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| https://upload.wikimedia.org/wikipedia/commons/thumb/4/4e/VU_Logo.png/260px-VU_Logo.png | **Artificial Intelligence (CS607)**  Assignment # 02  **Spring 2024** | **Total marks = 20**  **Deadline**  **24 June 2024** |
| **Please carefully read the following instructions before attempting the assignment.**  **RULES FOR MARKING**  **It should be clear that your assignment would not get any credit if:**   * The assignment is submitted after the due date. * The submitted assignment does not open or the file is corrupt. * Strict action will be taken if the submitted solution is copied from any other student or the internet.   **You should consult the recommended books to clarify your concepts as handouts are not sufficient.**  **You are supposed to submit your assignment in Doc or Docx** **format.**  Any other formats like scan images, PDF, ZIP, RAR, PPT, BMP, etc. will not be accepted.  **Topic Covered:**   * Understanding the concept of fuzzy logic and its application in decision-making. * Familiarizing with membership functions and their role in defining fuzzy sets. * Practicing the design and implementation of a fuzzy inference system for real-world scenarios. * Exploring different types of membership functions (trapezoidal, triangular) and their characteristics. * Learning how to interpret and analyze fuzzy logic outputs for decision-making.   **Topic Covered**  Lecture 28 to Lecture 32 | | |
| **NOTE**  No assignment will be accepted *after the due date via email in any case* (whether it is the case of load shedding or internet malfunctioning etc.). Hence refrain from uploading assignments in the last hour of the deadline. It is recommended to upload the solution at least two days before its closing date.  If you people find any mistake or confusion in the assignment (Question statement), please consult with your instructor before the deadline. After the deadline, no queries will be entertained in this regard.  **For any query, feel free to email me at:**  [**CS607@vu.edu.pk**](mailto:CS607@vu.edu.pk) | | |

**Question**  **Marks (20)**

**Scenario Description**

You are tasked with designing a fuzzy inference system for an intelligent air conditioning (AC) system for a residential building. The system aims to adjust the cooling power based on various factors such as the current temperature, humidity, and the number of occupants in the room. The goal is to maintain a comfortable indoor environment while optimizing energy consumption.

**Requirements**

**Inputs:**

1. **Temperature (°C):**

* Low: 0-15°C
* Medium: 10-30°C
* High: 25-40°C

1. **Humidity (%):**

* Low: 0-30%
* Medium: 20-70%
* High: 60-100%

1. **Number of Occupants:**

* Few: 0-2 persons
* Moderate: 1-5 persons
* Many: 4-10 persons

**Output:**

1. **AC Power Level (%):**
   * + Low: 0-40%
     + Medium: 30-70%
     + High: 60-100%

**Your Tasks are to:**

1. **Define Membership Functions:**
2. Create membership functions for each input variable.
3. Create membership functions for the output variable.
4. **Develop Fuzzy Rules:**

Define a set of fuzzy rules based on the input conditions to determine the appropriate AC power level.