also been ported to Android and iOS platforms. Its practicality for real-world applications has been successfully demonstrated.