Person Re-Identification and Tracking for Surveillance Camera Systems

S.H.J.N. Samarathunga, M.U.M.G.C.P.K. Wijesinghe, R.P.S.R. Kumara and D.R.V.L.B. Thambawita

Department of Computer Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

Person re-identification is a contemporary trend of technology, which is used to identify identities of people over a network of the camera system. Most person re-identification systems are working based on the colour histogram matching method. The problem is challenging due to the low resolution of videos, vary of illumination, positional variances and the possible appearance of carried objects at exclusive viewpoints. Another problem is when wearing the same clothes may be detected as they are the same person. Therefore, these kinds of person re-identification systems get low accuracy results. Hence, we focus our research on using comprehensive *Convolutional Neural Network (CNN)* for person re-identification and tracking in public areas with the aim of the full automation person re-identification system using multiple cameras. In our method, we grab the frames from the video sequence using an accurate multi-target tracker. Then, each frame is processed by a *Siamese* network architecture developed by using *Caffe Framework* to generate a feature vector consist of 1024 values representing the person's physical appearance. This architecture consists of two sub-networks with identical weights with. When the network gets two inputs, the sub-networks map those inputs to a pair of feature vectors. Then it compares two output vectors using *Euclidean distance*. During training, the *Siamese* network is shown similar and dissimilar input pairs. Features are extracted from the frame by frame using a *CNN* in our system. Here, we crop the person using the *Python image library* module as background reduction for accurate the results. Then, we combine information from all time-steps to give a comprehensive appearance feature for the outright sequence. The System achieves 55% accuracy using our Siamese network architecture.

Keywords: Re-Identification, Convolutional neural network, Siamese network architecture, Euclidean distance