Public Abstract
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The thesis advanced herein is that linguistic summarization is essential for the reliable succinct modeling and inference of human activity. It is also asserted that the inherent and unavoidable uncertainty is linguistic and fuzzy. Advantages of the proposed work include the generation of human interpretable confidence values, improved rejection of unknown activity, information reduction, complexity management, and the recognition of adverse events. Specifically, a computer vision-based hierarchical soft-computing linguistic summarization framework is proposed. First, images are summarized through the identification of a human and a three-dimensional object called voxel person is constructed. Next, approximate reasoning is used to linguistically summarize the state of the human at each moment, i.e. image, using features extracted from voxel person. Subsequently, temporal linguistic summarizations are produced from the state membership time series. State summaries are used to infer activity, which are also linguistically summarized and subsequently used in a hierarchical similar fashion to recognize additional specific types of higher level activity. A system comprised of two levels is described for the goal of elderly activity recognition. The system parameters are designed under the supervision of nurses. The results are compared to probabilistic graphical models for three data sets consisting of student and nurse trained and supervised stunt actor activities.