Foundations of Artificial Intelligence

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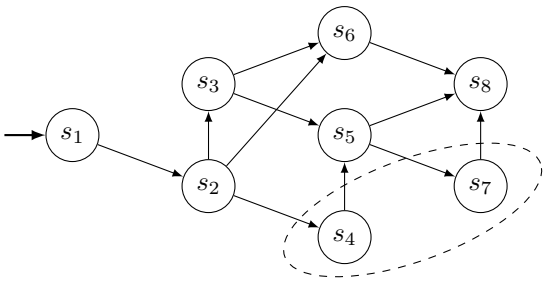
Exercise Sheet 3

Due: March 18, 2020

Important: For submission, consult the rules at the end of the exercise. Non-adherence to the rules will lead to your submission not being corrected.

Exercise 3.1 (1+1+1 marks)



Consider the search space depicted above (labels are omitted for clarity). Are the following statements correct? Justify your answer.

(a) Tree search expands a finite amount of nodes, no matter in which order nodes are expanded.

(b) If the algorithm continues exploring the search space after finding a goal (meaning the goal test is omitted and nodes are expanded until the open list is exhausted), tree and graph search expand the same number of nodes.

(c) With any expansion order, graph search finds a goal with less than 10 expansions.

Exercise 3.2 (1.5+1.5 marks)

Provide an example of a state space with the following property, or argue why such a state space cannot exist:

(a) A state space that contains cycles but where tree search is still guaranteed to terminate.

(b) A state space where the optimal expansion order for graph search results in less expansions than the optimal expansion order for tree search.

Submission rules:

- Create a single PDF file (ending .pdf) for all non-programming exercises. If you want to submit handwritten parts, include their scans in the single PDF. Put the names of all group members on top of the first page. Use page numbers or put your names on each page.
- For programming exercises, create only those Java textfiles (ending .java) required by the exercise. Put your names in a comment on top of each file.
- For the submission, you can either upload the single PDF or prepare a ZIP file (ending .zip, .tar.gz or .tgz; not .rar or anything else) containing the single PDF and the Java textfile(s) and nothing else. Please do not use subdirectories in the ZIP.
- Only upload one submission per group. Do not upload several versions, i.e., if you need to resubmit, use the same file name again so that the previous submission is overwritten.