COMP694 (2019/20)	**Artificial Intelligence**	**Contribution 100% of course**
Module Leader Dr Jixin Ma	**Artificial Intelligence Coursework**	**Deadline Date Monday 06/12/2019**
This coursework should take an average student who is up-to-date with tutorial work approximately 50 hours Feedback and grades are normally made available within 15 working days of the coursework deadline		
Learning Outcomes: A. Understand and use typical representation schemas as representation and reasoning strategies for AI (formal and statistical, e.g., temporal/spatial representation, Bayesian inference); B. Understand the main principles and search algorithms; C. Understanding the relevance of the main AI techniques to a set of practical applications.		

Plagiarism is presenting somebody else's work as your own. It includes: copying information directly from the Web or books without referencing the material; submitting joint coursework as an individual effort; copying another student's coursework; stealing coursework from another student and submitting it as your own work. Suspected plagiarism will be investigated and if found to have occurred will be dealt with according to the procedures set down by the University. Please see your student handbook for further details of what is / isn't plagiarism.

All material copied or amended from any source (e.g. internet, books) must be referenced correctly according to the reference style you are using.

Your work will be submitted for plagiarism checking. Any attempt to bypass our plagiarism detection systems will be treated as a severe Assessment Offence.

Coursework Submission Requirements

- An electronic copy of your work for this coursework must be fully uploaded by the Deadline Date of Monday 06/12/2019, using the link on the coursework Moodle page for COMP1694.
- For this coursework you must submit a single PDF document. In general, any text in the document must not be an image (i.e. must not be scanned) and would normally be generated from other documents (e.g. MS Office using "Save As .. PDF"). An exception to this is hand written mathematical notation, but when scanning do ensure the file size is not excessive.
- There are limits on the file size (see the relevant course Moodle page).
- Make sure that any files you upload are virus-free and not protected by a password or corrupted otherwise they will be treated as null submissions.
- Your work will not be printed in colour. Please ensure that any pages with colour are acceptable when printed in Black and White.
- You must NOT submit a paper copy of this coursework.
- All courseworks must be submitted as above. Under no circumstances can they be accepted by academic staff.

The University website has details of the current Coursework Regulations, including details of penalties for late submission, procedures for Extenuating Circumstances, and penalties for Assessment Offences. See http://www2.gre.ac.uk/current-students/regs

Detailed Specification

This coursework is to be done individually.

Deliverables

A report in terms of answers to the corresponding questions in the form of PDF should be uploaded by the Deadline Date of Monday 06/12/2019, using the link on the coursework Moodle page for COMP1694.

- **Grading/Assessment Criteria**

You will be assessed on the correctness and completeness of the coursework.

Grade	%	
I	70-100	The coursework is excellent/outstanding and is evidence of comprehensive knowledge, understanding and skills appropriate to the level of this course. There is also excellent evidence showing that all the learning outcomes and responsibilities appropriate to that level are satisfied.
II(i)	60-69	The coursework is (very) good and is evidence of the knowledge, understanding and skills appropriate to the level of this course. There is also good evidence showing that all the learning outcomes and responsibilities appropriate to that level are satisfied.
II(ii)	50-59	The coursework is sound and provides some evidence of the knowledge, understanding and skills appropriate to the level of this course. There is also certain evidence showing that most of the learning outcomes and responsibilities to that level are satisfied.
PASS	40-49	The coursework is acceptable but provides restricted evidence of the knowledge, understanding and skills appropriate to the level of this course. There is also acceptable but restricted evidence showing that all the learning outcomes and responsibilities appropriate to that level are satisfied.
FAIL	0-39	The coursework provides insufficient evidence of the knowledge, understanding and skills appropriate to the level of this course. The evidence provided shows that the majority of the learning outcomes and responsibilities appropriate to that level are unsatisfied.

Artificial Intelligence Coursework

1.
Select a single topic from Search Techniques, Deep Learning and Reinforcement Learning, and write a brief literature review report on it. You may make use of materials which you find in the lecture notes, textbooks and the Internet, but you should adapt them to your report and give full citations and references to sources each time copied material is used (**8 marks**). The main aim of the report is to provide your understanding, critical analysis and evaluation of the selected topic in terms of observations and/or application examples (**12 marks**). The report should be 3 pages using Times New Roman Font, 12 point, with 1.5 spacing, including references and Web/Book citations. Longer submissions will not be penalized but will not necessarily draw extra credit.

[20 marks]

2.
Write a research essay/report on temporal logics and/or their application in the domain of Artificial Intelligence. It can be about any relevant theoretical and / or practical topics, such as:

- Time Theories and / or Models
- Temporal Knowledge Representation and Management
- Temporal Data Mining or Case-Based Reasoning
- Time Series and / or State Sequences
- Temporal Database Management
- Reasoning about action, event and change
- Prediction / Planning
- Diagnosis / Explanation
- Industrial Process Control
- Historical Reconstruction
- Natural Language Understanding

etc., but only focusing on a SINGLE topic. You may make use of materials which you find in the lecture notes, textbooks and the Internet, but you should adapt them to your essay and give full citations and references to sources each time copied material is used. The contents of the essay/report must be related to the key words "Time" and/or "temporal", in terms of a well-presented literature review/survey (**8 marks**), together with your own understanding, observations, critical analysis and evaluation of temporal logics and/or their applications in the domain of Artificial Intelligence (**12 marks**). The essay/report should be around 5 pages using Times New Roman Font, 12 point, with 1.5 spacing, including references and Web/Book citations. Longer submissions will not be penalized but will not necessarily draw extra credit.

[20 marks]

3.

Assume that the universe of discourse is the set of people studying or working at the University of Greenwich. Rewrite the following statements in the form of predicate logic.

(a) Each person is either a student or a staff.

[2 marks]

(b) Each lecturer teaches some modules.

[2 marks]

(c) Some hard-working people are not boring.

[2 marks]

(d) Hard-working people are respectable.

[2 marks]

(e) Everyone knows some hard-working people.

[2 marks]

4.

(a) Use a truth table to verify the following equivalence:

$$A \wedge B \rightarrow C \cong \sim A \vee \sim B \vee C$$

[7 marks]

(b) List the four main representation schemas learnt from this course and give a typical example for each of them.

[8 marks]

5.

There are three men: two good men and one bad man. One of the good men is rich and the other is poor. Each of the two good men only makes statements which are true and the bad man only make statements which are false. Write down a statement which will guarantee that one of these persons who can make such a statement must be the rich good man. Please critically justify your answer by proving that it can be only made by the rich good man, but neither the poor good man, nor the bad man.

[10 marks]

6.

(a) State the axioms of probability.

[3 marks]

(b) Explain briefly why reasoning using probabilistic data is important in artificial intelligence.

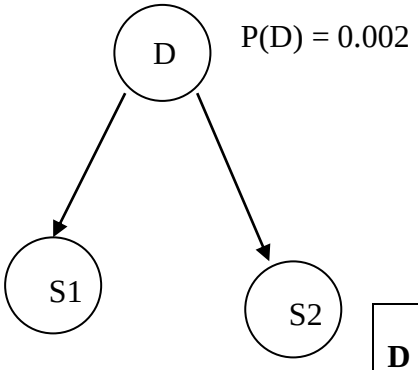
[4 marks]

(c) A disease D causes two symptoms S1 and S2 in an individual with probabilities P(S1|D), P(S2|D), by two independent mechanisms. Explain why the occurrence of the symptoms should be treated as independent *only* if it is known that the disease is present i.e. the relation P(S1, S2|D) = P(S1|D).P(S2|D) holds, but not P(S1, S2) = P(S1).P(S2).

[5 marks]

(d) Calculate the probability of a person having a disease D given that they are showing both symptoms S1 and S2, from the Bayes Network of Figure 2.

[13 marks]



D	**P(S2|D)**
T	0.7
F	0.04

D	**P(S1|D)**
T	0.3
F	0.01

Figure 2