CT421 Artificial Intelligence

- The area has evolved and changed many times over the years
- Changing focus on both problems and the approaches
- Many problems that were considered typical AI problems are now often considered to be in different fields.
- Many difficulties in defining intelligence

Intelligence?

- Turing test - Computing Machinery and Intelligence (Turing, 1950)
- Attempts to give an objective notion of intelligence
- Abstracts away from any notions of representation, awareness etc.
- Tries to eliminate bias in favour of living beings by focusing solely on content of questions and answers
- Many criticisms:
  - Bias towards symbolic problem-solving criticisms;
  - Doesn't test many aspects of human intelligence;
  - Possibly constrains notions of intelligence

Sub-fields:

- Game playing
- Automated Reasoning
- Expert Systems
- Natural Language Processing (understanding, generation)
- Planning
- Robotics
- Machine Learning
- Neural nets/deep learning
- Evolutionary Computation

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Approach: Classical AI approaches

- Predicate calculus (and others) and logical inference used to infer or find new information
- Powerful approach for many domains
- Issues arise with dealing with noise or contradictory data

Approach: Machine learning

- Learning from data
- Distributed representation of learned information
- Typified by neural networks and deep learning approaches

Approach: Agent based Systems

- Social systems provide another metaphor for intelligence in that they exhibit global behaviours that enable them to solve problems that would prove impossible for any of the individual members.
- Intelligence is viewed as a collective emergent behaviour from a large number of simple interacting individuals or agents

Properties of agent based systems/artificial life

- Agents are autonomous or semi autonomous
- Agents are situated
- Agents are interactional
- Society is structured
- Intelligence is emergent

Topic 1: Search

- Basic search strategy
- Heuristic Search; A*;
- Minimax, Alpha-beta Pruning;
- Others: GAs, simulated annealing

Topic 2: Multi-Agent Systems/Artificial Life

- Agent based systems; approaches
- Game theory and reasoning
- Artificial Life and distributed AI

Topic 3: Learning: Neural networkds, Deep learning

- Neural Networks
- Deep Learning - sequential processing; CNNs
- Application/uses

Course assessment

- End of year exam 60%
- Two projects: 20% each