School of Computer Science and Engineering

COMP4418: Knowledge Representation and Reasoning

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Lecturers:

* Haris Aziz (K17-L3; Haris.Aziz@unsw.edu.au)

* Maurice Pagnucco (J17-501B; morri@cse.unsw.edu.au)

* Abdallah Saffidine (Lecturer-in-Charge; K17-501B; abdallahs@cse.unsw.edu.au)

Aim: Introduce

* Techniques used in KR to represent knowledge

* Associated methods of automated reasoning

Units of Credit: 6

Prerequisites: COMP3411 plus 6 Units of Credit in COMP3###

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Marking: 3 assignments of equal value (15%) and final exam work 55%.

No project but some programming

Text: References provided in class

Format:

- Lectures:
    - Tuesdays 4-6pm, Online
    - Thursdays 4-6pm, Online
    - Lectures posted online before class. Part of class time used for interactive sessions.
- Consultations: as required

Course Structure:

- 3 weeks: Introduction to KRR.
- 3 weeks: Resource allocation, social choice, and cooperative game theory.
- 3 weeks: Non-monotonic reasoning, reasoning about action.
- Note Week 6 is Flexibility Week and there will be no lectures held that week.

Topics for KRR Part 1: Introduction:

- Introduction to KRR

- First-order logic

- Expressing knowledge

- Full Clausal logic

- Horn Clause logic

- Procedural representation

- Nonmonotonic reasoning and defaults

Topics for KRR Part 2: Algorithmic Decision Theory

– Multi-agent Resource Allocation: allocation problems; efficiency concepts; fairness concepts; representation of preferences; mechanisms; allocation under endowments; allocation under priorities; allocation of divisible items

– Social Choice Theory: voting rule; impossibility results; axiomatic approach; tournament solutions; domain restrictions; randomization

– Cooperative Game Theory: solution concepts; stability; core, Shapley value, computational of payoffs, computational issues

Topics for KRR Part 3: Non-monotonic reasoning, reasoning about actions

– Introduction to Answer Set Programming

– Solving problems with Answer Set Programming

– Reasoning about Actions