Shiwali Mohan

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Research Interests

Cognitive systems and agents, situated language processing for agents, learning with human-agent interaction, natural language semantics.

Education

University of Michigan, Ann Arbor, MI USA
Ph.D., Computer Science and Engineering — 2008 - 2014 (expected)
Thesis Topic: *Learning Tasks and Verbs from Situated Interactive Instruction*
Thesis Advisor: John Laird
Thesis Committee: Edmund Durfee, Richard Lewis, Edwin Olson, Andrea Thomaz

University of Michigan, Ann Arbor, MI USA
M.S.E., Computer Science and Engineering — 2008 - 2009

University of Delhi, New Delhi, India
Netaji Subhas Institute of Technology
B.Tech, Instrumentation and Control Engineering — 2003 - 2007
Senior Thesis: *Extraction-based Single Document Summarization*

Honors and Awards

Doctoral Consortium Travel Scholarship, AAAI: 2012
Rackham Travel Grant: 2011, 2012, 2013
Best Paper Award, CICLing: 2008
Scholarship for Academic Excellence at the University of Delhi: 2003 - 2007

Research Experience

University of Michigan, Ann Arbor, MI USA
Graduate Student Research Assistant to John E. Laird — August 2010 - present
Learning tasks with situated interactive instruction
Studying linguistic interaction and knowledge-intensive learning paradigms useful in acquiring novel tasks for collaborative cognitive agents.

Situated language for embodied agents
Investigating situated language comprehension models that generate meanings by associating amodal linguistic symbols with modal perceptual, spatial, and task knowledge. Studying the role of non-linguistic context and domain knowledge in linguistic comprehension.

University of Michigan, Ann Arbor, MI USA
Graduate Student Research Assistant to John E. Laird — January 2009 - August 2010
Reinforcement learning in Soar cognitive architecture
Designed, implemented, and analyzed reinforcement learning agents for Infinite Mario. Formulated and implemented modular reinforcement learning for Soar cognitive architecture that allows the agent to simultaneously learn multiple MDPs.

Indian Institute of Technology, New Delhi, India
Research Assistant to Niladri Chatterjee May 2007 - July 2007
Sense disambiguation, Word-Space models for language
Designed, implemented, and analyzed algorithm for sense disambiguation of homonyms using K-Means clustering and Random Indexing.

University of Delhi, New Delhi, India
Thesis with Shampa Chakravarty, Niladri Chatterjee December 2006 - May 2007
Single document summarization, Word-Space models for language
Designed, implemented, and analyzed algorithms for single-document summarization using PageRank and Random Indexing.

Publications

Journal Articles

J1: **Shiwali Mohan**, Aaron Mininger, James Kirk, and John Laird. Acquiring grounded representations of words with situated interactive instruction. Advances in Cognitive Systems, 2012

Conference Proceedings

C1: **Shiwali Mohan**, Aaron Mininger, and John Laird. Towards an indexical model of situated comprehension for real-world cognitive agents. In Proceedings of the 2nd Conference on Advances in Cognitive Systems, 2013

C2: **Shiwali Mohan**, James Kirk, and John Laird. A computational model of situated task learning with interactive instruction. In Proceedings of the 17th International Conference on Computational Modeling, 2013

C3: Mandar Joshi, Rakesh Khobragade, Saurabh Sarda, Umesh Deshpande, and **Shiwali Mohan**. Object-oriented representation and hierarchical reinforcement learning in Infinite Mario. In Proceedings of the 24th IEEE International Conference on Tools with Artificial Intelligence (ICTAI), 2012

C4: **Shiwali Mohan** and John Laird. An Object-Oriented approach to reinforcement learning in an action game. In Proceedings of the 7th Artificial Intelligence for Interactive Digital Entertainment Conference, AIIDE, 2011

C5: Niladri Chatterjee and **Shiwali Mohan**. Discovering word senses from text using random indexing. In Proceedings of the 9th International Conference on Computational linguistics and Intelligent Text Processing, CICLing, 2008. Best Paper Award

C6: Niladri Chatterjee and **Shiwali Mohan**. Extraction-based single-document summarization using random indexing. In Proceeding of the 19th IEEE International Conference on Tools with Artificial Intelligence, ICTAI, 2007

Refereed Symposia/Workshop Proceedings

W1: John E. Laird and **Shiwali Mohan**. A case study of knowledge integration across multiple memories in Soar. In AAAI Fall Symposium on Integrated Cognition, 2013

W2: **Shiwali Mohan***, Aaron Mininger*, James Kirk*, and John Laird. Learning grounded language through situated interactive instruction. In Papers from Robots Learning Interactively from Human Teachers (AAAI Fall Symposium Series), 2012

W3: John Laird, Keegan Kinkade, **Shiwali Mohan**, and Joseph Xu. Cognitive robotics using the

soar cognitive architecture. In Proceedings of the 8th International Cognitive Robotics Workshop, 2012

W4: **Shiwali Mohan** and John Laird. Situated comprehension of imperative sentences in embodied, cognitive agents. In the AAAI 2012 Workshop on Grounding Language for Physical Systems, 2012

W5: **Shiwali Mohan** and John Laird. Towards situated, interactive, instructable agents in a cognitive architecture. In Papers from the 2011 AAAI Fall Symposium Series, 2011

Extended Abstracts

A1: Mandar Joshi, Rakesh Khobragade, Saurabh Sarda, Umesh Deshpande, and **Shiwali Mohan**. Hierarchical action selection for reinforcement learning in Infinite Mario. In Proceedings of the 6th Starting Artificial Intelligence Research Symposium (ECAI), 2012

A2: **Shiwali Mohan** and John Laird. Learning actions and action verbs from human-agent interaction. In Proceedings of the 26th AAAI Conference on Artificial Intelligence, 2012

A3: **Shiwali Mohan** and John Laird. Exploring mixed-initiative interaction for learning with situated instruction in cognitive agents. In Proceedings of the 26th AAAI Conference on Artificial Intelligence, 2012

A4: **Shiwali Mohan** and John Laird. Relational reinforcement learning in Infinite Mario. In Proceedings of the 24th AAAI Conference on Artificial Intelligence, AAAI, 2010

Teaching Experience

University of Michigan, Ann Arbor, MI, USA
Graduate Student Instructor — January 2012 - April 2012
EECS 492: Introduction to Artificial Intelligence

University of Michigan, Ann Arbor, MI, USA
Student — September 2011 - December 2011
EECS 580: Teaching Engineering

Advising Experience

Undergraduate Student Advising — September 2012 - Present
Anant Mittal, Anmol Gupta
Undergraduate thesis project: *Designing Soar agents for planet wars*
Bharati Vidyapeeth College of Engineering, New Delhi, India

Undergraduate Student Advising — September 2011 - May 2012
Mandar Joshi, Rakesh Khobragade, Saurabh Sarda
Undergraduate thesis project: *Reinforcement learning agents for Infinite Mario*
Visvesvaraya National Institute of Technology, Nagpur, India

Talks

Learning Hierarchical Tasks with Situated Interactive Instruction

Center for Vision, Cognition, Learning, and Art, UCLA	November 2012
USC Institute for Creative Technologies.	November 2012
Interaction Lab, Computer Science and Engineering, USC	December 2012
Information Sciences Institute, Los Angeles	December 2012

Service

Co-Chair, Special Interest Group - Faculty, University of Michigan 2013
Co-Chair, Special Interest Group - Faculty, University of Michigan 2012
Vice-President, CSE Graduate Organization, University of Michigan 2011
Social Chair, Indian Students Association, University of Michigan 2011
DCO Representative, CSE Graduate Organization, University of Michigan 2010
Social Chair, Indian Students Association, University of Michigan 2010

Industry Experience

Yahoo! Research and Development, Bangalore, India
Software Engineer with Strategic Data Services July 2007 - July 2008
Implemented feed aggregation to generate analytic numbers such as page views and click-through rate for many Yahoo! websites on a custom distributed computing platform. Implemented better scheduling of I/O and CPU bound processes leading to performance improvement of feed analytics processes.

Bharat Electronics Limited, Ghaziabad, India
Software Intern **May 2006 - July 2006**

Central Research Laboratory, Ghaziabad, India
Software Intern **May 2005 - July 2006**

Computer Skills

- Experience with cognitive architectures Soar and ACT-R
- Experience in programming with Java, C++, Perl, Python, JavaScript
- Operating Systems: Unix/Linux, Windows.