

Granular Data Mining in Video Analytics: Shallow to Deep Learning

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The talk first describes the –

- Components of granular computing (GrC) and information granules
- Significance of rough sets in granular computing
- Relevance of generalized rough sets and entropy as a stronger paradigm for uncertainty modeling

Then, the problem of Video tracking (unsupervised) in ambiguous situations is considered, as an example application of granular mining.

The application demonstrates the roles of different kinds of granules, rough lower approximation, and various information measures. Granules considered range from crisp, overlapping, 1-d color, 2-d spatio-color and 3-d spatio-temporal to regular shape and arbitrary shape. Concept of rough lower approximation in temporal domain provides an initial estimate of the object model in unsupervised tracking, while that of lower-upper approximations in granular level, as used in designing a neighborhood rough filter, estimates the location and color model of objects for handling overlapping and occlusion.

The third part deals with the significance of deep learning (DL) in object recognition and tracking in video. Explaining the relevance of GrC in DL in reducing the computation time, the talk presents a new deep architecture, named G-RCNN (granulated region proposal neural nets). This is an improved version of the Fast RCNN and Faster RCNN for extracting Rols (regions of interest) by incorporating spatio-temporal granulation in a deep CNN. G-RCNN accepts videos directly as input. Spatio-color granules enable extraction of less number but more representative Rol-pixels of object regions, and thereby make the G-RCNN superior in real-time detection speed and accuracy during both training and testing.

Several examples and results are provided to explain the aforesaid concepts. The talk concludes mentioning the challenging issues and future directions of research including some cautions.
