* Describe the Turing Test.

The Turing Test is a test of a machine's ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human.

an example is when a computer (A) asks questions to a human (C) and takes turns with another human (B) that asks different questions to human (C),

at the end of the test Human (C) needs to decide which Questioner was a human and which was a computer.

* Describe how Moore's Law and Big Data are related to the recent advances in AI.

Gordon Moore said that roughly every two years, the number of transistors on microchips will double. Commonly referred to as Moore's Law, this phenomenon suggests that computational progress will become significantly faster, smaller, and more efficient over time. The centralized computer workstations and data centers that work on artificial intelligence data sets are smaller than they would have been in the earlier days of computing. Apple and Android gives us small mobile data-collecting devices, digital cameras, music players and many other small pieces of hardware that all collect their own data about us.

* Explain the difference between belief and knowledge.

I Belive Knowledge can be defined as information or awareness gained through experience or education.

Belief is a firmly held opinion. Knowledge has its basis in intellect. Belief is based on religious faiths. Lastly I belive Knowledge arises out of self-experience and the natural state of things.

Belief arises from what another has preached.

* Use Propositional Logic to prove the following. Show your work using a Logic Table.

*A*∧ ¬A ⇔ f

A │ (A ∧ ¬A) ↔ FALSUM

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1 │ 0 0 \*1 0

0 │ 0 1 \*1 0

¬(A ∧ B) ⇔ ¬A ∨ ¬B

A B │ ¬(A ∧ B) ↔ (¬A ∨ ¬B)

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1 1 │ 0 1 \*1 0 0 0

1 0 │ 1 0 \*1 0 1 1

0 1 │ 1 0 \*1 1 1 0

0 0 │ 1 0 \*1 1 1 1

(A ∨ B) ∧ (A ∨ C) ⇔ A ∨ (B ∧ C)

A B C │ ((A ∨ B) ∧ (A ∨ C)) ↔ (A ∨ (B ∧ C))

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1 1 1 │ 1 1 1 \*1 1 1

1 1 0 │ 1 1 1 \*1 1 0

1 0 1 │ 1 1 1 \*1 1 0

1 0 0 │ 1 1 1 \*1 1 0

0 1 1 │ 1 1 1 \*1 1 1

0 1 0 │ 1 0 0 \*1 0 0

0 0 1 │ 0 0 1 \*1 0 0

0 0 0 │ 0 0 0 \*1 0 0

* Use Backward Chaining to infer the answers to the following queries using the below facts and rules.

Facts

food(burger).              // burger is a food

food(sandwich).          // sandwich is a food

food(pizza).                 // pizza is a food

lunch(sandwich).        // sandwich is a lunch

dinner(pizza).              // pizza is a dinner

Rules

meal(X) :- food(X). // Every food is a meal OR Anything is a meal if it is a food

Queries

food(pizza).                 // Is pizza a food? Answer : true

meal(X), lunch(X).       // Which food is meal and lunch? Answer : X = sandwich.

dinner(sandwich).       // Is sandwich a dinner? Answer : false.

* Using the criteria of completeness, optimality, computation time and memory space, compare the following search algorithms:

Breadth-First Search:

completeness - BFS considers all neighbour so it is not suitable for decision tree used in puzzle games.

optimality - BFS is better when target is closer to Source.

computation time - BFS = O(V+E) where V is vertices and E is edges.

memory space - BFS uses Queue to find the shortest path.

Depth-First Search:

completeness - DFS is more suitable for decision tree. As with one decision, we need to traverse further to augment the decision. If we reach the conclusion, we won.

optimality- DFS is better when target is far from source.

computation time - DFS = O(V+E) where V is vertices and E is edges.

memory space - DFS uses Stack to find the shortest path.

Iterative Deepening Search:

completeness- (IDS) is an iterative graph searching strategy that takes advantage of the completeness of the Breadth-First Search (BFS) strategy but uses much less memory in each iteration (similar to Depth-First Search).

optimality - IDDFS calls DFS for different depths starting from an initial value. In every call, DFS is restricted from going beyond given depth. So basically we do DFS in a BFS fashion

computation time - O(bd)

memory space - IDDFS is optimal like breadth-first search, but uses much less memory; at each iteration

* The Hill-Climbing Search Algorithm replaces the current node with its best neighbor. This approach is susceptible to “local optima”. Explain how Simulated Annealing attempts to address this problem.

The algorithm is basically hill-climbing except instead of picking the best move, it picks a random move. If the selected move improves the solution, then it is always accepted. Otherwise, the algorithm makes the move anyway with some probability less than 1

* Compare the crossover, cloning, and mutation genetic operators used in genetic algorithms.

Crossover:

The crossover is considered the main operator of genetic algorithms.The crossover operator is a genetic operator that combines (mates) two chromosomes (parents) to produce a new chromosome (offspring). The idea behind crossover is that the new chromosome may be better than both of the parents if it takes the best characteristics from each of the parents.

Cloning:

Abstract. A novel genetic operator called cloning is introduced and tested in different applications of genetic algorithms. Essentially, the cloning monotonically increases the lengths of the chromosomes during the evolution. The gene cloning definition is creating a genetically identical copy of a gene. Gene cloning examples include creating clones of the human gene for insulin, which can be inserted into bacteria to mass produce the drug for diabetes. Scientists can also clone genes to isolate them for further study

Mutation:

Mutation is a secondary operation. Mutation is an asexual operator, which needs only one chromosome in order to generate a child chromosome. These operators make it possible to maintain the random aspect in the evolution of the population in order to avoid premature convergence.

* Explain how computers learn.

Algorithms. Humans feed algorithms, which are sets of rules used to help computers perform problem-solving operations, large volumes of data from which to learn. The more data a machine learning algorithm is provided the more accurate it becomes.

Machine learning algorithms are split into two main categories based on how they interact with data: Supervised and unsupervised. Due to their differences when analyzing data, these two machine learning categories are better suited for solving different problems. All forms of machine learning rely on the availability of a huge quantity of data to train algorithms.

* Compare unsupervised, supervised and semi-supervised learning approaches. What are some of the commonly used criteria for comparing the different classification techniques?

Supervised learning algorithms are trained using labeled data. Unsupervised learning algorithms are trained using unlabeled data. Supervised learning model takes direct feedback to check if it is predicting correct output or not. Unsupervised learning model does not take any feedback.

Semi-supervised machine learning is a combination of supervised and unsupervised learning. It uses a small amount of labeled data and a large amount of unlabeled data, which provides the benefits of both unsupervised and supervised learning while avoiding the challenges of finding a large amount of labeled data.

* Having a large, high-quality data is preferred for developing successful AI applications. In practice, having both (large volume and high-quality) may not always be possible. Which of the two would you prioritize in the cybersecurity context? Provide the reasons for your choice.

I would Prioritize Large volume when it comes to Cyber Security, we have collected lots of data from past hacks and breches that have already occured, giving AI thoes data will help us more in stopping attacks or preventing the same attacks in our related Sector.

* Explain some of the reasons that may reduce the acceptability of an AI system.

One application of artificial intelligence is a robot, which is displacing occupations and increasing unemployment (in a few cases). Therefore, some claim that there is always a chance of unemployment as a result of chatbots and robots replacing humans

* Describe three possible solutions and subdomains of AI Safety.

DEVELOP GUIDELINES FOR AI SAFETY

Any tool, physical or digital, including AI, can be used unethically. Organizations should ensure that AI systems are utilized in a right way and for the right reasons. Companies can enforce some guidelines regarding the use of AI systems. These guidelines comprise of rules and regulations that can help engender trust among the developers, users and beneficiaries of artificial intelligence. These guidelines should govern the ethical management an AI system’s operations as well as the conduct of its employees

MANAGE INTEGRITY OF DATA

For assuring the integrity of AI systems as a whole, businesses must first carefully manage the integrity of the data and models underlying AI systems. Anomalies can be introduced through several factors ranging from incompleteness to malicious attacks. Organizations should implement techniques and processes to protect, detect, correct and mitigate risks due to anomalies.

VALIDATE AND VERIFY

Validating and verifying is a measurement of the reliability and predictability of AI systems. For achieving robustness and safety, all AI systems should be verified, validated and tested, both probabilistically and logically before they are deployed. Validity is another technique critical to gauge predictability, and thus confirm that an AI system does not have unwanted behaviors. To define those unwanted behaviors, organizations must need to know what is good or bad in a particular situation.

* Privacy is one of the big concerns in developing AI applications. Give examples of why this is particularly a more serious in the healthcare context.

In radiology, AI is proving to be highly useful for the analysis of diagnostic imagery . Researchers at Stanford have produced an algorithm that can interpret chest X-rays for 14 distinct pathologies in just a few seconds . Radiation oncology, organ allocation, robotic surgery and several other healthcare domains also stand to be significantly impacted by AI technologies. In the United States, the Food and Drug Administration (FDA) recently approved one of the first applications of machine learning in clinical care—software to detect diabetic retinopathy from diagnostic imagery.

Many AI technologies end up owned and controlled by private entities. Public–private partnerships for implementing AI have resulted in poor protection of privacy. There have been calls for greater systemic oversight of big data health research.