



# **CS1001**

## Lecture 25

# Overview

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- Homework 4
- Artificial Intelligence
- Database Systems

# Reading

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- Brookshear, 11
- Brookshear, 10
- Brookshear, 9

# Homework 4

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- Check Courseworks
- Problems based on
  - Handout (Smullyan, Natural Deduction)
  - Question from Ch. 10
  - Question from Ch. 11

# Artificial Intelligence

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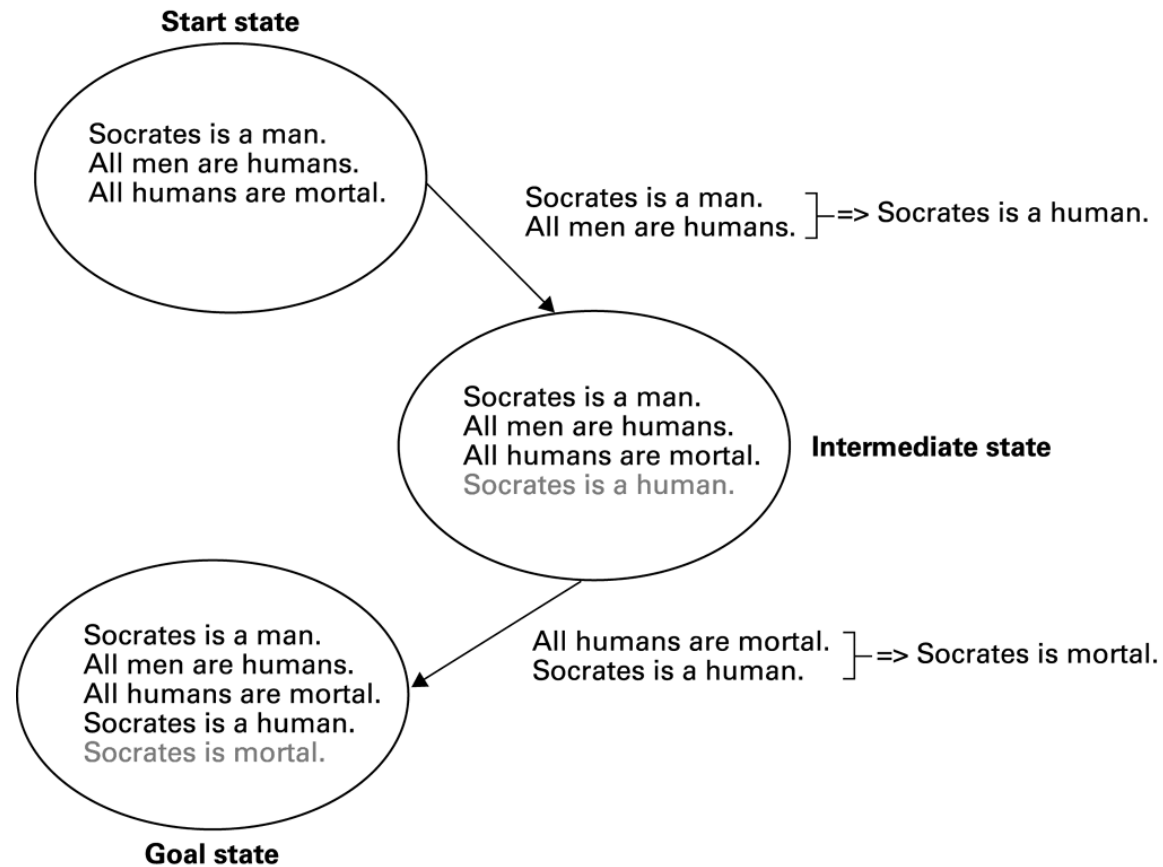
- Reasoning (Production Systems)
  - Goal is to *derive* a solution given facts and rules
- Searching
  - You are given facts and rules and *search* all possible combinations to find some desired solution (usually minimum/max)
- Heuristics
  - Operate based on guidelines you know to be true about a problem

# Paradigms in AI

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- “Top Down”
  - Describe intelligent behavior as rule sets
  - Define behavior at the highest level and refine as need be
  - Examples: most production systems, expert systems
- “Bottom Up”
  - Define very basic behavior of “agents”
  - Describe simple rules of how these agents interact
  - Simulate interactions on a grand scale

# A Production System



# Genetic Algorithms

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- A “Bottom Up” approach
- Create simple logic and rules for interactions
- Essentially, a GA is a program that *writes and alters* other programs. It then simulates those programs and evaluates their performance
- <http://math.hws.edu/xJava/GA/>
- <http://users.ox.ac.uk/~quee0818/ts/ts.html>



# Expert Systems

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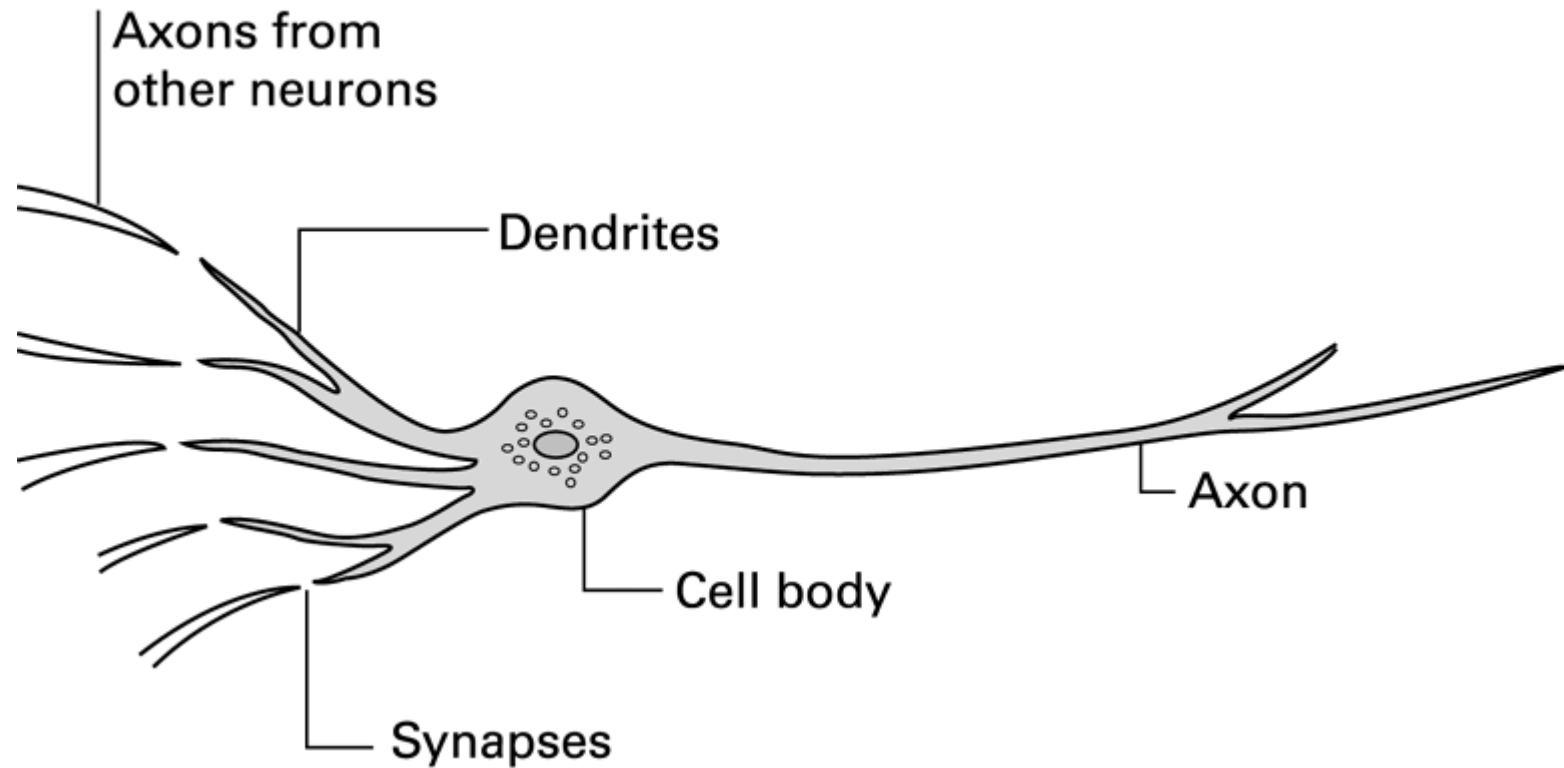
- Expert systems are a strict set of rules
- These rules allow for drawing conclusions from an initial set of facts
- Propositional logic *could* be used as the mathematical system behind an expert system
- Example: If a patient has a Hematocrit reading of 8, he/she has severe Anemia

# Neural Networks

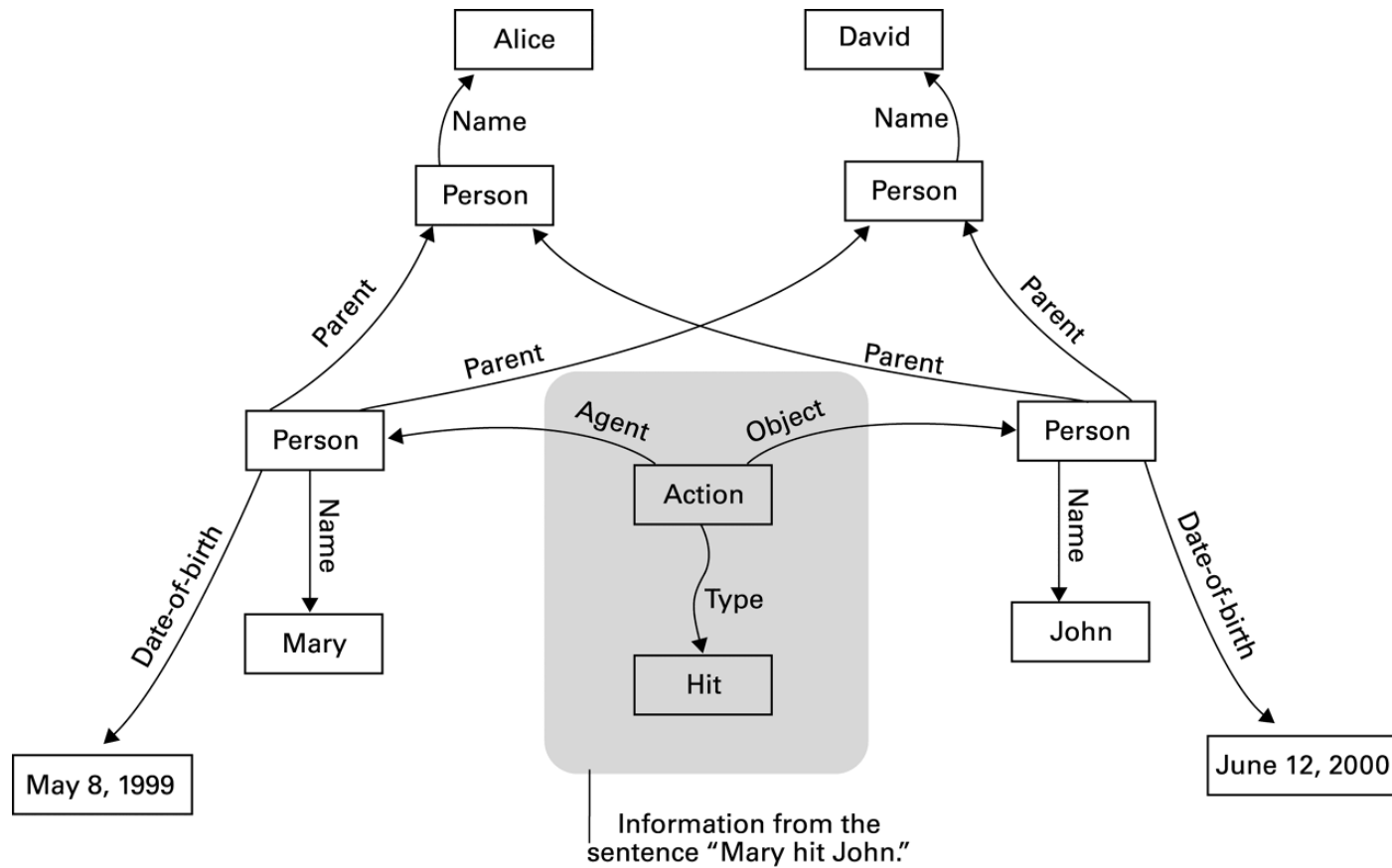
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- Neural networks are based on the biological function of brain neurons (sort of)
- This is a *learning* model, whereby the model can be *trained* and updated over time

# Neural Networks



# Semantic Networks



# Blackboard Systems

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- Blackboard systems contain all sorts of subsystems that we've seen so far
- They are a metaphorical area for different AI systems to exchange predictions and vote on a consensus as a whole