G H raisoni COLLEGE | Engineering and Management Pune

DEPARTMENT OF CSE - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
UCAML302 | SOFT COMPUTING
TAE - II POSTER PRESENTATION

FUZZY LOGIC & SETS

WHAT IS FUZZY LOGIC?

FUZZY LOGIC IS A MATHEMATICAL APPROACH THAT ALLOWS REASONING WITH DEGREES OF TRUTH RATHER THAN BINARY (TRUE/FALSE) LOGIC. IT IS WIDELY USED IN AI, CONTROL SYSTEMS, AND DECISION-MAKING.

FLOW OF PROCESS

CLASSICAL VS. FUZZY LOGIC

- CLASSICAL LOGIC USES BINARY VALUES (0 OR 1, TRUE OR FALSE) FOR DECISION-MAKING.
- FUZZY LOGIC ALLOWS PARTIAL TRUTH VALUES BETWEEN 0 AND 1, MAKING IT MORE FLEXIBLE.

FUZZY SETS & MEMBERSHIP FUNC.

- MEMBERSHIP FUNCTION (M) DEFINES THE DEGREE OF MEMBERSHIP (0 TO 1).
- TYPES OF MEMBERSHIP FUNCTIONS

1. TRIANGULAR (SIMPLE & LINEAR)
2. TRAPEZOIDAL (MORE FLEXIBLE)
3. GAUSSIAN (SMOOTH)
4. SIGMOIDAL (GRADUAL TRANSITION)

OPERATIONS ON FUZZY SETS

- OPERATIONS HELP COMBINE FUZZY LOGIC CONDITIONS.
- UNION (OR): MAX(MA, MB)
- INTERSECTION (AND): MIN(MA, MB)
- COMPLEMENT (NOT): 1 - MA

FUZZY RELATIONS & OPERATIONS

- FUZZY RELATIONS MATRIX REPRESENTS INPUT-OUTPUT RELATIONSHIPS.
- OPERATIONS:

1. MAX-MIN COMPOSITION
2. MAX-PRODUCT COMPOSITION

EX.

- FUZZY: IF TEMPERATURE IS "WARM" (0.6) → ADJUST AC POWER ACCORDINGLY
- HOT TEMPERATURE FUZZY SET
  - 20°C → 0 (NOT HOT)
  - 30°C → 0.5 (MED. HOT)
- WEATHER FORECAST
  U (CLOUDY OR SUNNY) 0.6
  ∩ (CLOUDY AND SUNNY) 0.4
- IF ROAD = WET, THEN SPEED
  = SLOW (M = 0.8)

APPLICATIONS

AI & ROBOTICS	MEDICAL DIAGNOSIS	HOME AUTOMATION	SELF-DRIVING CARS
DECISION-MAKING IN AI	DISEASE PREDICTION USING SYMPTOMS	AIR CONDITIONERS SETTING COOLING LEVELS	FUZZY LOGIC HELPS IN SPEED CONTROL AND OBSTACLE AVOIDANCE

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