

CS6700 Advanced AI

Prof. Carla Gomes

Prof. Bart Selman

Projects

Very open-ended

Go for BIG ideas! (No such thing as “failure.”

Empirically driven building on foundational insights.)

E.g.

Can you evolve a language from scratch?

Can you learn from “reading”? (E.g. game play from text on discussion boards)

Mechanical Turk --- Human-computing hybrids

Mine info from twitter feeds

Boost game play via “mimicry”

Projects

Cont.

Deep learning: still many “mysteries”

E.g. Google’s alphaGo example of successful reinforcement learning using deep nets **but** what about deep learning chess through self-play?

Student project 4701 last semester: works reasonably but hits a limit; end game: can’t figure out it needs to checkmate the opponent! Can we explain this? Fix this?

Scientific discovery --- in discrete math and materials science. (Slides: “Non-Human Intelligence”)



AI Knowledge-Data-Inference Triangle

NLU

Computer Vision

20+ yr GAP!

Google's Knowl. Graph

Watson

Google Transl.

Siri

Google Search (IR)

Machine Learning

Iamus

Verification

Dr. Fill

Robbin's Conj.

4-color thm.

Deep Blue

Semantic Web

Inference/Search Intensive

Data Intensive



Knowledge or Data?

Last 5 yrs: New direction.

Combine a few general principles / rules (i.e. knowledge) with training (ML) on a large expert data set to tune hundreds of model parameters. Obtain world-expert performance using inference.

Examples:

- IBM's Watson / Jeopardy
- Dr. Fill / NYT crosswords
- lamus / Classical music composition
- Google's alphaGo (deep learning)
- computer vision (deep learning)
- language translation (deep learning)

Performance: (several) Top 50 or better in the world!

Is this the key to human expert intelligence?