

Computer Vision



"man in black shirt is playing guitar."



"construction worker in orange safety vest is working on road."



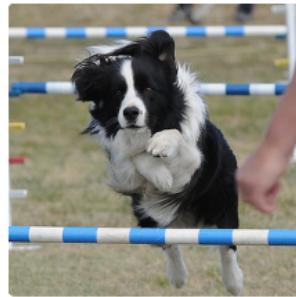
"two young girls are playing with lego toy."



"boy is doing backflip on wakeboard."



"girl in pink dress is jumping in air."



"black and white dog jumps over bar."



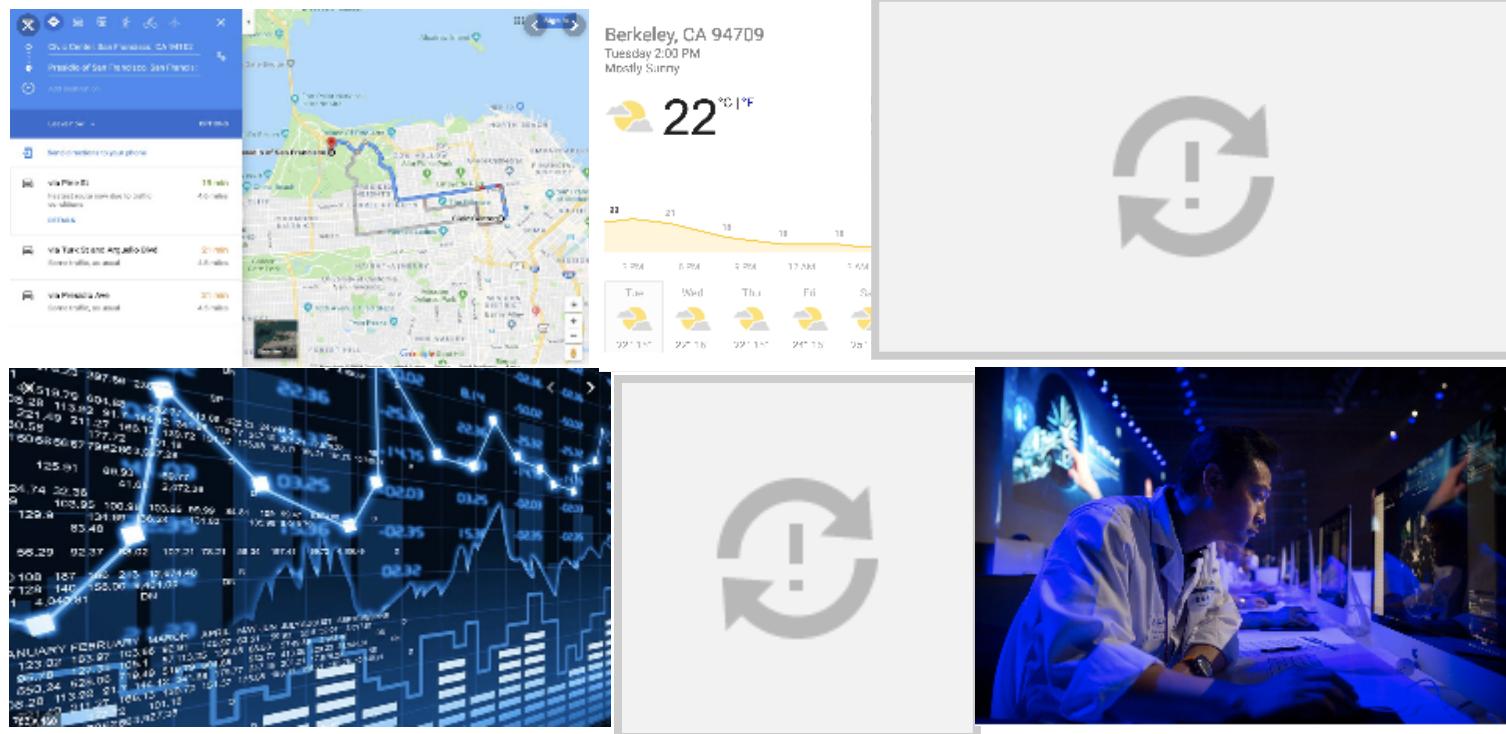
"young girl in pink shirt is swinging on swing."



"man in blue wetsuit is surfing on wave."

Karpathy & Fei-Fei, 2015; Donahue et al., 2015; Xu et al, 2015; many more

Tools for Predictions & Decisions



Game Agents

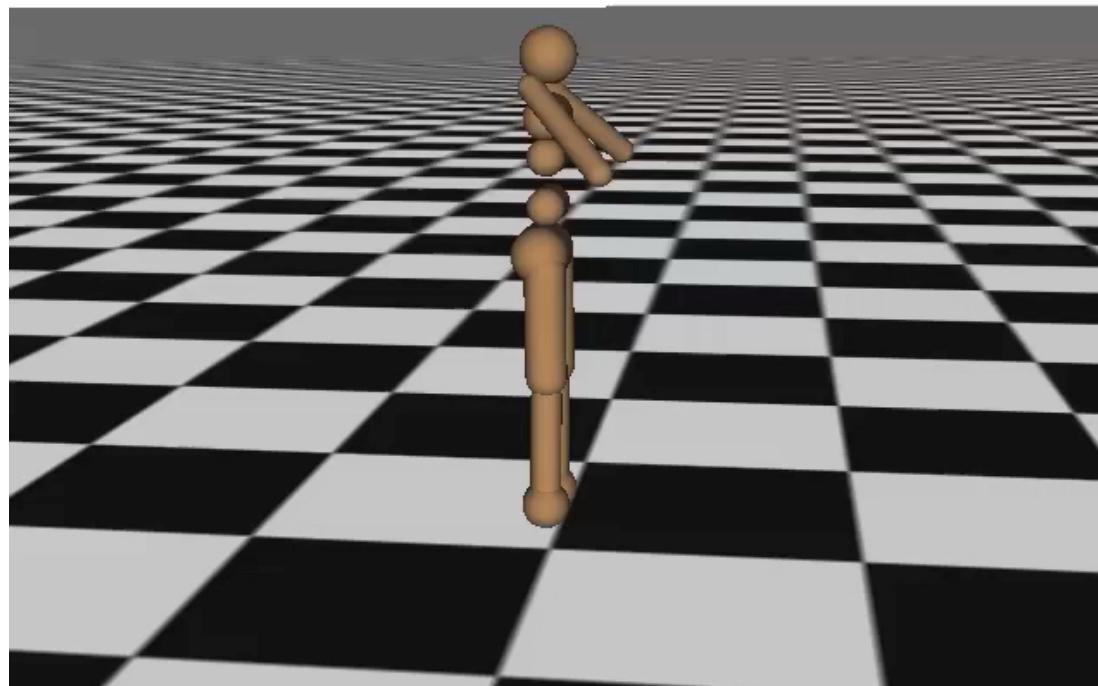
- o Classic Moment: May, '97: Deep Blue vs. Kasparov
 - o First match won against world champion
 - o “Intelligent creative” play
 - o 200 million board positions per second
 - o Humans understood 99.9 of Deep Blue's moves
 - o Can do about the same now with a PC cluster
- o 1996: Kasparov Beats Deep Blue
 - “I could feel --- I could smell --- a new kind of intelligence across the table.”
- o 1997: Deep Blue Beats Kasparov
 - “Deep Blue hasn't proven anything.”



Text from Bart Selman, image from IBM's Deep Blue pages

Simulated Agents

Iteration 0



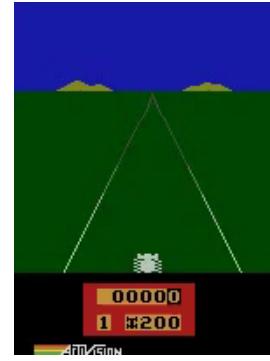
[Schulman, Moritz, Levine, Jordan, Abbeel, ICLR 2016]

Game Agents

- o Reinforcement learning



Pong



Enduro



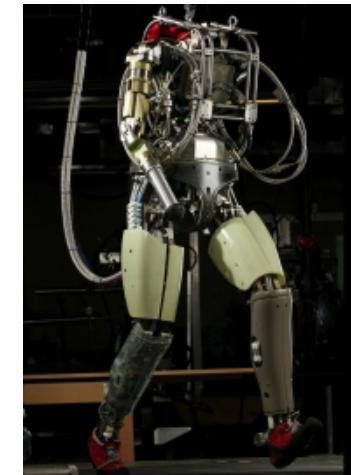
Beamrider



Q*bert

Robotics

- o Robotics
 - o Part mech. eng.
 - o Part AI
 - o Reality much harder than simulations!
- o Technologies
 - o Vehicles
 - o Rescue
 - o Help in the home
 - o Lots of automation...
- o In this class:
 - o We ignore mechanical aspects
 - o Methods for planning
 - o Methods for control



Images from UC Berkeley, Boston Dynamics, RoboCup, Google

Demo 1: ROBOTICS – soccer.avi Demo 4: ROBOTICS – laundry.avi
Demo 2: ROBOTICS – soccer2.avi Demo 5: ROBOTICS – petman.avi
Demo 3: ROBOTICS – gcar.avi

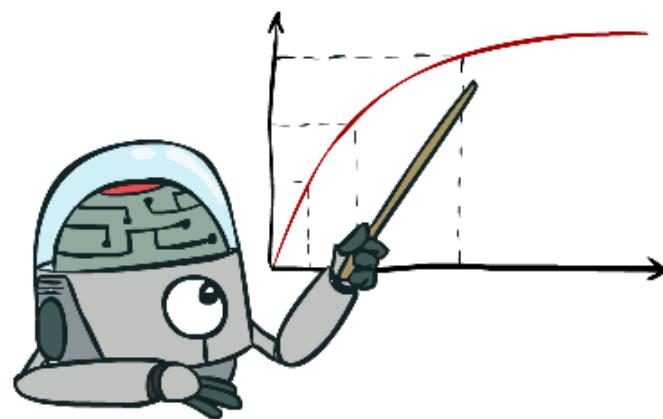
Robots



Human-AI Interaction



Maximize Your Expected Utility



Utility?

Clear utility function



Not so clear utility function

