

# Context aware Person Re-identification via Fusion of Anthropometric and Gait Features

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Person Re-Identification (Re-ID) is one of the interesting yet challenging tools in the realm of intelligent video surveillance and security. It consists in recognising whether an individual has already been observed and then associating his identity, over a network of cameras. The classical approaches leverage appearance features (e.g. colour, texture) based on the *Appearance Constancy Hypothesis* i.e., the appearance of the person is not changing during acquisition period. However, they restrain the system from long term applications. A recent trend is to leverage *Soft-biometrics* features, which relax these constraints and best deploy in surveillance applications e.g. non obtrusiveness, acquisition from distance, non-requirement for the cooperation of the subject etc.

In this work, we present a novel soft-biometric enabled long term Re-ID framework by exploiting human anthropometrics and gait features. The computation of these features depend strongly on the view-point. For instance, a person with a short stride gait is better perceived from a lateral view, whereas a person with a large chest is more distinct from a frontal view. Based on this rationale, we incorporate the information associated to the view-points (contexts) and thus proposes a novel '*Context-aware ensemble fusion Re-ID framework*'.

The key proposals of this work are as follows: (i) Study the impact of soft-biometric (anthropometric and gait) features both individually and jointly; (ii) A '*context-aware*' Re-ID architecture, where we consider view-points as '*contexts*'; (iii) Model each context with a specific set of potentially relevant features selected with Sequential Forward Selection (SFS) algorithm, to maximize Re-ID score in each context; (iv) Proposal of a '*Context-aware ensemble fusion framework*' to fuse information from different context specific classifiers via our proposed '*Context-specific score level fusion strategy*'.

As a test bed, we considered MS Kinect<sup>TM</sup> v.2 based indoor person Re-ID set up (a new pose-invariant dataset collected in house), by leveraging 3D skeleton joints of the subjects. Some novel ideas are already been proposed very recently (under review), and some further novel improvements (e.g., how to learn context automatically from the data?) are underway, by the time of Workshop.