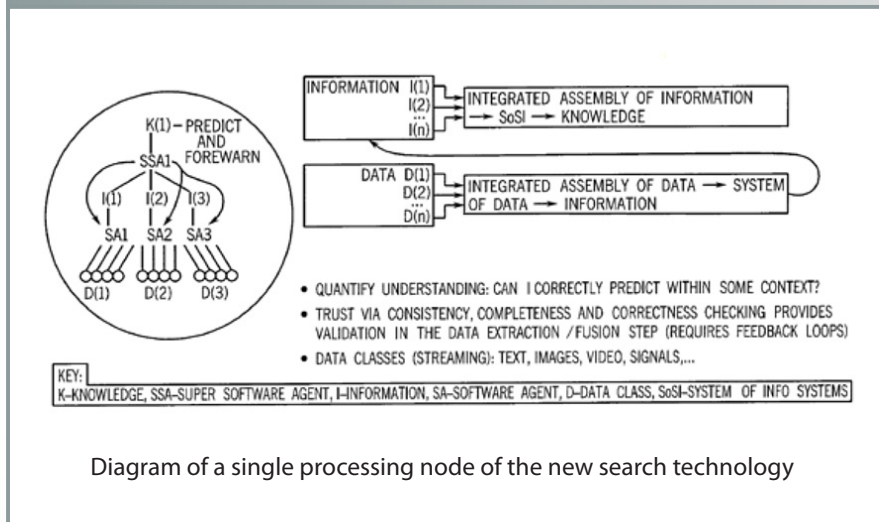


Search Method for Real-time Knowledge Discovery Modeled on the Human Brain

UT-B ID 200601732



Technology Summary

A new computational search method developed by an ORNL researcher detects patterns in digital data by adapting unique information processing properties of the human brain to computational knowledge discovery. The ORNL method follows a new paradigm, the neocortex of the human brain, which has superior speed and insight in processing text, images, audio, and sensory data simultaneously for real-time situational understanding. The technology can be used in situations as diverse as inferring terrorists' plans from disparate e-mail exchanges, analyzing existing scientific literature to infer new relationships, scanning satellite data to infer the effects of global change, and forewarning of adverse events from complex, time-serial data.

The technology is different from other search methods by modeling itself on four unique properties of the human brain: 1. an irreducible representation of each item; 2. auto-associative memory of the information for robust recall; 3. hierarchical processing of the information for rapid understanding; and 4. feed-forward, plus feedback to enable the hierarchical processing and to ensure consistency. The new method simultaneously processes different sources of test data into informational data and then processes different categories of informational data into knowledge-based data. The knowledge-based data can then be communicated between nodes in a system of multiple computers according to rules for complex, hierarchical system modeled on the human brain.

The system includes a memory for storing source data sets; a first tier program to process the sets of source data to produce informational data; and a second-tier computer program on either the first computer or another computer to process the informational data to produce knowledge data. The invention further requires a network communication device to transmit any or all of the above to a second computer that has other source, informational, or knowledge-based data for evaluation of the first computer's data.

Advantages

The invention is a paradigm shift from keyword searching by present knowledge discovery methods to actual understanding of the data input under the new neocortex paradigm. This results in faster knowledge discovery from large amounts of data.

Potential Applications

- National security and intelligence
- Analysis of existing scientific literature to infer new relationships
- Analysis of satellite data to infer global change effects

Patent

Lee Hively. *Method and System for Knowledge Discovery*, U.S. Patent 7,979,372, issued July 12, 2011.

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