

SemanticNSA

Semantic Network Structure Analysis

Discovering the Unexpected

Benefit: *SemanticNSA will help analysts to assess the evidentiary value of data stored in graph or network form. Data will be shown in context to help differentiate correlation from causation. Patterns found in historical analyses will be re-used to suggest hypotheses indicating recurring themes as they emerge in new situations. Reuse of such patterns will help to increase the breadth of hypothesis coverage in new scenarios for novice and expert analysts. Externalizing these patterns will help to make explicit the situational experience usually held implicit by expert analysts. These patterns may then be more effectively reused for the benefit of novice analysts.*

The need to improve hypothesis generation capability is a prominent theme in Visual Analytics and Intelligence Analysis research agendas. Many tools exist to help an analyst explore data while working against implicit hypotheses. SemanticNSA's contribution is to increase the effectiveness of analysts by suggesting hypotheses and making them explicit. By increasing the breadth of the analytical problem solving process we can increase the chance of discovering unexpected themes.

It is hypothesized that key events or entities will share similar structural relationships in the context of neighbor events across situations. For example, content analysis of emergency room data from a historical outbreak situation may reveal patterns of relations between patients, symptoms, locations and time. SemanticNSA will provide a framework for documenting such relationships in a reusable way. The tool will then provide a means for detecting occurrences of similar patterns in new data. With this capability, the system might suggest a hypothesis of a developing outbreak in terms of different patients, symptoms, locations and time. The suggestion can include the hypothesis itself, the supporting evidentiary data from the current situation, and reference to the structural similarity of the historical situation. Ultimately this may help novice analysts to find patterns for which expert analysts implicitly look.

SemanticNSA is being developed as a Java application that integrates research capabilities from multiple systems including the open-source Prefuse Information Visualization Toolkit and SUBDUE, a graph based knowledge discovery tool. SemanticNSA works with GraphML format to facilitate integration with many other analytical systems.

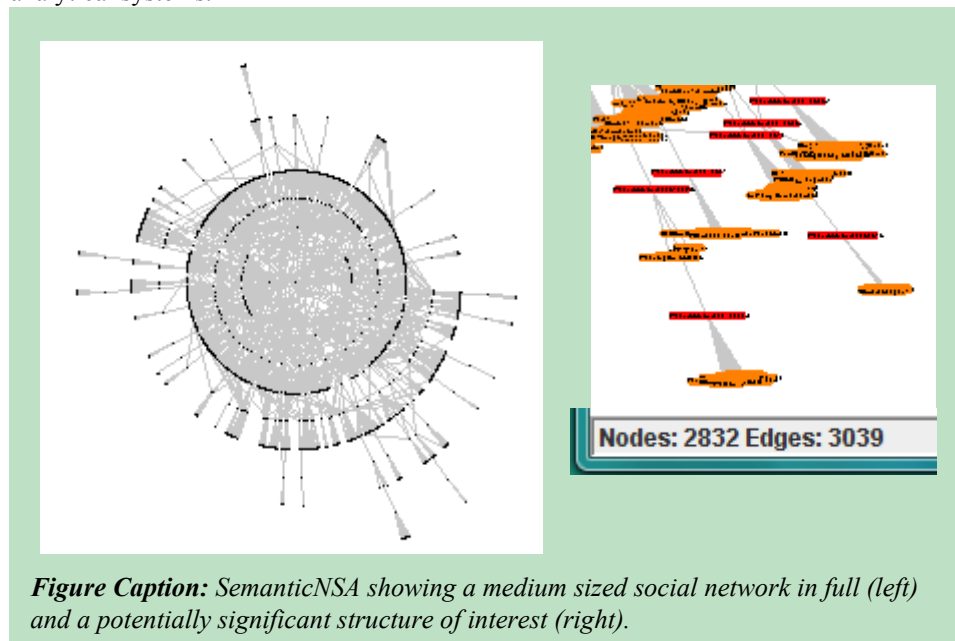


Figure Caption: *SemanticNSA showing a medium sized social network in full (left) and a potentially significant structure of interest (right).*

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Early Development

Lab Prototype

Commercial Product

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