

EEL-5840 Elements of {Artificial} Machine Intelligence

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- Introduction
- Syllabus
- Grading: Last 3 Yrs Class Average = 3.5 (3.45 Fall 2007; 3.54 Fall 2008 w/ 54 students)
- General Comments

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■ Machine Intelligence vs. Artificial Intelligence?

■ DEF: Artificial Intelligence

- (Rich, UT) The study of how to make computers do things at which, presently, people are better.
- (Nilsson, Stanford) Intelligent behavior in artifacts. Intelligent behavior involves: perception, reasoning, learning, communicating, and acting in complex environments.
- (Winston, MIT) The study of the computations that make it possible to perceive, reason, and act.

■ DEF: Machine Intelligence

- (Arroyo) The ability to build machines that exhibit a high degree of sophistication and can operate autonomously in "their" environment. For example, a roach is a highly intelligent insect, a "roach-like" machine would also be considered "intelligent". Computer intelligence grounded in reality - what can be realized.

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■ AI has as one of its long-term goals the development of machines that can do these things as well as humans can, or possibly better.

■ Another goal is to understand intelligent behavior whether it occurs in machines or in humans or other animals.

■ Computer systems have been built that perform symbolic integration, perform medical diagnosis, prospect for oil, design and troubleshoot electronic circuits, play chess, and understand limited amounts of speech and natural language. These systems possess a degree of "artificial intelligence" but do not display what we call "machine intelligence." They are NOT grounded in reality.

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■ (Some) APPLICATION AREAS OF MACHINE INTELLIGENCE.

- Mathematics
 - Dynamic Programming
 - Non-linear Dynamic
 - Gradient Search Techniques
 - Fuzzy Logic
 - Markov Processes
 - Chaos
 - Opinion-Guided Reaction
- Psychology
 - Conditioned Responses
 - Stimulus Reinforcement
- Ethology

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■ (Some) APPLICATION AREAS OF MACHINE INTELLIGENCE.

- Reactive Behavior
 - No memory
- Behavior with Memory
- Reinforcement Learning
 - Supervised
 - Unsupervised
- Evolutionary Learning
 - Genetic Algorithms
- Gradient Search Techniques
 - Temporal Differences
 - Reinforcement & Q-Learning
 - Neural Networks

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Nilsson: "Projecting present trends into the future, I think there will be new emphasis on integrated, autonomous systems—robots and "softbots." The constant pressure to improve the capabilities of robot and software agents will motivate and guide AI research for many years to come" pp. 11

The End!

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