UNIT OVERVIEW

CITS4404
Artificial Intelligence & Adaptive Systems
Unit overview

- Artificial Intelligence
- Adaptive Systems
- Computational Intelligence

Nature-inspired, heuristic-based technologies, that demonstrate emergent, adaptive, or intelligent behaviour
Contd.

- **Nature-inspired**: ideas taken from observations of natural systems
- **Heuristic-based**: solutions constructed using guidelines, estimates, trends, …
- **Emergent behaviour**: systems behave in ways that aren’t or can’t be predicted in advance
- **Adaptive behaviour**: systems behave differently depending on contextual or environmental factors
- **Intelligent behaviour**: ??
CITS4404 will introduce several core CI technologies, e.g.

- Evolutionary algorithms
- Particle swarm optimisation
- Ant colony optimisation
- Neural networks
- Market-based optimisation

- Learning classifier systems
- Artificial immune systems
- Fuzzy reasoning
- Bayesian reasoning

These are “heavyweight” technologies, usually applied to
- Complex optimisation problems
- Adaptive learning
- Knowledge acquisition

Applying these technologies is not like calling quicksort!
Reading units

• CITS4404 is a reading unit
  • We will not teach you the material
  • We will assist you in learning the material
• The emphasis is on self-learning and self-investigation, where students find and apply information themselves
• You should still expect to average 10–12 hours/week, as normal for a 6-point unit
Unit structure

- Three lectures that introduce
  - The CI concept
  - The technologies
  - Practical issues
- Students are then divided into groups
- Each group is assigned one of the CI technologies and they
  - Present seminar(s) on their technology
  - Apply their technology to an interesting problem
- All students are expected to develop a basic understanding of all the technologies in the unit
- One final lecture on local research in the CI area
Background research

• All students will be given some introductory references on each technology
• These papers will introduce/summarise the topic, but they will be insufficient for a complete understanding
• Each group is expected to research their technology in more detail than provided by these papers
The group seminars

- Seminars in Weeks 5–6 on the technologies
- Seminars in Weeks 7–8 on applications

- Do not assume any prior knowledge of the technology
- Maintain a balance between overview and technical details
- Ideas should build upon each other successively
- Pictures, diagrams, videos, and demos are all good!
Contd.

- Seminars will be assessed on
  - Understanding of the technical material
  - Breadth of coverage
  - Quality of the presentation

- All group members should contribute to all aspects
- Don’t be afraid to include other people’s material
  - But all such material should be attributed properly
- Slides should be emailed to the coordinator after the seminar
The project

• The project will be introduced in Week 8
• Groups will apply their technology to a real-world problem chosen by them as suitable for that approach
• Week 9: groups present their chosen problem to the class
• Weeks 12–13: groups present their results to the class
• Week 13: written submission due
  • A report on your chosen problem
  • Its solution using your technology
  • The structure, implementation, and performance of your solution
• Again, all group members should contribute to all aspects
• More details on the project will be released in due course
The exam

- A final exam in November
- More details on the exam will be released in due course