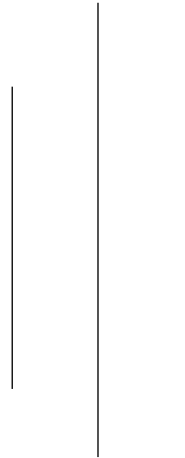




# COLLEGE OF MANAGEMENT & INFORMATION TECHNOLOGY

## BACHELOR IN INFORMATION TECHNOLOGY



### OPERATING SYSTEM

#### LAB REPORT (II)

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## **1) How does incorporating logic improve AI system credibility, ensuring precise decisions and dependable outcomes? Research. [10]**

=> Artificial intelligence has become one of the biggest inventions in the humankind history. The inventions had made a human a god helping to create technologies similar like human. The features of AI like capability to think like us Human, talking like us and and do tasks like human but it is still on the development phase.

Scientist use certain things like programming language, machine to make AI to think more like human. We all know that programming the AI with strong logic help us to provide more accurate and precise answer. Logic-based AI technologies depend on standard rules and logical concept which add in the minimization to the factor affecting from reliable data. Other things is transparency in the logic helping to understand how our goals can be achieved. This also helps in the audit and troubleshooting scenario

Some times, we can get the unexpected outcomes and have improve our logical concept. Logic enforcing consistency in the decision making prevent us from getting the unpredictable error.

Logic-based AI systems generate that can be easily interpreted by humans which gives the reason of decision like diagnoses .Logic -based AI can identifies error ,detect and correct to some extent minimizing our work. Expertise in a particular domain: Logic enables AI systems to include domain-specific knowledge and expert rules, which may result in more accurate and contextually appropriate judgments.

Logic and probabilistic reasoning together can help AI systems handle uncertainty more skillfully, according to research. This is especially helpful when making decisions based on evidence that is sparse or noisy. Logic-based AI systems can be given ethical rules and principles, ensuring that their choices are consistent with ethical considerations. This is crucial in delicate fields where moral ramifications matter a lot.

Collaboration between humans and artificial intelligence is made easier by logic-based AI systems. As a result of the structured and visible form of logic-based reasoning, people can influence, correct, or direct the AI system's judgments, promoting a more cooperative environment.

In conclusion, the AI produces the outcomes according to the data provided us , use standard rules and logic for calculation. The strong the logic, the strong the desired outcome. So, the incorporating logic improve AI system credibility, ensuring precise decisions and dependable outcomes.

## **2) What are the reasons for adopting propositional logic in AI, ensuring its reliability and suitability for accurate decision-making? Explore. [10]**

=>Artificial Intelligence has embraced propositional logic with the variety of reasons convincing us showing the dependability and suitability for the logical and precise answer.

Propositional logic operates in binary values – either true or false. This helps AI to understand to figure what is going on. Sorting the information we provided and connecting into the interrelated component to achieve the goals. Sometimes, the data provided cannot be enough so that AI can have unpredictable error. But the propositional logic can be the solution.

The problem AI faced can be a way bigger as it can be difficult in solving them at once. Here, propositional logic gives the idea of dividing and conquering over the problem. Sometimes, AI can use propositional logic to guess things based on what it knows. Giving the some clues, and guessing the answer using logic.

In logic, either it is true or false not to stand on the middle ground. This makes the AI more convincing us to use. Confusing the user is not on the options. Everything should be kept logical and clear so that confusing answer should not arise in any kind of situation. Propositional logic helps to keep everything clear and understandable for the people to know how the AI makes decisions.

Propositional logic is the building block of AI reasoning. It is the simplest form of logic, dealing with binary values using symbols and connectives which helps AI to show the relationship among the different segments of the information,

These are the AI programs that act like human experts in the particular fields. It is used to represent the rules and knowledge of the expert for more logic on systems like to determine the disease based on the symptoms and many more others.

In the end, propositional logic is the foundation upon which AI builds its reasoning capabilities making AI more convincing to use in a very structured and systematic way. This framework makes AI more like human, make sense information on the clear rules.

**3) Imagine a delivery company facing the challenge of optimizing its delivery routes for a set of five customers (A, B, C, D, E) situated across a city. The distances between these customers are as follows: A-B: 8 km, A-C: 10 km, A-D: 15 km, A-E: 20 km, B-C: 12 km, B-D: 18 km, B-E: 25 km, C-D: 14 km, C-E: 22 km, D-E: 30 km. The company aims to determine the most efficient path that the delivery truck should take, starting and ending at the company's warehouse, while visiting each customer only once. Utilizing the concept of a Hamiltonian circuit in the Traveling Salesman Problem, the company can find the optimal route that minimizes travel distance and maximizes efficiency. The solution not only ensures that every customer is visited precisely once, meeting delivery requirements, but also minimizes the overall travel distance, reducing fuel costs and delivery time.**

**Explain how the concept of a Hamiltonian circuit in the Traveling Salesman Problem ensures the optimality of the route. How does it help in finding a balance between visiting all customers and minimizing the distance traveled? [15]**

=> The Traveling Salesman Problem is a classic optimization problem in the fields of operations research and computer science. It involves finding the shortest possible route that visits a given set of customers exactly once and returns to the starting customer. The main goal is to minimize the total distance covered by delivering the package in minimum cost.

The concept of the a Hamiltonian Circuit ensures the optimality of the route in the Traveling Salesman Problem. First, to be Hamiltonian Circuit it must have hamiltonian path which means to visits each vertices in a graph exactly once not allowing the repetition of the edges.

In this case, Hamiltonian circuit guarantees that every customer is visited once exactly and not visiting the distance again increasing the distance to be covered .As, the Hamiltonian ensures the customer receive the deliveries as required and not left out.

Using the Hamiltonian circuit, it provides the combinations of all possible outcome and calculating the distance, we can choose the path we like.

Distances:

A-B: 8 km

A-C: 10 km

A-D: 15 km

A-E: 20 km

B-C: 12 km

B-D: 18 km

B-E: 25 km

C-D: 14 km

C-E: 22 km

D-E: 30 km

Finding the some of the possible outcomes using the Hamiltonian Graph

A -> B -> C -> D -> E -> A:  $8 + 10 + 15 + 20 + 30 = 83$  km

A -> B -> C -> E -> D -> A:  $8 + 10 + 22 + 18 + 15 = 73$  km

A -> B -> D -> C -> E -> A:  $8 + 18 + 14 + 20 + 12 = 72$  km

A -> B -> D -> E -> C -> A:  $8 + 18 + 30 + 22 + 10 = 88$  km

A -> B -> E -> C -> D -> A:  $8 + 25 + 12 + 14 + 15 = 74$  km

A -> B -> E -> D -> C -> A:  $8 + 25 + 30 + 18 + 10 = 91$  km

A -> C -> B -> D -> E -> A:  $10 + 12 + 18 + 20 + 30 = 90$  km

A -> C -> B -> E -> D -> A:  $10 + 12 + 25 + 15 + 30 = 92$  km

A -> C -> D -> B -> E -> A:  $10 + 14 + 18 + 25 + 20 = 87$  km

In this case , A -> B -> D -> C -> E -> A:  $8 + 18 + 14 + 20 + 12 = 72$  km  
is the shortest total distance.

In the scenario of the delivery company's problem, the separations between customers serve as the graph's edge weights. These distances are taken into consideration by TSP algorithms, including the brute-force method, dynamic programming, or heuristic techniques (such as nearest neighbor, genetic algorithms), to find the ideal Hamiltonian circuit. These algorithms discover the most effective way that satisfies delivery requirements by visiting each client

precisely once while decreasing the overall journey distance by methodically examining several routes.

In the Traveling Salesman Problem, the idea of a Hamiltonian circuit assures that every customer is seen once while assisting in finding a balance between seeing every customer and covering the fewest possible miles. The distances between consumers are taken into account using optimization algorithms designed for the TSP to identify the most effective route for the delivery truck. This solution helps in the reduction of fuel costs, improve the delivery time and overall the operational efficiency for the delivery company.

#### 4) Case Study: Symmetric Relations in Social Media Connections

**In the rapidly evolving landscape of social media platforms, one prominent player seeks to revolutionize user engagement and connections through the innovative application of symmetric relations. By harnessing the power of these relations, the platform aims to create a more immersive and interconnected user experience.**

**The social media platform embraces symmetric relations to forge and emphasize mutual friendships among its users. At the heart of this endeavor lies the symmetric relation "is a mutual friend of," which forms the foundation of fostering genuine and meaningful connections.**

***Symmetric Property:*** The essence of the symmetric property comes alive as users navigate the platform. It signifies that if user A is a friend of user B, the converse also holds true – user B is a friend of user A. This bilateral association not only acknowledges the mutual bond but also nurtures a sense of shared camaraderie and interactivity.

***Friend Recommendations:*** Leveraging this symmetric relation, the platform crafts personalized friend recommendations. When a user explores potential connections, the system identifies individuals who share mutual friends. This approach facilitates a higher likelihood of friend requests being accepted, as users recognize familiar faces and connections within their existing social circle.

***News Feed Prioritization:*** The algorithm powering the platform's news feed is finely attuned to the symmetric relations in play. As users scroll through their feed, posts and updates from mutual friends are accorded a place of prominence. This strategic prioritization enriches user experiences by delivering content that resonates on a deeper level, enhancing engagement and interaction.

***Event Invitations:*** Event creation and participation gain new dimensions through the platform's utilization of symmetric relations. When users organize gatherings or events, mutual friends are seamlessly brought into the fold. These connections are given privileged access to event invitations, fostering a sense of inclusivity and community participation.

**How does the symmetric property of "is a mutual friend of" relation contribute to cultivating a sense of interconnectedness and shared experiences among users on the platform? [15]**

=> In the field of the social media platform, the user engagement and connections through the innovative application of symmetric relation is key factor. A key factor in encouraging a sense of community and shared experiences among users of the social media platform is the symmetrical nature of the "is a mutual friend of" link. By encouraging sincere connections and meaningful

interactions, this characteristic helps to create a more immersive and interesting atmosphere. Let's look at how this symmetry fosters a feeling of connectivity and common experiences:

Building mutual relations among the user A and User B are two way reinforces itself through the mutual connection of friendship. The idea that relationships are two-way reinforces itself through this mutual connection of friendship. Users actively participate in establishing and nurturing relationships rather than merely being passive consumers of friend invitations. The validity and credibility of connections are strengthened by this connections of shared pals, resulting in more sincere conversations.

The platform fosters a feeling of shared relationship by highlighting the symmetrical nature of friendships. Users connect with one another as equals, leveling the playing field and maintaining greater engagement. User feel the feeling is mutual and like to share more about themselves which promotes the open conversation.

Symmetric relationships help users feel more engaged. People are more likely to believe someone's motives and honesty when they can see that they have mutual pals. Users are encouraged to interact more actively with their relationships thanks to this trust factor. As people believe their connections to be sincere and trustworthy, they are more willing to share personal experiences, hobbies, and updates.

The symmetric relations helps us to recommend the friend just like in the facebook. The platform increases the likelihood of making new connections by using symmetric relations to power friend recommendations. Users are more likely to accept friend requests when they see potential acquaintances who have mutual friends with them. In addition to expanding their network, this also enhances the likelihood that these new connections will result in worthwhile interactions because of the common connections.

The symmetric features also affects the how user's new feed is displayed according to their's views and content we see. The user is more likely to find the posts and updates from the people with whom they share common connection which can be the relevant and interesting. This focus on connections between users improves content engagement and motivates users to stay on the platform longer.

The symmetric relation has a amazing features to invite the friends to the events where they can have the experience of community they created. This inclusiveness strengthens the sense of shared experiences and community participation. Users are more likely to show up at events if they anticipate being surrounded by friends and connections.

In conclusion, the "is a mutual friend of" relation's symmetric quality plays a key role in fostering a sense of connectivity and shared experiences among members of the social media platform. Genuine connections are fostered, trust is established, involvement is raised, and an environment that is more inclusive and engaging is produced. Due to the platform's recognition of the reciprocal nature of connections, its users have a stronger sense of community and are more likely to engage in deep conversations.