Rough Sets in Interactive Granular Computing

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Decision support in solving problems related to complex systems requires relevant computation models for the agents as well as methods for incorporating reasoning over computations performed by agents. Agents are performing computations on complex objects (e.g., (behavioral) patterns, classifiers, clusters, structural objects, sets of rules, aggregation operations, (approximate) reasoning schemes etc.). In Granular Computing (GC), all such constructed and/or induced objects are called granules. To model, crucial for the complex systems, interactive computations performed by agents, we extend the existing GC approach to Interactive Granular Computing (IGC) by introducing complex granules (c-granules or granules, for short). Many advanced tasks, concerning complex systems may be classified as control tasks performed by agents aiming at achieving the high quality computational trajectories relative to the considered quality measures over the trajectories. Here, new challenges are to develop strategies to control, predict, and bound the behavior of the system. We propose to investigate these challenges using the IGC framework. The reasoning, which aims at controlling the computational schemes from time-to-time, in order to achieve the required targets, is called an adaptive judgement. This reasoning deals with granules and computations over them. Adaptive judgement is more than a mixture of reasoning based on deduction, induction and abduction. Due to the uncertainty the agents generally cannot predict exactly the results of actions (or plans). Moreover, the approximations of the complex vague concepts initiating actions (or plans) are drifting with time. Hence, adaptive strategies for evolving approximations of concepts are needed. In particular, the adaptive judgement is very much needed in the efficiency management of granular computations, carried out by agents, for risk assessment, risk treatment, and cost/benefit analysis. In the lecture, we emphasize the role of the rough set based methods in IGC. The discussed approach is a step towards realization of the Wisdom Technology (WisTech) program, and is developed over years of experiences, based on the work on different real-life projects.