Technosocial Predictive Analytics Initiative

QUARTERLY NEWSLETTER

Summer 2009 http://predictiveanalytics.pnl.gov/

Antonio's Notes

Dear "Technosocialites":

As our TPAI matures, work on decision-making is increasingly taking a front seat. The reasons for this will probably not come as a surprise to all of you. Analysts and policymakers are constantly challenged to make assessments about plausible outcomes across domains as diverse as energy, security, the environment, health, and finance in order to maximize opportunities and counter adversities. Despite the human natural disposition towards prediction, our ability to forecast, analyze, and respond to plausible futures remains one of the greatest intelligence challenges due to inherent limitations on human cognition.

Qualities such as the ability to focus on what is perceived as most important and the capacity to make quick decisions based on insight and intuition make human judgment uniquely effective. However, these qualities can also be responsible for fallacious reasoning when judgment is affected by factors such as lack of knowledge, groupthink, and other forms of biased attention focus, memory limitations, and increased confidence in extreme judgments and highly correlated observations.

TPAI helps analysts and policymakers provide better analysis and response by enabling naturalistic decision-making, while countering adverse influences on human judgment. Check out our TPAI contribution to the International Conference on Naturalistic Decision Making (http://predictiveanalytics.pnl.gov/publications/papers/NDM9_TPAI-6Mar09-2.pdf) and our forthcoming IEEE workshop on Social Intelligence in Applied Gaming (http://predictive-analytics.pnl.gov/ieee_conference) to learn more about our approach to decision-making.

In this issue we are also introducing our new modeling project on the Impact of Energy Consumption on National and Global Security; I invite all of you to review the initial work carried out by this team in this issue's highlight.

TECHNOSOCIAL PREDICTIVE ANALYTICS FOCUS AREAS AND PROJECTS

Technosocial Modeling

Explores the development, implementation, and evaluation of new mathematical and statistical methods in predictive modeling for real-world scenarios.

- Vulnerability of Food Security and Energy Infrastructures to Climate Change and Terrorism
- Dynamic Scenarios for Organizations in Infrastructures
- Predicting the Impact of Climate Change on U.S. Power Grids and Its Wider Implications on National Security
- Impact of Energy Consumption on National and Global Security

Knowledge Inputs

Leverages computer-aided content/signal extraction and analysis for marshaling actionable evidence and using knowledge-representation methods to encapsulate and access expert knowledge and marshaled evidence.

- Knowledge Encapsulation Framework: A Framework for Knowledge Inputs for Technosocial Predictive Analytics

Cognitive Enhancement

Exploits visual interactivity and enhanced cognition techniques within a serious gaming paradigm to empower the user in the modeling task.

- Development of Serious Gaming Technology for Cognitive Enhancement in Predictive Analytics

Evaluation of Technosocial Predictive Analytics

Evaluates efforts focused on evaluating the utility that technosocial predictive analytic environments provide to the end users.

- Evaluation of Technosocial Predictive Analytics

For more information in these four research and development areas, please visit www.predictiveanalytics.pnl.gov.

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IMPACT OF ENERGY CONSUMPTION, USER BEHAVIOR, AND POLICIES & TECHNOLOGY ON GLOBAL & NATIONAL ENERGY SECURITY

This project provides forward-looking analytic insights on energy security through the identification of dynamic patterns that relate to energy consumption, user behavior, policies, and technologies tied to energy efficiency.

Such patterns will establish predictive inference networks capable of adapting to change through the evaluation of historical and emerging evidence drawn from time-sensitive data. Critical to this outcome is the ability to effectively and efficiently capture relationships across policy, technology, and social behavior in the context of space and time. This activity will provide ongoing energy landscape analysis with visualization output and deliver scenarios appropriate for use with a gaming module.

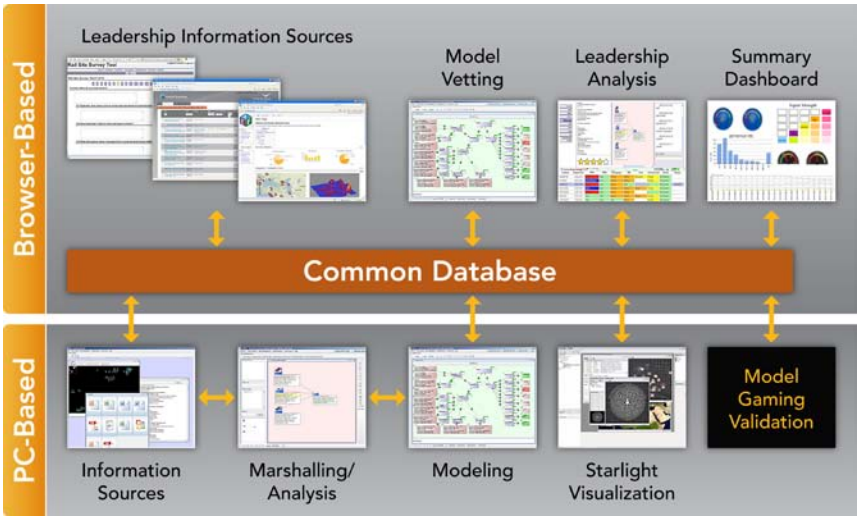
These activities follow a best-practice systems approach to rapid pattern recognition and assessment. We extend existing prototype technologies to create a proof-of-concept system for key government and industry customer sets interested in real-time decision-support systems. The scenario used for this project will focus on macro trending in response to energy security and its relationship to national security and climate change.

Expected Outcomes

This project will enable the effective and efficient identification of time- and space-sensitive relationships across policy, technology, and social behavior that influence global energy security. We will:

1. Use analysis tools and human expert judgment to identify and structure critical evidence about policy, technologies, and human engagement from large datasets.
2. Encapsulate strategic insights from subject matter experts that combine informed opinion, intuitive reasoning, and expert vetting.
3. Engage dynamic probabilistic modeling techniques to create adaptive inference networks that leverage the evidence and expert knowledge gathered to offer proactive analytic insights on energy security.
4. Provide the ability to interrogate the energy security models developed to support rapid decision-making through the exploration of multiple perspectives.
5. Develop a critical reasoning environment based on the iterative and mutual optimization of human intelligence and technology processes.

This project will result in a system design that captures the analyst's information evaluation processes to conduct trend evaluations and identify significant changes that may result in strategic surprise (watch and warn).



IEEE INTERNATIONAL CONFERENCE ON SOCIAL COMPUTING (SOCIALCOM-09)

A one-day workshop on "Social Intelligence in Applied Gaming" will be held in conjunction with the 2009 IEEE International Conference on Social Computing. SocialCom-09 will be held in Vancouver, British Columbia, Canada, August 29-31. The workshop session will comprise a full-day workshop within the conference program, focusing on the use of games and game-like interfaces as a means of accessing social intelligence for anticipatory reasoning, decision-making, and problem analysis.

The workshop goals are (1) to bring together researchers who are exploring the use of so-called "serious gaming" paradigms, decision markets, and other game-like methods to gather social intelligence; (2) to help identify key research questions posed by these applications; and (3) to conduct this workshop in an environment that provides opportunities for cross-fertilization with other researchers who share a strong focus on social intelligence and social computing.

For more information, visit http://predictiveanalytics.pnl.gov/ieee_conference/.