Mid-Term Exam

- Due Oct 7 at 9pm
- Points 60
- Questions 46
- Available Oct 7 at 3pm - Oct 7 at 9pm 6 hours
- Time Limit 90 Minutes

Instructions

CSCE 5210 – Fundamentals of Artificial Intelligence

Mid-Term Exam

Time: Monday 10/07/2024 from 3:00 PM to 9:00 PM

Instructions:

- This exam is an **online exam**, and you can do it remotely or in the class room.
- The exam will be available for students on **Monday 10/07/2024 from 3:00 pm to 9:00 pm.**
- The actual time of the exam is only **90 minutes,** and you can start any time when the exam is available**.**
- The exam contains **41** MCQs (**1 point each**), **3** critical-thinking questions (**3 points each**), and **2** problem-solving questions (**5 points each**).
- For **the problem-solving questions**, you can use the provided space to answer your questions or turn in them by uploading any **pdf/doc file** for each question **separately**, and **showing the name and UNT ID** in each file.

(**Remember, the submission of files is not accepted by emails or in comment section of the exam, and any such submission will be ignored and not graded toward this exam**)

This quiz was locked Oct 7 at 9pm.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	83 minutes	47.5 out of 60

Score for this quiz: 47.5 out of 60
Submitted Oct 7 at 9pm
This attempt took 83 minutes.

First part: Multiple Choice Questions

In this part you have only 41 questions, and you need to answer all questions in this section.

Question 1
0 / 1 pts

Which of the following can improve the performance of an AI agent?

- Perceiving

Correct Answer

- Learning
- Observing

You Answered

- All of the mentioned

Question 2
1 / 1 pts

Which of the following is not an application of artificial intelligence?

- LIDAR
- Face recognition system
- Chatbots

Correct!

- DBMS

Question 3
0 / 1 pts

What is Weak AI?

- the embodiment of human intellectual capabilities within a computer
- all of the mentioned

Correct Answer

the study of mental faculties using mental models implemented on a computer

You Answered

a set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans

Question 4
1 / 1 pts

The main tasks of an AI agent are_____.

Correct!

Perceiving, thinking, and acting on the environment

Moment and Humanly Actions

Input and Output

None of the mentioned

Question 5
1 / 1 pts

Which of the following is a dimension of Artificial Intelligence?

Puzzling

Training

Correct!

Learning

Designing

Question 6
1 / 1 pts

Which of the following is not a type of Artificial Intelligence agent?

Correct!

Unity-based AI agent

Learning AI agent

- Goal-based AI agent
- Simple reflex AI agent

Question 7
1 / 1 pts

Which of the following is an application of Artificial Intelligence?

- Easy to create a website
- It helps to exploit vulnerabilities to secure the firm

Correct!

- Language understanding and problem-solving (Text analytics and NLP)
- It helps to deploy applications on the cloud

Question 8
1 / 1 pts

What kind of observing environments are present in artificial intelligence?

- Partial

Correct!

- Both Partial & Fully
- Learning
- Fully

Question 9
1 / 1 pts

A _____ is used to demonstrate, on a purely syntactic basis, that one formula is a logical consequence of another formula.

- Reasoning with Knowledge Based Systems

Correct!

- Deductive Systems
- Inductive Systems

Search Based Systems

Question 10
1 / 1 pts

Which of the following task/tasks Artificial Intelligence could not do yet?

Web mining

Construction of plans in real time dynamic systems

Correct!

All of the mentioned

Understand natural language robustly

Question 11
1 / 1 pts

The goal of AI is to build systems that exhibit intelligent behavior.

Correct!

True

Can't say

May be

False

Question 12
1 / 1 pts

Artificial Intelligence is about_____.

Putting your intelligence in Machine

Correct!

Making a machine Intelligent

Programming on Machine with your Own Intelligence

Playing a game on Computer

Question 13
1 / 1 pts

What is the function of an Artificial Intelligence “Agent”?

- Work without the direct interference of the people

Correct!

- Mapping of precept sequence to an action
- Mapping of goal sequence to an action
- Mapping of environment sequence to an action

Question 14
0 / 1 pts

Optimality of BFS is _____

You Answered

- When all step costs are unequal
- When there is less number of nodes
- None of the mentioned

Correct Answer

- When all step costs are equal

Question 15
1 / 1 pts

DFS is _____ efficient and BFS is _____ efficient.

- Time, Time

Correct!

- Space, Time
- Time, Space
- Space, Space

Question 16
0 / 1 pts

The search strategy the uses a problem specific knowledge is known as _____

- Best First Search

You Answered

- Informed Search

- Heuristic Search

Correct Answer

- All of the mentioned

Question 17
1 / 1 pts

Which AI technique enables the computers to understand the associations and relationships between objects and events?

- Relative Symbolism

- Cognitive Science

Correct!

- Pattern Matching

- Heuristic Processing

Question 18
1 / 1 pts

Which search implements stack operation for searching the states?

- None of the mentioned

- Breadth-first search

Correct!

- Depth-first search

- Depth-limited search

Question 19
1 / 1 pts

Depth-first Branch-and-Bound technique usually has the following aspects:

I) it is useful when there are multiple solutions, and we want an optimal one.

II) it usually finds the optimal solution.

III) it uses the space of depth-first search.

IV) since it use the bound, the heuristics may not be important.

Correct!

- (●) Only I, II and III are correct
- ( ) All statements are correct
- ( ) Only I, II and IV are correct
- ( ) Only I and III are correct

Question 20
1 / 1 pts

Which is the best way to go for Game playing problem?

Correct!

- (●) Heuristic approach (Some knowledge is stored)
- ( ) Random approach
- ( ) Linear approach
- ( ) An Optimal approach

Question 21
1 / 1 pts

Best-First search can be implemented using the following data structure.

- ( ) Circular Queue
- ( ) Queue
- ( ) Stack

Correct!

- (●) Priority Queue

Question 22
1 / 1 pts

What is the term used for describing the judgmental or commonsense part of problem solving?

- Value based
- Critical
- Analytical

Correct!

- Heuristic

Question 23
1 / 1 pts

What is state space?

Correct!

- Representing your problem with variable and parameter
- The whole problem
- Your Definition to a problem
- Problem you design

Question 24
1 / 1 pts

What is the other name of informed search strategy?

- Simple search
- None of the mentioned

Correct!

- Heuristic search
- Online search

Question 25
1 / 1 pts

A blind search will be acceptable when this situation occurs:

- complex game
- real-life situation

Correct!

- [x] small search space
- [ ] All of the mentioned

Question 26
1 / 1 pts

Which is used to improve the performance of heuristic search?

- [ ] None of the mentioned
- [ ] Quality of nodes
- [ ] Simple form of nodes

Correct!

- [x] Quality of heuristic function

Question 27
1 / 1 pts

Among the given options, which search algorithm requires less memory?

- [ ] Best First Search
- [ ] Breadth-First Search
- [ ] Least Cost First Search

Correct!

- [x] Depth First Search

Question 28
1 / 1 pts

A* algorithm is based on _____

- [ ] Depth-First –Search
- [ ] Breadth-First-Search
- [ ] Hill climbing

Correct!

Best-First-Search

Question 29
0 / 1 pts

CSP is related to search problem in the following aspects:

I) there are no predefined starting nodes like in the search problem.

II) not like search problems, these problems are huge, with thousands of variables.

III) usually in these problems, the path to a goal isn't important, but only the solution is important.

IV) in these type of problems, systematically searching the space is infeasible.

Only I, II and III are correct

Only I, II and IV are correct

You Answered

Only I and III are correct

Correct Answer

All statements are correct

Question 30
0 / 1 pts

In many problems the path to goal is irrelevant, this class of problems can be solved using ——————————

Informed Search Techniques

Correct Answer

Local Search Techniques

You Answered

Uninformed Search Techniques

Informed & Uninformed Search Techniques

Question 31
1 / 1 pts

What kind of environment is crossword puzzle?

None of the mentioned

- Dynamic
- Semi Dynamic

Correct!

- Static

Question 32
1 / 1 pts

_____ are mathematical problems defined as a set of objects whose state must satisfy a number of constraints or limitations.

Correct!

- Constraints Satisfaction Problems
- All of the mentioned
- Local Search Problems
- Uninformed Search Problems

Question 33
0 / 1 pts

In solving a CSP, the technique in which we first select a best variable and then select a value for that variable is ------.

Correct Answer

- Two-Stage Choice Algorithm

You Answered

- Iterative Best Improvement
- stochastic local search
- Any Conflict Algorithm

Question 34
1 / 1 pts

Searching using query on Internet is, use of _____ type of agent.

Correct!

- Goal Based & Online agent
- Both Offline & Online agent

- Offline agent
- Online agent

Question 35
1 / 1 pts

Which of the Following problems can be modeled as CSP?

Correct!

- All of the mentioned
- Map coloring problem
- 8-Queen problem
- 8-Puzzle problem

Question 36
1 / 1 pts

Categorize Crossword puzzle in Fully Observable / Partially Observable.

- All of the mentioned
- Partially Observable

Correct!

- Fully Observable
- None of the mentioned

Question 37
1 / 1 pts

Though local search algorithms are not systematic, key advantages would include
_____

- Finds a solution in large infinite space

Correct!

- Less memory & Finds a solution in large infinite space
- More time

- Less memory

Question 38
1 / 1 pts

What are the main cons of hill-climbing search?

- Terminates at global optimum & Does not find optimum solution

Correct!

- Terminates at local optimum & Does not find optimum solution

- Fail to find a solution

- Does not find optimum solution & Fail to find a solution

Question 39
0 / 1 pts

Backtracking is based on _____

- Last in first out

You Answered

- Recursion

- First in first out

Correct Answer

- Both Last in first out & Recursion

Question 40
1 / 1 pts

To overcome the need to backtrack in constraint satisfaction problem can be eliminated by _____

Correct!

- Forward Searching

- Constraint Propagation

- Omitting the constraints and focusing only on goals

- Backtrack after a forward search

Question 41
1 / 1 pts

Constraint satisfaction problems on finite domains are typically solved using a form of ——————————

- Greedy Search Algorithms
- Heuristic Search Algorithms

Correct!

- All of the mentioned
- Search Algorithms

Second part: Critical Thinking Questions

In this part you have only 3 questions, and you need to answer all questions to point that satisfy the right answer, and do not spend much time to express your answer.

Question 42
1.5 / 3 pts

To what extent are the following computer systems instances of artificial intelligence:

a) Web search engines. .
b) Voice-activated telephone menus.
c) Supermarket bar code scanners.

Your Answer:

a) They heavily use AI through algorithms that rank and retrieve relevant results using machine learning and natural language processing.
b) These systems use AI for speech recognition and natural language understanding to interpret user commands.
c) Not considered AI, as they rely on simple rule-based systems to scan and look up prices without any learning or decision-making capabilities.

Short answers.

Question 43
2 / 3 pts

Which of the following are true and which are false? Explain your answers.

a) Depth-first search is a special case of best-first search.
b) Uniformed search is a special case of A* search.
c) Depth-first search always expands at least as many nodes as A* search with an admissible heuristic.

Your Answer:

a) **True**: Depth-first search can be seen as a special case of best-first search where the evaluation function always prefers deeper nodes over shallow ones. It's a simple version with no heuristic guiding the search.

b) **False**: Uninformed search doesn't use any heuristic information, where as A* search relies on a heuristic function to guide its search. Uninformed search is not the special case of A*.

c) **False**: Depth-first search may expand more nodes than A* search, as A* uses an admissible heuristic to minimize the number of nodes expanded, while depth-first search blindly explores deeper paths which can lead to more expansions.

b) is true

Question 44
3 / 3 pts

Which of the following methods for solving CSP can:

1. determine that there is no model, if there is not one
2. find a model if one exists
3. find all models?

The methods to consider are:

a) arc consistency with domain splitting
b) variable eliminations
c) stochastic beam search

Your Answer:

1.

- **Arc consistency with domain splitting**: **Yes**, it can determine if there is no model after applying arc consistency.
- **Variable elimination**: **Yes**, it can detect there is no model by summing over constraints and eliminating variables.

- **Stochastic beam search**: **No**, it doesn't exhaustively explore all paths.

2.

- **Arc consistency with domain splitting**: **Yes**, it can find a model if one exists by systematically applying arc consistency and splitting domains.
- **Variable elimination**: **Yes**, this method can find a model by reducing the problem.
- **Stochastic beam search**: **Possibly**, it may find a model, but there's no guarantee due to its stochastic nature.

3.

- **Arc consistency with domain splitting**: **No**, it does not guarantee finding all models.
- **Variable elimination**: **No**, it focuses on finding a single solution, not all possible models.
- **Stochastic beam search**: **No**, it is designed to find one or a few good solutions, not all models.

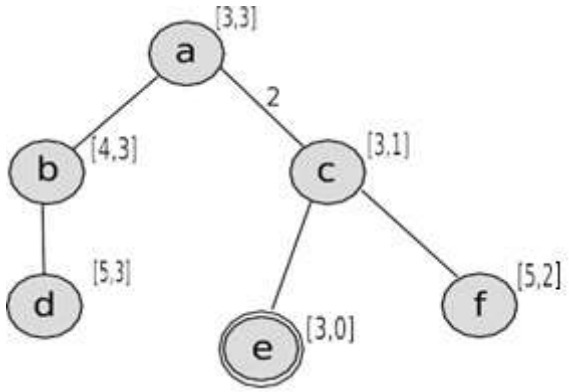
Third part: Problem-Solving Questions

In this part you have only 2 questions, and you need to answer all questions clearly by showing your derivation of the solution and any figure explaining your answer.

Question 45
5 / 5 pts

Consider the search problem represented in following figure, where *a* is the start node and *e* is the goal node. The pair [*f; h*] at each node indicates the value of the *f* and *h* functions for the path ending at that node (i.e, at any path *p*, $f(p) = h(p) + Cost(p)$). Given this information,

a) what is the cost of each path? The cost < a; c >= 2 is given as a hint. [1 points]
b) is the heuristic function *h* admissible? Explain why or why not. [2 points]
c) show the solution steps of solving this problem with A* search and the solution path, if any. [2 points]



Your Answer:

a) < a, b > = 1, < b, d > = 1, < a, c > = 2, < c, e > = 1, < c, f > = 1

b) Yes, it is admissible because it never overestimates the distance to the goal.

c) paths are shown with their corresponding f value:

<a> 3 : <a,b> 4, <a,c> 3 : <a,b> 4, <a,c,e> 3, <a,c,f> 5

<a,c,e> is now extracted from the frontier and goal e is found.

Question 46
3 / 5 pts

Consider the problem of scheduling four tasks: A, B, C, D, each of which takes one hour to complete. The tasks may start at 1:00, 2:00, 3:00. Any number of tasks can be executed simultaneously provided the following restrictions are satisfied.

- A must start after D (i.e A>D).
- D must start before C (i.e D<C).
- A cannot execute at the same time as B (i.e A≠B).
- B cannot execute at the same time as C (i.e B≠C).
- C cannot start at 2:00 (i.e C≠2).

a) Formulate the problem as a CSP by stating: the variables, their domain, and the applicable constraints. (Hints: focus on the start time of a task). [1 point]
b) Draw the constraint network. [2 points]
c) Apply arc-consistency to each constraint in the CSP until no values can be ruled out (i.e., the CSP becomes arc-consistent). [2 points]

Midexam_46.pdf (https://unt.instructure.com/files/29542572/download)
No derivation to get to the final domains

Quiz Score: 47.5 out of 60