AMT'10/BI'10 Program AT A GLANCE

On-site Registration August 28-29, 08:15-18:00 [TEL Basement Hallway]

Saturday August 28, 2010

09:10-9:30 **Conference Opening** [TEL 0001]

09:30-10:30 **Keynote Talk** [TEL 0001] Chair: Aijun An

Technology-Mediated Social Participation: Deep Science and Extreme Technology, Ben Shneiderman

10:30-10:50 **Coffee break**

10:50-11:50 **Keynote Talk** [TEL 0001] Chair: Pawan Lingras

Fractionating the Rational Brain, Vinod Goel

11:50 - 13:20 **Lunch**

13:20 - 14:50	**BI Session - B1** [TEL 0005] ***Brain Data Analysis and Data Brain I*** Chair: Frank Hsu	**AMT Session - A1** [TEL 0006] ***Special session on Text Analysis and Utilization (TAU)*** Chairs: Tetsuya Yoshida	**AMT Session - A2** [TEL 0007] ***Data Mining, Ontology Mining and Web Reasoning*** Chair: Orland Hoeber

14:50-15:00 **Short break**

15:00 - 16:30	**BI Session - B2** [TEL 0005] ***Brain Data Analysis and Data Brain II*** Chair: Peipeng Liang and Tatsuro Hori	**AMT Session - A3** [TEL 0006] ***Entertainment and Social Applications of Active Media*** Chair: Daryl Hepting	**AMT Session - A4** [TEL 0007] ***Special session on Technology Intelligence*** Chair: Hanmin Jung

16:30-16:50 **Coffee break**

16:50 - 18:20	**BI Session - B3** [TEL 0005] ***Neuronal Modeling and Brain Modeling*** Chair: Natalie van der Wal	**AMT Session - A5** [TEL 0006] ***Web Based Social Networks*** Chair: Runhe Huang	

19:00-21:00 **Conference Reception** [TBA]

Sunday August 29,, 2010

09:30-10:30 **Keynote Talk** [TEL 0001] Chair: Jiming Liu

Cognitive Informatics and Denotational Mathematical Means for Brain Informatics, Yingxu Wang

10:30-10:50 **Coffee Break**

10:50-11:50 **Keynote Talk** [TEL 0001] Chair: Sheila Petty

Active Smart u-Things and Cyber Individuals, Jianhua Ma

11:50 - 13:20 **Lunch**

13:20 - 14:50	**BI Session - B4** [TEL 0005] ***WICI Perspectives on Brain Informatics I*** Chair: Ning Zhong	**AMT Session – A6** [TEL 0006] ***Adaptive Web Systems and Information Retrieval*** Chair: Yue Xu	**AMT Session – A7** [TEL 0007] ***Active Computer Systems and Intelligent Interfaces*** Chair: Sheila Petty

14:50-15:10 **Coffee Break**

15:10 - 16:15	**BI Session - B5** [TEL 0005] ***WICI Perspectives on Brain Informatics II*** Chair: Ning Zhong	**AMT Session – A8** [TEL 0006] **Evaluation of Active Media and AMT Based Systems** Chair: Pawan Lingras	**AMT Session – A9** [TEL 0007] (Two sessions) ***Multi-Agent*** **and AMT Based Systems** Chair: Predrag Tosic/Jiming Liu

16:20 - 18:20 [TEL 0005] **Special Panel on Computational Neurolinguistics**

Chairs: Kevyn Collins-Thompson and Gwen Frishkoff

18:30 - 21:30 Conference Banquet

Monday August 30, 2010

09:00 - 11:00	**BI Session - B6** [TEL 0005] ***Cognition-inspired Applications I*** Chair: Norberto Malpica	**BI Session - B7** [TEL 0006] ***Cognitive Computing and Learning*** Chair: Yulin Qin	**AMT Session - A10** [TEL 0007] ***Web Mining, Wisdom Web and Web Intelligence*** Chair: Aijun An

11:00-11:20 **Coffee Break**

11:20 - 13:20	**BI Session - B8** [TEL 0005] ***Cognition-inspired Applications II*** Chair: Jimmy Huang	**BI Session - B9** [TEL 0006] ***Cognitive Modeling and Information Processing*** Chair: Yiyu Yao	**AMT Session - A11** [TEL 0007] ***Machine Learning and Human-Centered Robotics*** Chair: Vijay Raghavan

AMT'10/BI'10 Program

Saturday, August 28, 2010

On-site Registration

Time: August 28-29, 08:15-18:00
Location: Lobby

Conference Opening (09:10-09:30)

Location: TEL 0001
Welcome:
Program Introduction:

Keynote Talk (August 28, 09:30 - 10:30)

Chair: Aijun An
Location: TEL 0001
Title: Technology-Mediated Social Participation: Deep Science and Extreme Technology
Speaker: Ben Shneiderman

Coffee break (10:30 - 10:50)

Keynote Talk (August 28, 10:50 - 11:50)

Chair: Pawan Lingras
Location: TEL 0001
Title: Fractionating the Rational Brain
Speaker: Vinod Goel

Lunch (11:50 - 13:20)

BI Session - B1 (August 28, 13:20 - 14:50)

Brain Data Analysis and Data Brain I
Chair: Frank Hsu
Location: TEL 0005

- The Effect of the Normalization Strategy on Voxel-Based Analysis of DTI Images: A Pattern Recognition Based Assessment, Gloria Diaz, Gonzalo Pajares, Eduardo Romero, Juan Alvarez-Linera, Eva Lopez, Juan Antonio Hernandez-Tamames and Norberto Malpica (B240)
- Single Trial Classification of EEG and Peripheral Physiological Signals for Recognition of Emotions Induced by Music Videos, Sander Koelstra, Ashkan Yazdani, Mohammad Soleymani, Christian Muhl, Jong-Seok Lee, Anton Nijholt, Thierry Pun, Touradj Ebrahimi and Ioannis Patras (B227)
- Brain Signal Recognition and Conversion Towards Symbiosis with Ambulatory Humanoids, Yasuo Matsuyama, Keita Noguchi, Takashi Hatakeyama, Nimiko Ochiai and Tatsuro Hori (B207)
- Recurrence Plots for Identifying Memory Components in Single-trial EEGs, Nasibeh Talebi and Ali Motie Nasrabadi (B213)

AMT Session - A1 (August 28, 13:20 - 14:50)

Special session on Text Analysis and Utilization (TAU)
Chairs: Tetsuya Yoshida
Location: TEL 0006

- Performance Evaluation of Constraints in Graph-based Semi-Supervised Clustering, Tetsuya Yoshida
- Recommendation of Little Known Good Travel Destinations using Word-of-mouth Information on the Web, Kuzou Ohara, Yu Fujimoto, and Tomofumi Shiina
- Exploring Social Annotation Tags to Enhance Information Retrieval Performance, Zheng Ye, Xiangji Jimmy Huang, Song Jin, and Hongfei Lin
- Enhancing Content-Based Image Retrieval Using Machine Learning Techniques, Qinmin Vivian Hu, Zheng Ye, and Xiangji Jimmy Huang

AMT Session - A2 (August 28, 13:20 - 14:50)

Data Mining, Ontology Mining and Web Reasoning
Chair: Orland Hoeber
Location: TEL 0007

- Multiagent based Large Data Clustering Scheme for Data Mining Applications, T. Ravindra Babu, M. Narasimha Murty and S.V. Subrahmanya
- A Semantic Web Services Discovery Algorithm Based on QoS Ontology, Baocai Yin, Huirong Yang, Pengbin Fu, and Xiaobo Chen
- User Interests: Denition, Vocabulary, and Utilization in Unifying Search and Reasoning, Yi Zeng, Yan Wang, Zhisheng Huang, Danica Damljanovic, Ning Zhong, Cong Wang
- Modeling User Knowledge from Queries: Introducing a Metric for Knowledge, Frans van der Sluis and Egon L. van den Broek

Short break (14:50 - 15:00)

BI Session - B2 (August 28, 15:00 - 16:30)

Brain Data Analysis and Data Brain II
Chair: Peipeng Liang and Tatsuro Hori
Location: TEL 0005

- Feature Rating by Random Subspaces for Functional Brain Mapping, Diego Sona and Paolo Avesani (B235)
- Improving Individual Identification in Security Check with an EEG based Biometric Solution, Qinlin Zhao, Hong Peng, Bin Hu, Quanying Liu, Li Liu, Yanbing Qi and Lanlan Li (B219)
- A Study of Mozart Effect on Arousal, Mood, and Attentional Blink, Chen Xie, Lun Zhao, Duoqian Miao, Deng Wang, Zhihua Wei and Hongyun Zhang (B228)
- Computational Modeling and Analysis of Therapeutical Interventions for Depression, Fiemke Both, Mark Hoogendoorn, Michel C.A. Klein and Jan Treur (B232)

AMT Session - A3 (August 28, 15:00 - 16:30)

Entertainment and Social Applications of Active Media
Chair: Daryl Hepting
Location: TEL 0006

- Perception of Parameter Variations in Linear Fractal Images, Daryl H. Hepting and Leila Latifi
- Music Information Retrieval with Temporal Features and Timbre, Angelina A. Tzacheva and Keith J. Bell
- Assessing End-user Programming for a Graphics Development Environment, Lizao Fang and Daryl H. Hepting
- Visual Image Browsing and Exploration (Vibe): User Evaluations of Image Search Tasks, Grant Strong, Orland Hoeber, and Minglun Gong

AMT Session - A4 (August 28, 15:00 - 16:30)

Special session on Technology Intelligence
Chair: Hanmin Jung
Location: TEL 0007

- Extracting Concerns and Reports on Crimes in Blogs, Yusuke Abe, Takehito Utsuro, Yasuhide Kawada, Tomohiro Fukuhara, Noriko Kando, Masaharu Yoshioka, Hiroshi Nakagawa, Yoji Kiyota, and Masatoshi Tsuchiya
- Ontology Matching Method for Efficient Metadata Integration, Pyung Kim, Dongmin Seo, Mikyoung Lee, Seungwoo Lee, Hanmin Jung, and Won-Kyung Sung
- Extracting protein sub-cellular localizations from literature, Hong-Woo Chun, Jin-Dong Kim, Yun-Soo Choi, and Won-Kyung Sung
- Natural Language Query Processing for Life Science Knowledge, Jin-Dong Kim, Yasunori Yamamoto, Atsuko Yamaguchi, Mitsuteru Nakao, Kenta Oouchida, Hong-Woo Chun, and Toshihisa Takagi

Coffee break (16:30 - 16:50)

BI Session - B3 (August 28, 16:50 - 18:20)

Neuronal Modeling and Brain Modeling

Chair: Natalie van der Wal
Location: TEL 0005

- Segmentation of 3D Brain Structures Using the Bayesian Generalized Fast Marching Method, Mohamed Baghdadi, Nacera Benamrane and Lakhdar Sais (B239)
- Domain-Specific Modeling as a Pragmatic Approach to Neuronal Model Descriptions, Ralf Ansorg and Lars Schwabe (B211)
- Guessing What's on Your Mind: Using the N400 in Brain Computer Interfaces, Marijn van Vliet, Christian Muhl, Boris Reuderink and Mannes Poel (B215)

AMT Session - A5 (August 28, 16:50 - 18:20)

Web Based Social Networks
Chair: Runhe Huang
Location: TEL 0007

- Contextual Recommendation of Social Updates, a Tag-based Framework, Adrien Joly, Pierre Maret, and Johann Daigremont
- Semantic Web Portal: A Platform for Better Browsing and Visualizing Semantic Data, Ying Ding, Yuyin Sun, Bin Chen, Katy Borner, Li Ding, David Wild, Melanie Wu, Dominic DiFranzo, Alvaro Graves Fuenzalida, Daifeng Li, Stasa Milojevic, ShanShan Chen, Madhuvanthi Sankaranarayanan, Ioan Toma
- NicoScene: Video Scene Search by Keywords based on Social Annotation, Tahara Tahara, Atsushi Tago, Hiroyuki Nakagawa, and Akihiko Ohsuga
- Social Relation Based Search Refinement: Let Your Friends Help You!, Xu Ren, Yi Zeng, Yulin Qin, Ning Zhong, Zhisheng Huang, Yan Wang, Cong Wang

Conference Reception (19:00 - 21:00)

Location: Schulich Dining Room

Sunday, August 29, 2010

Keynote Talk (August 29, 09:30 - 10:30)

Chair: Jiming Liu
Location: TEL 0001
Title: Cognitive Informatics and Denotational Mathematical Means for Brain Informatics
Speaker: Yingxu Wang

Coffee break (10:30 - 10:50)

Keynote Talk (August 28, 10:50 - 11:50)

Chair: Sheila Petty
Location: TEL 0001
Title: Active Smart u-Things and Cyber Individuals
Speaker: Jianhua Ma

Lunch (11:50 - 13:20)

BI Session - B4 (August 29, 13:20 - 14:50)

WICI Perspectives on Brain Informatics I
Chair: Ning Zhong
Location: TEL 0005

- Interaction Between Visual Attention and Goal Control for Speeding up Human Heuristic Search, Rifeng Wang, Jie Xiang and Ning Zhong (B222)
- The Role of the Parahippocampal Cortex in Memory Encoding and Retrieval: An fMRI Study, Mi Li, Shengfu Lu, Jiaojiao Li and Ning Zhong (B217)
- Brain Activation and Deactivation in Human Inductive Reasoning: An fMRI Study, Peipeng Liang, Yang Mei, Xiuqin Jia, Yanhui Yang, Shengfu Lu, Ning Zhong and Kuncheng Li (B248)
- Clustering of fMRI Data Using Affinity Propagation, Dazhong Liu, Wanxuan Lu, and Ning Zhong (B218)

AMT Session – A6 (August 29, August 29, 13:20 - 14:50)

Adaptive Web Systems and Information Retrieval
Chair: Yue Xu
Location: TEL 0006

- Folksonomy-Based Ontological User Interest Profile Modeling and Its Application in Personalized Search, Xiaogang Han, Zhiqi Shen, Chunyan Miao, and Xudong Luo
- Visualizing Threaded Conversation Networks: Mining Message Boards and Email Lists for Actionable Insights, Derek L. Hansen, Ben Shneiderman, and Marc Smith
- A Hybrid Chinese Information Retrieval Model, Zhihan Li, Yue Xu, and Shlomo Geva
- Term Frequency Quantization for Compressing an Inverted Index, Lei Zheng and Ingemar J. Cox

AMT Session – A7 (August 29, August 29, 13:20 - 14:50)

Active Computer Systems and Intelligent Interfaces
Chair: Sheila Petty
Location: TEL 0007

- The Influence of Ubiquity on Screen-Based Interfaces, Sheila Petty and Luigi Benedicenti
- Intelligent Implicit Interface for Wearable Items Suggestion, Aasim Khan, Muhammad Aslam, and A. M. Martinez-Enriquez
- Implementation of an Intelligent Product Recommender System in an e-Store, Seyed Ali Bahrainian, Seyed Mohammad Bahrainian, Meytham Salarinasab, and Andreas Dengel
- Enhanced Intra Coding of H.264/AVC Advanced Video Coding Standard with Adaptive Number of Modes, Mohammed Golam Sarwer and Q. M. Jonathan Wu

Coffee break (14:50 - 15:10)

BI Session - B5 (August 29, 15:10 - 16:15)

WICI Perspectives on Brain Informatics II
Chair: Ning Zhong
Location: TEL 0005

- Towards Systematic Human Brain Data Management Using a Data-Brain Based GLS-BI System, Jianhui Chen, Ning Zhong and Runhe Huang (B230)
- The Role of Posterior Parietal Cortex in Problem Representation, Jie Xiang, Yulin Qin, Junjie Chen, Haiyan Zhou, Kuncheng Li and Ning Zhong (B238)
- Basic Level Advantage and Its Switching during Information Retrieval: An fMRI Study, Haiyan Zhou, Jieyu Liu, Wei Jing, Yulin Qin, Shengfu Lu, Yiyu Yao and Ning Zhong (B256)

AMT Session – A8 (August 29, 15:10 - 16:15)

Evaluation of Active Media and AMT Based Systems
Chair: Pawan Lingras
Location: TEL 0006

- Interactive Visualization System for DES, Mohamed S. Asseisah, Hatem M. Bahig, and Sameh S. Daoud
- Investigating Perceptions of a Location-Based Annotation System, Huynh Nhu Hop Quach, Khasfariyati Razikin, Dion Hoe-Lian Goh, Thi Nhu Quynh Kim, Tan Phat Pham, Yin-Leng Theng, Ee-Peng Lim, Chew Hung Chang, Kalyani Chatterjea, and Aixin Sun
- Apollon13: A Training System for Emergency Situations in a Piano Performance, Yuki Yokoyama and Kazushi Nishimoto

AMT Session – A9 (August 29, 15:10 - 16:15)

Multi-Agent Systems and AMT Based Systems
Chair: Predrag Tosic/Jiming Liu
Location: TEL 0007

- Building Users Profiles from Clustering Resources in Collaborative Tagging Systems, Maya Rupert and Salima Hassas
- Some Optimizations in Maximal Clique based Distributed Coalition Formation for Collaborative Multi-Agent Systems, Predrag T. Tosic and Naveen K. R. Ginne
- Computer-Assisted Interviewing with Active Questionnaires, Seon-Ah Jang, Jae-Gun Yang, and Jae-Hak J. Bae

BI Panel Discussion - BP (August 29, 16:20 - 18:20)

Special Panel on Computational Neurolinguistics
Chair: Kevyn Collins-Thompson and Gwen Frishkoff
Location: TEL 0005

- Distributed Time Series Analysis for Studying Brain and Language in Context, Sarah Kenny (speaker), Steve Small, Michael Wilde, University of Chicago
- Capturing Structure in Human Semantic Knowledge via Semantic Features Learned from Topic Models, Francisco Pereira, Princeton University
- A Latent Feature Analysis of the Neural Representation of Object Knowledge, Kai-min Kevin Chang, Carnegie Mellon University
- Using Random Walk Models on Word-Relation Graphs to Analyze Robust Word Learning, Kevyn Collins-Thompson, Microsoft Research
- Development of Neural Electromagnetic Ontologies (NEMO): Ontology-based Tools for Representation and Integration of Event-related Brain Potentials, Gwen Frishkoff, Georgia State University

Conference Banquet (18:30 - 21:30)

Location: Underground Restaurant, York University

Monday, August 30, 2010

BI Session - B6 (August 30, 09:00 - 11:00)

Cognition-inspired Applications
Chair: Norberto Malpica
Location: TEL 0005

- Modelling Caregiving Interactions During Stress, Azizi Ab Aziz, Jan Treur, and C. Natalie van der Wal (B254)
- A Time Series Based Method for Analyzing and Predicting Personalized Medical Data, Vivian Hu, Jimmy Huang, William Melek and C. Joseph Kurian (B251)
- Language Analytics for Assessing Brain Health: Cognitive Impairment, Depression and Pre-Symptomatic Alzheimer's Disease, William L. Jarrold, Bart Peintner, Eric Yeh, Ruth Krasnow, Harold S. Javitz and Gary D. Swan (B246)
- A Cognitive Architecture Based on Neuroscience for the Control of Virtual 3D Human Creatures, Felipe Rodriguez, Francisco Galvan, Felix Ramos, Erick Castellanos, Gregorio Garcia and Pablo Covarrubias (B237)
- Data Fusion and Feature Selection for Alzheimer's Diagnosis, Blake Lemoine, Sara Rayburn and Ryan Benton (B242)

BI Session - B7 (August 30, 09:00 - 11:00)

Cognitive Computing and Learning
Chair: Yulin Qin
Location: TEL 0006

- An Adaptive Model for Dynamics of Desiring and Feeling based on Hebbian Learning, Tibor Bosse, Mark Hoogendoorn, Zulfiqar A. Memon, Jan Treur and Muhammad Umair (B216)
- Rank-Score Characteristics (RSC) Function and Cognitive Diversity, D. Frank Hsu, Bruce S. Kristal and Christina Schweikert (B247)
- Cognitive Effort for Multi-agent Systems, Luca Longo and Stephen Barrett (B205)
- Concept Learning in Text Comprehension, Manas Hardas and Javed Khan (B221)
- Comparing EEG/ERP-like and fMRI-like Techniques for Reading Machine Thoughts, Fabio Massimo Zanzotto and Danilo Croce (B209)

AMT Session - A10 (August 30, 09:00 - 11:00)

Web Mining, Wisdom Web and Web Intelligence
Chair: Aijun An
Location: TEL 0007

- Automatically Extracting Web Data Records, Dheerendranath Mundluru, Vijay V. Raghavan, and Zonghuan Wu
- An Empirical Approach for Opinion Detection using Significant Sentences, Anil Kumar K.M and Suresha
- Web User Browse Behavior Characteristic Analysis Based on a BC Tree, Dingrong Yuan and Shichao Zhang
- Clustering Web Users Based on Browsing Behavior, Tingshao Zhu
- Privacy Preserving in Personalized Mobile Marketing, Yuqing Sun and Guangjun Ji

Coffee break (11:00 - 11:20)

BI Session - B8 (August 30, 11:20 - 13:20)

Cognition-inspired Applications II
Chair: Jimmy Huang
Location: TEL 0005

- A Brain Data Integration Model Based on Multiple Ontology and Semantic Similarity, Li Xue, Yun Xiong and Yangyong Zhu (B214)
- The Effect of Sequence Complexity on the Construction of Protein-Protein Interaction Networks, Mehdi Kargar and Aijun An (B252)
- Towards Inexpensive BCI Control for Wheelchair Navigation in the Enabled Environment: A Hardware Survey, Kenyon Stamps and Yskanda Hamam (B234)
- Investigation on Human Characteristics of Japanese Katakana Recognition by Active Touch, Suguru Yokotani, Jiajia Yang and Jinglong Wu (B249)
- Modelling the Emergence of Group Decisions Based on Mirroring and Somatic Marking, (B231)

BI Session - B9 (August 30, 11:20 - 13:20)

Cognitive Modeling and Information Processing
Chair: Yiyu Yao
Location: TEL 0006

- Behavioural Abstraction of Agent Models Addressing Mutual Interaction of Cognitive and Affective Processes, Alexei Sharpanskykh and Jan Treur (B250)
- How Does Repetition of Signals Increase Precision of Numerical Judgment? Eike Benjamin Kroll, Jorg Rieger and Bodo Vogt (B224)
- Sparse Regression Models of Pain Perception, Irina Rish, Guillermo A. Cecchi, Marwan N. Baliki and A. Vania Apkarian (B220)
- A Qualitative Approach of Learning in Parkinson's Disease, Delphine Penny-Leguy and Josiane Caron-Pargue (B233)

AMT Session - A11 (August 30, 11:20 - 13:20)

Machine Learning and Human-Centered Robotics
Chair: Vijay Raghavan
Location: TEL 0007

- K-Means Clustering as a Speciation Mechanism within an Individual-Based Evolving Predator-Prey Ecosystem Simulation, Adam Aspinall and Robin Gras
- Improving Reinforcement Learning Agents Using Genetic Algorithms, Akram Beigi, Hamid Parvin, Nasser Mozayani, and Behrouz Minaei
- Robust and Efficient Change Detection Algorithm, Fei Yu, Michael Chukwu, and Q. M. Jonathan Wu

AMT'10/BI'10 Invited Talks

Title: Technology-Mediated Social Participation: Deep Science and Extreme Technology

PROFESSOR BEN SHNEIDERMAN
University of Maryland, USA
http://www.cs.umd.edu/hcil/

Abstract
The dramatic success of social media such as Facebook, Twitter, YouTube, Flickr, blogs, and traditional discussion groups empowers individuals to become active in local and global communities. With modest redesign, these technologies can be harnessed to support national priorities such as healthcare/wellness, disaster response, community safety, energy sustainability, etc. This talk describes a research agenda for these topics that develops deep science questions and extreme technology challenges.

Biography
BEN SHNEIDERMAN (http://www.cs.umd.edu/~ben) is a Professor in the Department of Computer Science and Founding Director (1983-2000) of the Human-Computer Interaction Laboratory (http://www.cs.umd.edu/hcil/) at the University of Maryland. He was elected as a Fellow of the Association for Computing (ACM) in 1997, a Fellow of the American Association for the Advancement of Science (AAAS) in 2001, and a Member of the National Academy of Engineering in 2010. He received the ACM SIGCHI Lifetime Achievement Award in 2001.

Ben is the co-author with Catherine Plaisant of "Designing the User Interface: Strategies for Effective Human-Computer Interaction" (5th ed., 2010) http://www.awl.com/DTUI/. With Stu Card and Jock Mackinlay, he co-authored "Readings in Information Visualization: Using Vision to Think" (1999). With Ben Bederson he co-authored "The Craft of Information Visualization" (2003). His book "Leonardo's Laptop" appeared in October 2002 (MIT Press) and won the IEEE book award for Distinguished Literary Contribution. His latest co-authored book, "Analyzing Social Media Networks with NodeXL" (www.codeplex.com/nodexl) was published in August 2010.

Title: Fractionating the Rational Brain

PROFESSOR VINOD GOEL
York University, Canada
http://www.yorku.ca/vgoel

Abstract

Considerable progress has been made over the past decade in our understanding of the neural basis of logical reasoning. Unsurprisingly these data are telling us that the brain is organized in ways not anticipated by cognitive theory. In particular, they're forcing us to confront the possibility that there may be no unitary reasoning system in the brain (be it mental models or mental logic). Rather, the evidence points to a fractionated system that is dynamically configured in response to certain task and environmental cues. I will review three lines of demarcation including (a) systems for heuristic and formal processes (with evidence for some degree of content specificity in the heuristic system), (b) conflict detection/resolution systems, and (c) systems for dealing with certain and uncertain inferences; and then offer a tentative account of how the systems might interact to facilitate logical reasoning. Sensitivity to data generated by neuroimaging and patient methodologies will move us beyond the sterility of mental models vs. mental logic debate and further the development of cognitive theories of reasoning.

Biography

Vinod Goel studied architectural design and computer science as an undergraduate. He received his PhD in Cognitive Science from UC-Berkeley, followed by postdoctoral training in cognitive neuroscience at the NIH, USA and Institute of Neurology/UCL, UK. He is currently a Professor of Cognitive Neuroscience at York University, Canada, and the University of Hull, UK. His research uses brain imaging (fMRI) and lesion analyses techniques to study the cognitive, computational, and neural basis of rational thought processes ranging from logical inference to design problem-solving. This work has resulted in numerous, highly cited publications and has been recognized by a number of awards, including the McDonnell-Pew Program in Cognitive Neuroscience Award.

Title: Cognitive Informatics and Denotational Mathematical Means for Brain Informatics

PROFESSOR YINGXU WANG
University of Calgary, Canada
http://enel.ucalgary.ca/People/wangyx/

Abstract

The contemporary wonder of sciences and engineering has recently refocused on the beginning point of them: how the brain processes internal and external information autonomously and cognitively rather than imperatively as those of conventional computers. Cognitive Computing (CC) is an emerging paradigm of intelligent computing methodologies and systems that implements computational intelligence by autonomous inferences and perceptions mimicking the mechanisms of the brain. CC is emerged and developed based on the transdisciplinary research in cognitive informatics and abstract intelligence. Cognitive Informatics (CI) [Wang 2002] is a transdisciplinary enquiry of computer science, information science, cognitive science, brain science, and intelligence science that investigates into the internal information processing mechanisms and processes of the brain and natural intelligence, as well as their engineering applications. The theoretical framework of cognitive informatics covers the Layered Reference Model of the Brain (LRMB), the Object-Attribute-Relation (OAR) model of information representation in the brain, the cognitive informatics model of the brain, and neuroinformatics. Recent studies on LRMB in cognitive informatics reveal an entire set of cognitive functions of the brain and their cognitive process models, which explain the functional mechanisms and cognitive processes of the natural intelligence with 43 cognitive processes at seven layers known as the sensation, memory, perception, action, meta-cognitive, meta-inference, and higher cognitive layers from the bottom up. Abstract Intelligence (αI) [Wang, 2008] and Denotational Mathematics (DM) [Wang, 2000, 2009] play an important role in cognitive informatics, brain informatics, and cognitive computing. αI is a universal mathematical form of intelligence that transfers information into actions and behaviors; while DM is a category of expressive mathematical structures that deals with high-level mathematical entities beyond numbers and sets, such as abstract objects, complex relations, perceptual information, abstract concepts, knowledge, intelligent behaviors, behavioral processes, and systems. The latest advances in CI and CC have led to a systematic solution for explaining brain informatics and the future generation of intelligent computers. A wide range of applications of CI, αI, CC, and DM have been recognized in brain informatics toward the implementation of highly intelligent systems such as world-wide wisdom (WWW+), cognitive knowledge search engines, autonomous learning machines, and cognitive robots.

Biography

Dr. Yingxu Wang is professor of cognitive computing and software engineering, Director of International Institute of Cognitive Informatics and cognitive computing (IICICC), and Director of Theoretical and Empirical Software Engineering Research Center (TESERC) at the University of Calgary, Canada. He is a Fellow of WIF, a P.Eng of Canada, a Senior Member of IEEE and ACM, and a member of ISO/IEC JTC1 and the Canadian Advisory Committee (CAC) for ISO. He received a PhD in Software Engineering from the Nottingham Trent University, UK, in 1997, and a BSc in Electrical Engineering from Shanghai Tiedao University in 1983. He has industrial experience since 1972 and has been a full professor since 1994. He was a visiting professor in the Computing Laboratory at Oxford University in 1995, Dept. of Computer Science at Stanford University in 2008, and the Berkeley Initiative in Soft Computing (BISC) Lab at University of California, Berkeley in 2008, respectively. He is the founder and steering committee chair of the annual IEEE International Conference on Cognitive Informatics (ICCI). He is founding Editor-in-Chief of International Journal of Cognitive Informatics and Natural Intelligence (IJCINI), founding Editor-in-Chief of International Journal of Software Science and Computational Intelligence (IJSSCI), Associate Editors of IEEE Transactions on System, Man, and Cybernetics (Part A), Journal of Advanced Mathematics and Applications (JAMA), and International Journal of Applied Metaheuristic Computing (IJAMC), as well as Editor-in-Chief of CRC Book Series in Software Engineering. Prof. Wang is the initiator of a number of cutting-edge research fields or subject areas such as cognitive informatics, abstract intelligence, cognitive computing, cognitive computers, denotational mathematics (i.e., concept algebra, system algebra, real-time process algebra, granular algebra, visual semantic algebra, and inference algebra), software science (i.e., theoretical software engineering and mathematical laws of software engineering), coordinative work organization theory, deductive semantics, LRMB, the reference model of autonomous agent systems, cognitive complexity of software, and built-in tests (BITs). He has published over 110 peer reviewed journal papers, 200+ peer reviewed full conference papers, and 12 books in cognitive informatics, software engineering, and computational intelligence. He is the recipient of dozens international awards on academic leadership, research achievements, best papers, and teaching in the last 36 years.

Title: Active Smart u-Things and Cyber Individuals

PROFESSOR JIANHUA MA
Hosei University, Japan
http://cis.k.hosei.ac.jp/~jianhua/

Abstract

Due to the continuing miniaturization of chips and availability of wired/wireless communications, many kinds/forms of devices can be integrated into physical objects and ambient environments. The u-things, as opposed to pure digital e-things existing on computers/Web/Internet, are ordinary physical things with attached, embedded or blended computers, networks, and/or some other devices such as sensors, actors, e-tags and so on. Active smart u-things are ones that can, more or less, sense, compute, communicate, and may take some actions according to their goals, situated contexts, usersâ€™ needs, etc. Active smart u-things can be with different levels of intelligence from low to high, and in various intelligent forms, e.g., aware, context-aware, interactive, reactive, proactive, assistive, adaptive, automated, autonomic, sentient, perceptual, organic, life-like, cognitive, thinking, etc. Active smart u-things may cover innumerable types of physical things in the real world. They can be roughly classified into three categories, i.e., smart object, smart space and smart system, according to their appearances and functions. The grand challenge is how to enable these smart u-things to offer desired services to all people in right time, right place and right means with ubisafe guarantee. Furthermore, the essential and existence of human in cyber-physical combined spaces should be re-examined. The Cyber Individual, with a short term â€˜Cyber-Iâ€™, is a real individualâ€™s counterpart in cyberspace. Cyber-I can be seen as a comprehensive description of a real individual including oneâ€™s physical status, physiological states, psychological behaviors, personal features, social relations, history experiences, etc. Such kind of individual description and modeling is fundamental to offer personalized services to different users according to their needs and situations.

Biography

Jianhua Ma is a Professor at the Faculty of Computer and Information Sciences of Hosei University since 2000. Previously, he had 15 years' teaching/research experience at NUDT, Xidian University and the University of Aizu (Japan). His research from 1983 to 2003 covered wireless communications, data encryption, speech processing, multimedia QoS, 1-to-m HC hyper-interface, graphics ASIC, e-learning and virtual university, CSCW, multi-agents, Internet audio/video, mobile web service, P2P network, etc. Since 2003 he has been devoted to what he called Smart World/Hyperworld pervaded with smart physical u-things, characterized with Ubiquitous Intelligence (u-Intelligence, UI) for u-Services with UbiSafe guarantee. Dr. Ma has published over 200 papers in journals and proceedings, and edited over 10 books. He is a Co-Editor-in-Chief of JUCI, JMM, JoATC, JPCC and IJUNESST. He is on the editorial boards of IJCPOL, IJDET, IJWMC, IJSH, IJSIA, IJDTA, IJCIT and IJAS, and has edited over 15 journal special issues as a Guest Editor. He organized the 6th Int'l Conf. on Distributed Multimedia Systems (DMS'99) as a PC Co-Chair, the 1st Int'l Conf. on Cyber Worlds (CW'02) as one of founders and PC Co-Chairs, the 18th IEEE Int'l Conf. on Advanced Information Networks and Applications (AINA'04) as a General Co-Chair, and the 1st IEEE Int'l Conf. on Social Computing (SocialCom'09) as an Advisory Chair. He is a founder of Int'l Conf. on Ubiquitous Intelligence and Computing (UIC), Int'l Conf. on Autonomic and Trusted Computing (ATC), and IEEE/ACM Conf. on Cyber, Physical and Social Computing (CPSCom). He is a Chair of IEEE CIS Task Force on Autonomic and Trusted Computing, and a co-founder of IEEE Task Force on Ubiquitous Intelligence and Computing.

Special Panel on Computational Neurolinguistics

Distributed Time Series Analysis for Studying Brain and Language in Context

Sarah Kenny (speaker), Steve Small, Michael Wilde, University of Chicago

Collecting the human brain's functional responses to experimental stimuli generates enormous data sets for researchers to analyze. Typical experiments expose a group of participants to anywhere between 20 to 40 minutes of stimuli, generating on the order of 70,000 time series, each more than 1000 records long, per participant. Because analysis of these enormous data sets is constrained by the computational power available to a researcher, constraint is also inherently put on the types of questions that can be asked of the data and the experimental designs under which it is collected. In attempting to free researchers from these constraints, we developed a computational framework that uses relational databases, Grid-computing, and the Swift workflow system (Zhao et al., 2007) to manage, analyze, and share neuroimaging data (Small et al., 2009). Here, we further demonstrate this infrastructure's computational power by describing its use in a time series analysis that would not only otherwise be unfeasible, but also, because we are not constrained to conventional experimental methods, allows pursuing novel questions about the human brain.

Briefly described, we are exploring how the human brain functions in natural communication, under conditions more reflecting typical experience, rather than the highly constrained, experimentally controlled exposures conventionally used in neuroimaging studies. We record participants' blood oxygen level dependent (BOLD) signals as they view continuous videos of a woman spontaneously talking about various topics, i.e., more reflecting typical conversation. We project all acquired time series from the 3-dimensional volume image to a 2-dimensional surface representation (Fischl et al., 1999; Saad et al., 2004), resulting in 392,004 time series across the brain of an individual participant, and enter this data into a relational database. Using high performance computing (HPC) in a parallelized workflow, we then query each individual time series to find the position of extrema ("turning points", either peaks or valleys; for similar application, see Skipper et al., 2009) across that time series. At every surface vertex, the number of peaks and valleys corresponding to particular features of interest coded in the stimuli (e.g., specific words, syllables, gestures), as well as the statistical significance of their distribution, are entered into another set of relational tables. We then query these tables to view the resulting spatial layout of their significance as a brain map depicting those areas showing sensitivity to the stimuli of interest.

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Capturing Structure in Human Semantic Knowledge via Semantic Features Learned from Topic Models

Francisco Pereira, Princeton University

Over the last 15 years, functional magnetic resonance imaging (fMRI) has become the primary tool for identifying the neural correlates of mental activity. Traditionally, this consisted of finding brain regions active during performance of a task. More recently, it has become increasingly clear that there is much more information in the data, though often present diffusely over the entire pattern of brain activation rather than in any specific location. The tools of choice for capturing this information have been machine learning classifiers. Using them, it has been possible to predict which of several stimuli a subject is seeing, a subject's decisions or mistakes, whether a stimulus is recognized or will be remembered and even, controversially, subject deception or pre-conscious purpose. After these successes, interest expanded to discovering how the information present is encoded or testing scientific hypotheses about that encoding. Early on, this took the shape of dissecting an existing classifier, with awareness of its induction bias, in order to explain how it made a successful prediction. Of late, it has meant formulating forward models of early visual processing or how the meaning of a word is represented in the brain and testing them by predicting the resulting fMRI activation. Conversely, it has also been shown to be possible to reconstruct a complex scene a subject is seeing from fMRI activation captured while she is doing it.

The current research challenge is to extend this type of work to situations where there are no good forward models or understanding of the computation being done by the brain. In this talk, I will describe the ongoing effort at our research group to use topic models on special text corpora to learn semantic features that capture structure of human semantic knowledge. Given these models, it becomes possible to decompose the pattern of brain activation when considering the meaning of a word into constituent patterns associated with the presence of each semantic feature. I will show that this approach allows us to make predictions about subject performance in psychological tasks, classification or prediction of brain activation in response to novel stimuli and even generation of text about brain images.

A Latent Feature Analysis of the Neural Representation of Object Knowledge

Kai-min Kevin Chang, Carnegie Mellon University

Computational neurolinguistics is an emerging research area which integrates recent advances in computational linguistics and cognitive neuroscience, with the objective of developing cognitively plausible models of language and gaining a better understanding of the human language system. Advances in computational neurolinguistics require close collaboration between computational linguists and neuroscientists. To assist researchers who are new to this topic, the Center for Cognitive Brain Imaging at Carnegie Mellon University is providing the data used in Mitchell et al. (2008). In an object-contemplation task, participants were presented with 60 line drawings and/or text labels of objects in 12 categories, and were instructed to think of the same properties of the stimulus object consistently during multiple presentations of each item. For each concept there are 6 instances of ~20k brain activity features (brain blood oxygenation levels).

In this talk, I will describe the CMU fMRI data set and a new analysis that uses a generative probabilistic model to describe how fMRI-measured brain activity is generated from some latent semantic representation. More specifically, a linear-Gaussian infinite latent feature model (ILFM) with an Indian Buffet Process (IBP) prior can be used to derive a binary feature representation of object knowledge from the brain activity. I show that the semantic features recovered by ILFM are consistent with the human ratings of the shelter, manipulation, and eating factors that are recovered by factor analysis. Furthermore, different areas of the brain encode different psycholinguistics features: the latent features discovered at different brain areas are consistent with some existing conjectures regarding the role of different brain areas in processing different psycholinguistics features.

Using Random Walk Models on Word-Relation Graphs to Analyze Robust Word Learning

Kevyn Collins-Thompson, Microsoft Research

We develop a family of probabilistic random walk models on multi-type word relation graphs and show how such models provide a flexible, accurate source of features for analysis and prediction of robust word learning. Word relations are modeled as a conjunction of multiple edge-types such as synonymy, morphology, associative strength, and co-occurrence with other words, with each edge weight being a probability that models the strength of the corresponding word relationship. With such graphs, we can derive reliable random walk-based similarity algorithms with useful applications to neurolinguistics experiments. For example, we obtain continuous and fine-grained measures of partial word knowledge by computing random-walk similarity scores between the words in a target definition and the words in the participant's response; such graphs also provide features that may be used in conjunction with ERP-derived data to analyze and predict robust word learning.

Development of Neural Electromagnetic Ontologies (NEMO): Ontology-based Tools for Representation and Integration of Event-related Brain Potentials

Gwen Frishkoff, Georgia State University

We describe a first-generation ontology for representation and integration of event-related brain potentials (ERPs). The ontology is designed following OBO "best practices" and is augmented with tools to perform ontology-based labeling and annotation of ERP data, and a database that enables semantically based reasoning over these data. Because certain high-level concepts in the ERP domain are ill-defined, we have developed methods to support coordinated updates to each of these three components. This approach consists of "top-down" (knowledge-driven) design and implementation, followed by "bottom-up" (data-driven) validation and refinement. Our goal is to build an ERP ontology that is logically valid, empirically sound, robust in application, and transparent to users. This ontology will be used to support sharing and meta-analysis of EEG and MEG data collected within our Neural Electromagnetic Ontologies (NEMO) project.