Problem Set 1: Artificial Intelligence

1) Introduction, history

Read Turing's original paper (Turing, 1950 - available on the course web site). In the paper, he discusses several potential objections to his test for intelligence. Which objections still carry some weight? Are his refutations valid? Can you think of new objections arising from developments since he wrote the paper? In the paper, he predicts that by the year 2000, a computer will have a 30% chance of passing a five-minute Turing Test with an unskilled interrogator. What chance do you think a computer would have today? Provide some justification for your answers.

Every year the Loebner prize is awarded to the program that comes closest to passing a version of the Turing test. Research and report on the latest winner of the Loebner prize.

What techniques does it use? How does it advance the state of the art in AI?
http://www.loebner.net/Prizef/loebner-prize.html

Also evaluate current deep learning systems for question answering.
https://rajpurkar.github.io/SQuAD-explorer/

Max: 1-page.

2) AI Grand Challenge Topics

Visit the aaai.org Grand Challenges Web site and select an AI Topic that you find interesting and that you believe provides a Grand Challenge problem (see criteria below):
http://www.engineeringchallenges.org/challenges.aspx

https://www.datanami.com/2018/03/13/jeff-dean-thinks-ai-can-solve-grand-challenges-heres-how/

Justify your selected AI Topic by stating how well it satisfies the criteria for a Grand Challenge problem.

Grand Challenge Criteria

- *Clear and compelling demonstration of cognition*
  - Non-gameable proxy for a range of problems requiring cognitive capabilities
- *Clear and simple measurement*
  - Success is well-defined
- *Decomposable and diagnostic*
  - Partial results; failure should point to way to needed improvement
- *Ambitious and visionary, but not unrealistic*

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    - Faith in success in 10 - 20 years
- *Compelling to the general public*
    - *Impact*
- *Motivating for the research community*
    - *Interesting line of research.*

Max: 1-page.

3) Biologically inspired computing

Identify one method of biologically inspired computing and an application for using this method to solve an interesting or useful application. Explain why you thing this method is useful and interesting. What is it about this model of computation that you believe has the potential to move beyond our traditional model of computation (Turing model), i.e., what it is about biologically inspired computing methods that is different from our prescriptive approach to programming of identifying a problem, developing a specific algorithm to solve that problem, etc. Methods can include but are not limited to evolutionary systems such as genetic algorithms, cellular automata, neural computation models, swarm intelligence, particle swarm optimization, and artificial immune systems.

Read Josh Bongard's IEEE Computer Society article on Biologically Inspired Computing available in the course outline for an introduction. You may also wish to review other articles posted in the course outline for this week. John Markoff's NY Times article provides a basic introduction to Deep Learning networks. Consider how deep learning networks inspired by biology. Feel free to use other Internet sources as well.

Max: 1-page.

Submission:
Submit _one_ PDF file with your name, class, and problem set number to Blackboard, and submit a paper version in class. See course outline for due dates.