Lecture 3:
What is AI?

Artificial Intelligence
CS-GY-6613-I

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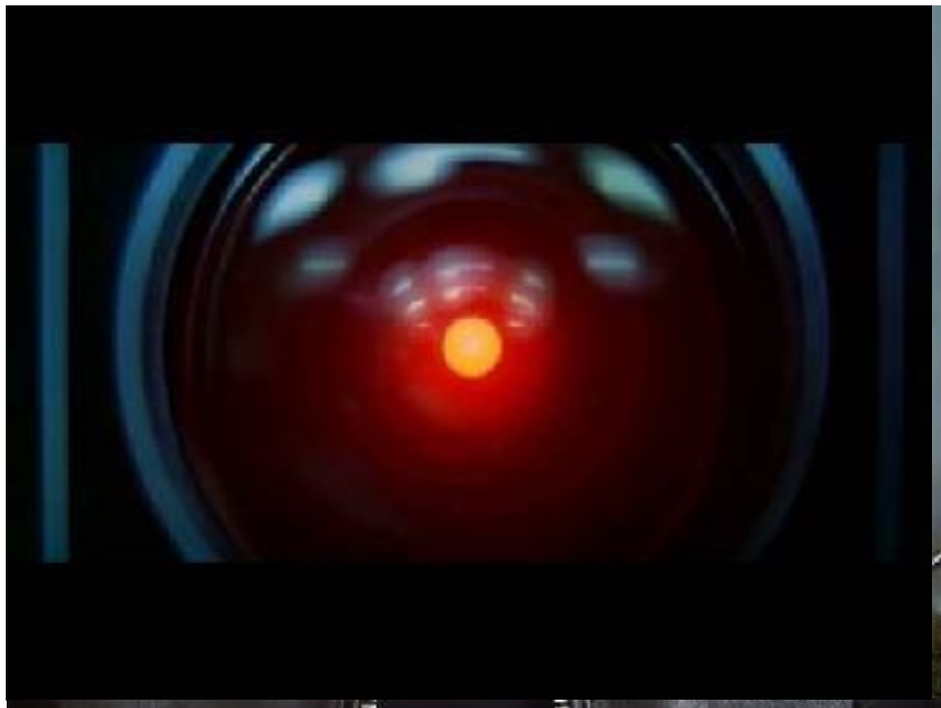
Artificial Intelligence



What is AI?

“the study and design of intelligent agents”

“a branch of computer science dealing with the simulation of intelligent behavior in computers”

“the quest to make machines able to perform tasks which normally require human intelligence”

“any kind of computer science method that doesn’t work well yet; when it works, it’s not AI”

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THIS ONE WEIRD THING...

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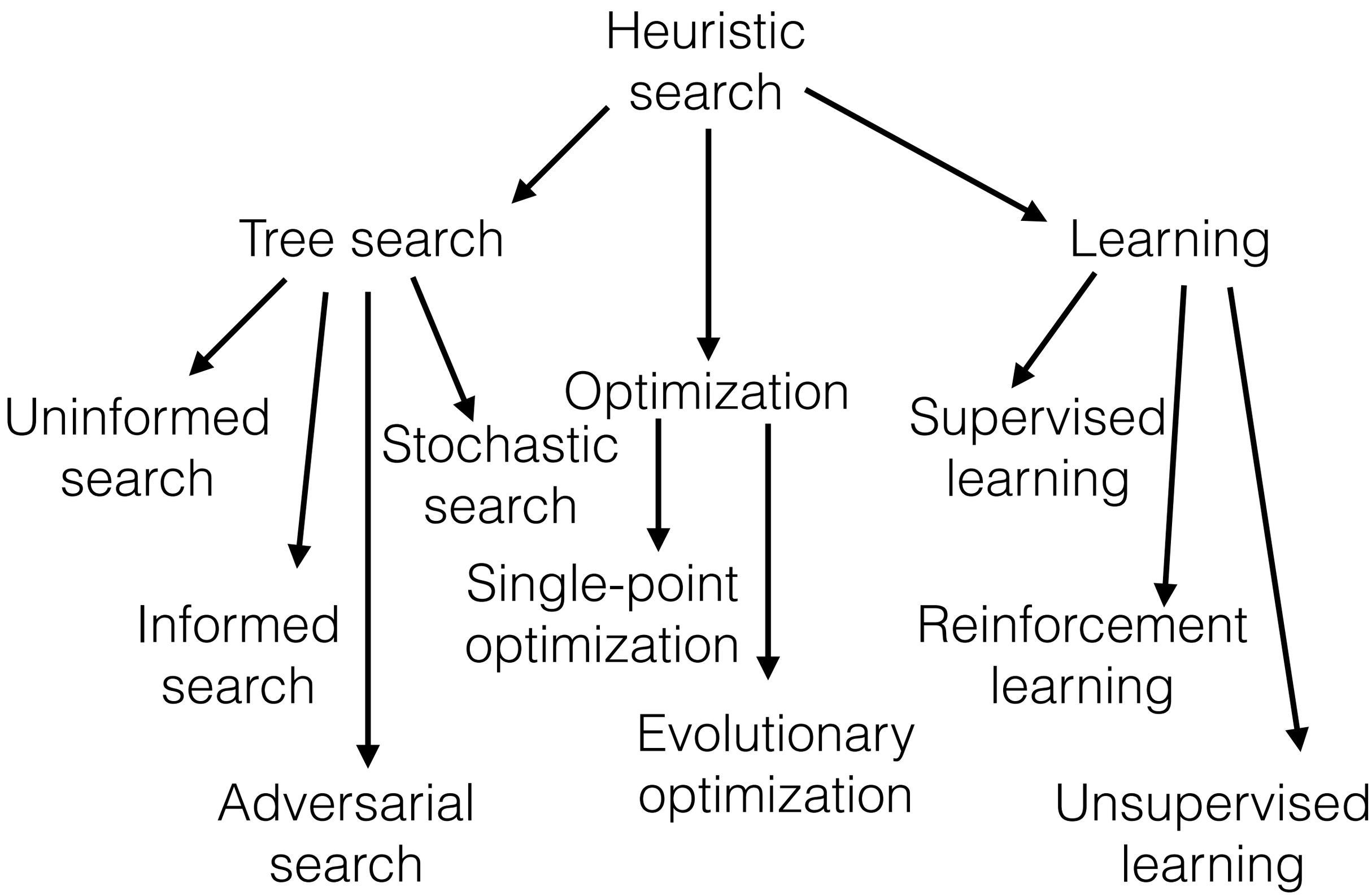
It’s all just search

AI as search

- Search for plans, strategies, policies, models, objects, proofs…

- In general, *heuristic* search rather than exhaustive search


Heuristic search
Tree search
Optimization
Learning
Uninformed search
Informed search
Stochastic search
Adversarial search
Single-point optimization
Evolutionary optimization
Supervised learning
Reinforcement learning
Unsupervised learning

Course overview 2.0:

It’s all just search

Sep 9: What is AI?

- Overview and history of the field
- Problem solving as search
- Applications of AI, particularly games and robotics

Sep 14: Uninformed search

- Breadth-first
- Uniform cost
- Depth-first
- Iterative deepening

Sep 21: Informed search and optimization

- A*
- Heuristics
- Hill-climbing
- Simulated annealing

Sep 28: Evolutionary search

- Evolution strategies
- Genetic algorithms
- Genetic programming
- Crossover, mutation
- Fitness landscapes

Oct 5: Adversarial search

- Minimax
- Alpha-beta pruning
- Evaluation functions
- Chance nodes

Oct 12:
Monte Carlo Tree Search

- Exploration and exploitation
- The UCB1 formula
- Rollouts

Oct 19: Supervised learning intro

- Active and lazy learning
- Linear discriminant functions
- Perceptrons
- Neural networks
- *Searching for functions that predict a target/class from features in a set of input data*

Oct 26: Decision trees

- Human-interpretable models
- The ID3 algorithm
- *Searching for decision trees*

Nov 2: Neural nets with backpropagation

- Multi-layer networks
- Nonlinear transfer functions
- The backpropagation algorithm
- *Searching for complex nonlinear predictive models through gradient descent*

Nov 9:
Reinforcement learning

- Policy search
- Temporal difference learning
- *Searching for policies that solve a problem*

Nov 16: Clustering

- Unsupervised learning
- k-Means
- hierarchical approaches
- *Searching for clusters that effectively and naturally partition data*

Nov 23: Philosophical perspectives

- Philosophical foundations of artificial intelligence
- Intelligence versus consciousness
- Superintelligence
- Are you a robot?
- Questions and answers on course content