Predictive Behavioral Analytics from Spatial-Temporal Data

In visual surveillance systems changes and movements in a scene are registered by motion and object detection, tracking or pose estimation by reconstruction. Examples of such systems can be found in security surveillance e.g. of critical infrastructure buildings, in sport tracking systems, in traffic or environmental monitoring systems.

We develop methods to extract, learn and discover knowledge from the raw spatial-temporal data extracted this way from a stream of images or other sensory sources (GPS, electronic positioning systems etc.). Particularly our research addresses the topics of

1. representing, recognizing and discovering (latent) behavioral patterns across multi scales in time and space
2. distinguishing noise and artefacts from data related to objects of interest, and
3. predicting near future behavior from observed data.

Approach and Topics
- data mining from trajectories
- scene understanding
- deep learning from sequential data (RNN)
- compositional structures of behavioral patterns

Selected Projects
- SKIN (KIRAS) on improving security surveillance systems of critical infrastructure in terms of relevance, interpretability and efficiency
- iKM (COMET) on multi-camera system for real-time tracking of ball and players in team sports
- WiMois (Bridge) on performance and tactics analysis in team sports by knowledge discovery of hidden patterns

Selected Publications
- T. Hoch: An ensemble learning approach for the Kaggle taxi travel time prediction challenge. In Proc. ECML/PKDD, Discovery Challenges, 2016 (First Prize Winner)

Applications
- Security Surveillance and Environmental Monitoring: Reducing false alarms by discarding artefacts resulting from wind, reflections etc. and improved significance of event detection and recognition.
- Sport Informatics: Performance, tactics and game analysis in team sports; more informative key performance indicators based on tactical context.

References

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