Probabilistic LMA-based Human Behavior Understanding by Conjugation of Frequency and Spatial Domains

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Introduction
- Analysing human motion is a prerequisite for understanding any human activities, such as human behaviour, human-robot and human-human interaction, etc.
- The idea comes from a known human motion analysis system, Laban Movement Analysis (LMA), which was created for choreography and dance notation purpose.
- For implementing the idea, Bayesian Networks (BN) has been used. BN presents many advantages on using prior knowledge and modeling the dynamic dependencies between parameters of object states.

Objectives
- Modeling LMA Effort component using frequency based features.
- Analysing human motions using frequency and spatial based features in Bayesian approach.
- Body motion and context based Human behaviour understanding using HMM.
- Exploring in LMA Relationship component to find a connection between human motions and human behaviour (human-environment and human-human).
- Probabilistic social-based interpersonal behaviour analysis using body motion informations.

Individual body-centered human motion analysis

Laban Movement Analysis
- Laban Movement Analysis (LMA) is a well-known method for observing, describing, notating, and interpreting human movement. The theory of LMA consists of several major components, though the available literature is not in unison about their total number.

LMA components:

Social based Interpersonal Behaviour
- Exploring the existent dependencies between LMA parameters and social interpersonal behaviour. (connection between LMA descriptor and Pentland definitions for social signals).

This BN presents the dependencies of those all different variables (LLFs, Relationship component, movement, activity) in two different space (related or not related to the environmental parameters) in one model.

Conclusion
- Using frequency-based features to reach the LMA parameters
- Using a Bayesian network to obtain LMA parameters
- Using a Bayesian network to behavior understanding
- Definition of bottom-up strategy for HBA
- Exploring in the Relationship component

Future works
- Defining LMA-based interpersonal behaviour understanding in Social aspect.

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