Identity recognition based on gait analysis under overlap of pedestrians

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ABSTRACT

Biometrics-based identity recognition, including the use of iris, fingerprints, palmprints, gaits, and facial images, is widely exploited to the fields of security-sensitive applications. Among these biometrics methodologies, human gait has many advantages of being non-intrusive, recognition at a distance, lower requirement of image resolution, difficulty in gait camouflage, and distinct gait for different people. These merits of gait recognition greatly attract much attention of researchers, which in turn leads to gait recognition to be a hot research topic. This thesis proposes a method to recognize the identity of different people in a monitoring region using the feature of human gaits, which is inspired by the fact that different gait behaviors certainly appear in different people. Identity recognition by gait silhouettes generally involves gait representation, gait extraction, and gait recognition. The extraction of moving gait silhouettes, which are represented as the combination of gait energy image (GEI) and Gabor wavelet, includes the procedures of background modeling, shadow removal, background subtraction, morphological processing, and a fast 8-component labeling method. Principle component analysis (PCA) is then used to extract the gait feature represented by GEI and Gabor wavelet. Finally, a classifier of support vector machine (SVM) is employed to recognize the identity of walking people. However, if the scene of overlap for walking people is happening, the method of motion estimation using a three-step tracking method is used to estimate the movement of each people. Experimental results show that the correct recognition rates of the proposed method are 90% and 88.5% for the test images of NLPR database with 20 persons at angles 0o and 90o, respectively, indicating the feasibility of the proposed method. Moreover, the identity recognition rate increases from 78.46% to 93.07% due to the introduction of the module of detecting overlapped pedestrians.

Keywords : Background modeling、Shadow removal、Gait energy image、Principle component analysis、Support vector machine 、Gabor Feature、Three-step tracking

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