FLAIRS-30 Poster Abstracts

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Editors

Group Decision Making Mechanisms and Evaluation

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We identify outstanding challenges for intelligent support of group decision-making. Decision-making is a multidisciplinary term. Technology for large group decision making is undergoing significant advancement with the widespread use of social networks and online decision support tools. Manual rules that govern traditional face-to face meetings need to be adapted to suit virtual meetings where co-decisions have to be made virtually. Collaborative virtual group decision-making is essential for several applications where face-to-face meetings is not pertinent. As information technology has added more dimensions to problems tackled by humans, it is a challenge to make decisions in such dynamic era. Online group decision-making can impact people's significant choices in different ways. The scale of technology-supported decision-making has grown to the point where virtual group decision-making influence has been accused or lauded in the last few US elections. Certain attributes are highly required. Various mechanisms and evaluation criteria are used to study and analyze group decision-making processes. Communications and different threats may affect critical decisions. Multiple attacks have been revealed. More intelligence could be integrated into group decision-making processes to support better communication and visualization of information concerning decision alternatives. Information available about decision alternatives has to be analyzed and adequately presented to decision makers. Varied decision information could be structured by the aid of decision support systems. Solid evaluation criteria for virtual group decision-making processes are needed. Numerous research directions that contribute to group decision-making advancement are highlighted.

Human-Computer Interaction in a Debate Decision Support System

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There are different types of user interaction possible with debate systems, and we identify those that lead to a better quality of the information exchange. We evaluate the I formation exchange based on its amount. We identified and analyzed a set of fora that were specially designed for debates. We used surveys and interviews as a question driven mode of evaluating the understandably for each studied system by asking the user to respond with yes, no, or with a value showing the clarity of the ideas presented on the system as perceived by them. The questions for surveys and interviews, a data-driven mode, were designed to capture general and specific expectations and beliefs that users have concerning the threading, structure, and content of debates on the corresponding user interfaces/platforms. Different types of inter-comment links lead to different degrees of understanding and memorization, which can be evaluated with interviews. We found out that DirectDemocracyP2P mechanisms of keeping only the last comment per user offer the best understandability in terms of number of ideas involved in the debate that are learned by users in a fix amount of time. YourView mechanisms of allowing for multiple final comments per user offer the best refined understandability in terms of remembering which ideas out of a list of ideas were used in support or rejection of the central thesis. The familiarity of the user with a given system was factored out by the execution of multiple experiments with each system and with randomized order between addressed theses.

Q-Table Compression for Reinforcement Learning

Leonardo Rosa Amado, Felipe Meneguzzi (PUCRS, Brazil)

Reinforcement learning algorithms are often used to compute agents capable of acting in environments with no prior knowledge. However, these algorithms struggle to converge in environments with large branching factors and their large resulting state-spaces. In this paper, we develop an approach to compress the number of entries in a Q-value table using a deep auto-encoder that uses a binary representation of the state, compressing it to a smaller representation. Our approach focuses specifically in mitigating the large branching factor problem resulting from dealing with multi-agent scenarios. We apply these techniques in the scenario of the MicroRTS Real-Time Strategy (RTS) game, where both state space and branching factor are a problem. To reduce the branching factor on the MicroRTS game, we use separate instances of Q-Learning for each agent, and we separate agents by roles. We combine both the auto-encoder and the separate instances of Q-Learning, creating an AI capable of playing the MicroRTS game. We empirically evaluate an implementation of the technique to control agents in an RTS game scenario where classical reinforcement learning fails. Our results shows that our approach is able to compete against pre-coded AIs and other works in the literature.

Distributed Trust for Intrusion Detection

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When we consider the typical approach to how a computer trusts another computer, the trust is either complete for the given action, or there exists no trust at all. Namely, either an authentication process based on passwords, keys or some other cryptographic mechanism succeeds, and all the corresponding service is provided for as long as the client is connected; or no information is provided and the client/attacker can try again, until some hard-coded rules are met and the peer is black-listed. If the computer at the remote end has been compromised, no amount of certainty given by the authentication protocol can protect the local machine. Further, if the local machine has some critical resource the hacker is trying to gain access to, then disconnecting the remote machine may be the only mechanism available to prevent it from identifying a vulnerability in the local machine. The question we address is to dynamically evaluate reliability as a probability of trustworthiness for a computer's communication channels and hypothesize if that communication channel has been compromised in a network unknown to the agent. A computer can decide to offer services and information according to the probabilities assessed. Namely, one can restrict dynamically the channel to block or disconnect it when the value of the information provided is lower than the perceived risk to the local machine. To that end we develop dynamic trust reevaluators based on belief networks, and linked in a network of probabilistic measurements, that do not fully trust each other.

A Supervised Classification Approach to Predicting Knee Pain Improvement in Osteoarthritis Patients

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The data-driven prediction of an individual patient's response to particular treatments is a major goal of precision medicine. We are tackling this problem in the domain of chronic diseases, specifically Osteoarthritis (OA), using the Osteoarthritis Initiative (OAI) dataset, which comprises OA-related medical records for more than 4000 patients over 10 consecutive years. Using these data, we have developed three new supervised machine learning classifiers that can determine at better-than-baseline rates as to whether osteoarthritis patients are experiencing improved, unchanged, or worsened pain relative to their previous assessment. Such a classifier is a necessary first step to predicting longer-term treatment outcomes. We use the standard Knee Injury and Osteoarthritis Outcome Score (KOOS) as labels, and train our classifiers on a set of easily observable features capturing demographics, related injuries, therapies (excluding medications), overall measures of pain, and measures of both physical activity and rest required during such activity. We trained three types of classifiers (Support Vector Machine, Random Forest, and a Multi-layer Neural Network), and all classifiers performed at better-than-baseline rates (baseline most-frequent-class gives 0.4 F1), with the neural network performing the best with over 0.7 F1. We further analyze which features are most predictive (particularly types and intensity ofrimarily walking and stand-sit activities coupled with the amount of time spent performing them), and identify several promising next steps for investigation, including integrating medications into the feature set.

DTLBO: A Diversified Optimization Algorithm for Uncertain and Deceptive Environment

Atm Golam Bari, Alessio Gaspar (University of South Florida)

Maintaining diversity in converging population and balance of search space exploration versus exploitation are