Experience-Based Narrative Memory

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ABSTRACT
This position paper describes a current topic of interest of DARPA's Information Processing Techniques Office (IPTO). The office is requesting information on areas of research concerning mixed-initiative decision support from the standpoint of a learned memory of experiences that drive the understanding of complex information streams using narrative processes.

Author Keywords
Mixed-initiative interpretation, story understanding, case-based reasoning, narrative, context-aware computing

ACM Classification Keywords
H5.m. Information interfaces and presentation

INTRODUCTION
Given the torrent of information available to the decision maker, how can a system organize and store such input as knowledge for current and future use? Too much information at too many levels of detail typifies the input stream provided by modern decision-support systems. Combat sensors, newswire feeds, video reports, and ISR platforms all provide both undigested and structured data concerning the current situation, its history, and future predictions, all without coordination or provenance. Thus, we seek to develop a means to distill and transform these complex, multi-source, heterogeneous data into a form that is more suitable for human consumption. To do this it is necessary to combine relevant data from this massive stream into a cohesive story that is germane to the goals of the decision-maker.

Making sense of a complex situation is like understanding a story (Schank, 1995). Sense making constructs and imposes an interpretation as well as extracts one. It weaves a commonly understood narrative into the information in a way that captures the basic interactions of characters and the dynamics of their motivations while filling in details not explicitly mentioned in the input stream. It uses story-lines with which we all have experience as analogies, and it simplifies the detail to communicate the crucial aspects of a situation. The story-lines it uses are those the decision maker should be reminded of, because they are similar to the current situation based upon what the decision maker is trying to do. That is, like people an Experience-Based Narrative Memory can retrieve and reuse stories to construct an appropriate interpretation of events, not because the stories have the most detail, but because they convey the aspects of a situation that are most important in determining a decision.

DARPA/IPTO is requesting information on approaches and methodologies for examining the related problems of situation assessment and decision management with the objective of building an intelligent system that can interpret complex information streams by using a library of schematic structures, can reorganize the information into actionable advice, and can store its interpretations and recommendations into a dynamic memory of experience that improves the capability of the system for understanding future input streams. Specifically, DARPA/IPTO is interested in descriptions of current or proposed research that examine how people understand complex events through narrative memory and that apply those findings to the improvement of similar memory-based functions in command, control, and communications tasks using technologies such as case-based reasoning and context-aware computing. The desired outcome of this research is a mixed-initiative system through which complex situations are made simple, understandable, and solvable.

Of particular interest are approaches that focus on the intelligent interpretation, storage, and reuse of information. Areas for consideration include, but are not limited to: (1) case-based reasoning and machine learning; (2) story understanding, explanation and context-aware computing; (3) intelligent information retrieval and other memory-based approaches; (4) psychological theories of narrative understanding and storytelling, and; (5) knowledge-based sensor fusion.

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