Technical Area:
Common Sense Reasoning and
Intelligent User Interfaces

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Description

One reason why software and robotic agents are helpful for humans is that they can function autonomously (at least partially). Functioning with autonomy in turn requires being context sensitive. One important aspect of context sensitivity is the ability to reason with *common sense*. Although research has been conducted in this area for years now, artificial common sense reasoning does not seem to be developed far enough to be applied to "real-world" products and applications. Nevertheless, could implementing such capabilities help create better user interfaces and autonomous agents? Could intelligent user interfaces to such entities profit from common sense reasoning methods?

Written Requirement

The written requirement for this area will consist of a 24-hour take-home exam.

Signature: _____   Date: _____

Reading list

Besides classics like *John McCarthy, Marvin Minsky, Ernest Davis, Mark Maybury* (intelligent user interfaces*)*, and *Jeff Bradshaw* (agents), a large portion of the reading list consists of papers and books by people who are working on actual common sense reasoning systems, like *Doug Lenat* (CYC), *Erik Muller* (ThoughtTreasure), *Push Sing* (Openmind Common Sense), and *Tim Berners-Lee* (Semantic Web). Another chunk of readings are conference papers published by *Intelligent User Interfaces* (1999 to 2001) and *Common Sense 2001*. Finally, there are papers that describe efforts to apply some (partial) kind of common sense reasoning to robotic and software agents.

The online version of this reading list contains links to most of the papers, as well as abstracts for most items: ***http://www.media.mit.edu/~stefanm/generals/***

John McCarthy (1959). *Programs with Common Sense*. In Mechanisation of Thought Processes, Proceedings of the Symposium of the National Physics Laboratory, London, U.K.: Her Majesty's Stationery Office, pp. 77-84.

Selected chapters from Ernest Davis (1990). *Representations of Commonsense Knowledge*. San Mateo, CA: Morgan Kaufmann Publishers, Inc.

Marvin Minsky (2000). *Deep issues: commonsense-based interfaces*. Communications of the ACM 43(8):66-73.

Jeff Bradshaw (1997). *Software Agents*. Cambridge, MA: The MIT Press.

Donald A. Norman (1988): *The Psychology Of Everyday Things*. New York, NY: Basic Books Inc.

Douglas B. Lenat and Ramanathan V. Guha (1990). *Building Large Knowledge-Based Systems: Representations and Inference in the CYC Project*. Reading, MA: Addison Wesley.

Douglas B. Lenat (1995). *Cyc: A Large-Scale Investment in Knowledge Infrastructure.* Communications of the ACM, 38(11):32-38.

Douglas B. Lenat (1998). *The dimensions of Context space.* Austin, TX: Cycorp.

Mark J. Stefik and Stephen W. Smoliar (1993). *The Commonsense Reviews* – Eight reviews of: Douglas Lenat and Ramanathan V. Guha (1990) Building Large Knowledge-Based Systems: Representations and Inference in the CYC Project, Addison-Wesley, and Ernest Davis, Representations of Commonsense Knowledge, Morgan Kaufmann 1990. Artificial Intelligence, 61: 37-179.

Ramanathan V. Guha and Douglas B. Lenat (1993). *Response: Re: CycLing paper reviews.* Artificial Intelligence 61:149-174.

Ramanathan V. Guha and Douglas B. Lenat (1994). *Enabling agents to work together.* Communications of the ACM, 37(7):127-142.

Push Sing (2001). *The Public Acquisition of Commonsense Knowledge*. Paper submitted to KCAP 2001.

Openmind Commonsense - Teaching computers the stuff we all know. Web site, URL http://commonsense.media.mit.edu/

Erik Muller (1999): *Prospects for in-depth story understanding by computer.* Unpublished paper.

Erik Muller (1999): *A database and lexicon of scripts for ThoughtTreasure.* Unpublished paper.

Erik Muller (2000). *A calendar with common sense*. Proceedings of the 2000 International Conference on Intelligent User Interfaces. New York, NY: Association for Computing Machinery.

Roger Schank (1995). *Information is Surprises*. Chapter 9 from John Brockman (ed.) *The Third Culture: Beyond the Scientific Revolution*. New York, NY: Simon and Schuster.

Tim Berners-Lee, James Hendler, and Ora Lassila (2001). *The Semantic Web.* Scientific American Volume 284, Number 5, May 2001, pp. 34-43.

Tim Berners-Lee (1998). *Semantic Web Road map.* Web document, online at URL http://www.w3.org/DesignIssues/Semantic.html

Tim Berners-Lee (1998). *What the Semantic Web can represent.* Web document, online at URL http://www.w3.org/DesignIssues/RDFnot.html

Selected papers from the *Common Sense 2001: 5th Symposium on Logical Formalizations of Commonsense Reasoning*. May 20-22, 2001.

Stuart C. Shapiro, Eyal Amir, Henrik Grosskreutz, David Randell, and Mikhail Soutchanski (2001). *Commonsense and Embodied Agents: A Panel Discussion*. Common Sense 2001: 5th Symposium on Logical Formalizations of Commonsense Reasoning, May 20-22, 2001.

Sheila McIlraith and Tran Cao Son (2001). *Adapting Golog for Programming the Semantic Web*. Common Sense 2001: 5th Symposium on Logical Formalizations of Commonsense Reasoning, May 20-22, 2001.

Eyal Amir and Pedrito Maynard-Reid II (2001). *LiSA: A Robot Driven by Logical Subsumption*. Common Sense 2001: 5th Symposium on Logical Formalizations of Commonsense Reasoning, May 20-22, 2001.

Selected papers from the Intelligent User Interfaces IUI conferences 1999–2001.

Yuri Gawdiak, Jeffrey M. Bradshaw, Williams, B., and Hans Thomas (2000). *R2D2 in a softball: The Personal Satellite Assistant.* In H. Lieberman (ed.), Proceedings of the ACM Conference on Intelligent User Interfaces IUI 2000, pp. 125-128.

Mark Maybury (1999). *Intelligent User Interface: an Introduction*. Proceedings of the 1999 International Conference on Intelligent User Interfaces IUI '99.

Selected chapters from Mark T. Maybury and Wolfgang Wahlster (eds.) (1997) *Readings in Intelligent User Interfaces*. Menlo Park, CA: Morgan Kaufmann.

Henry Lieberman and Ted Selker (2000). *Out of context: Computer systems that adapt to, and learn from, context.* IBM Systems Journal Vol. 39, Nos. 3 & 4, pp. 617-632.

Jeffrey M. Bradshaw, Maarten Sierhuis, Yuri Gawdiak, Hans Thomas (2000). *Human-Centered Design for the Personal Satellite Assistant*. Unpublished paper.

Thomas Längle, Thomas Hoeniger and Lanjuan Zhu (1997). *Cooperation in Human-Robot-Teams.* Unpublished paper.

Thomas Lüth and Jürgen Bier (1999): *Robot Assisted Intervention in Surgery.* In J.M. Gilsbach and H.S. Stiehl (eds.) *Neuronavigation – Neurosurgical and Computer Scientific Aspects*, New York, NY: Springer.

Eva Stopp, Klaus-Peter Gapp, Gerd Herzog, Thomas Längle, and Tim C. Lüth (1994). *Utilizing Spatial Relations for Natural Language Access to an Autonomous Mobile Robot*. Unpublished paper.

Thomas Längle, Tim C. Lüth, Eva Stopp, Gerd Herzog, and Gjertrud Kamstrup (1995). *KANTRA – A Natural Language Interface for Intelligent Robots.* International Conference on Intelligent Autonomous Systems, Karlsruhe, Germany, March. In Rembold et al. (eds.), *Intelligent Autonomous Systems*, IOS Press, pp. 357-364.