Real-Time NIR Single-Pixel Imaging for Gait Recognition

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Gait recognition is an important biometric measure that has been applied in many applications, including medical, social, and security issues [1]. Specifically, it is a useful approach in contactless identification. Under low illumination conditions, the image capture can be limited in some commercial cameras. In these cases, the use of infrared camera technology provides the best improvement performance, but it can be costly. Our proposed solution in this work is based on a camera with near-infrared single-pixel (SPC) technology in the spectral bands 850-1550 nm with active illumination over GPU architecture [2]. Due to the high processing capacity of the GPU unit, we can reconstruct the image and recognize human pose in night-time identification scenarios. We propose using the U^2NET network [3] for background extraction scenarios and preliminary silhouette generation as a basis for human pose classification in the captured image using the Vision Transformers (ViT) method [4]. For training we using dataset CASIA-B contains 124 subjects and 13,640 sequences [5] , GREW contains 128K sequences [6] and OU-MVLP consists of 10,307 identities [7], identification pose walking, lying, bendind, standing, age and gender the people capture. To increase the performance of the SPC camera, we applied TinyML applications with ONNX model optimization with low latency as a solution in real-world surveillance applications.

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