

# Artificial Intelligence Overview

## Logic Programming *weeks 2 & 3*

### Propositional logic e.g. $(A \wedge B) \rightarrow C$

*Proofs, truth tables, proof procedures.*

### Predicate calculus e.g. $\text{likes}(\text{bob}, X)$

*Constants, functions, predicates, variables, relationships, unification.*

### Backtracking

*Tracing steps backwards to re-satisfy goals.*

## Artificial Neural Networks *weeks 4 & 5*

### Neurons

*Dendrites/input, axons/output, synapses/connections, strength thresholds.*

### Training

*Data in  $\rightarrow$  output  $\rightarrow$  comparison  $\rightarrow$  weights modified.*

### Single layer

*Linear combination, activation function, bias, weights, linear.*

### Multi-layer

*Input, hidden, and output layers, non-linear, many uses, parallel/real-time.*

## Games as a Context for AI *week 6*

### Specifications

*Quick/real-time, predictable resources, understandable behaviour.*

### Pathfinding

*Breadth/depth first searches, node graphs.*

## Dijkstra's Algorithm *week 7*

### Key ideas

*Planning, divide and conquer, all possible paths, general graphs.*

### Method

*Find lowest cost, close that node, re-estimate neighbour costs, then update and link.*

## **Limitations**

*Entire solution in advance, does not react to changes or other moving objects.*

## **A\* and Further Optimisations** *week 8*

### **Heuristics**

*Manhattan, diagonal, or Euclidian distance.*

### **Optimisations**

*3D map conversion, path patching, pre-calculating, symmetry.*

## **AI Planning** *weeks 9 and 10*

### **Requirements**

*Initial and goal states, actions, preconditions, effects, parameters.*

### **Heuristic functions**

*Informed searching.*

## **Bayesian Reasoning** *week 14*

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