

# Introduction

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- Fuzzy Logic was initiated in 1965, by Dr. Lotfi A. Zadeh, professor for computer science at the university of California in Berkley.
- Fuzzy logic is a mathematical tool for dealing with uncertainty.
- It provides a technique to deal with imprecision and information granularity.
- The fuzzy theory provides a mechanism for representing linguistic constructs such as “many,” “low,” “medium,” “often,” “few.”

# Classical set

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- Classical sets are also called **crisp set** or **nonfuzzy set**.
- The traditional binary set theory describes crisp events, events that either do or do not occur.
- The crisp sets are sets without ambiguity in their membership.
- Example 1, for the set of integers, either an integer is even or it is not (it is odd).
- Example 2, However, either you are in the USA or you are not.

# Example

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Lists:  $A = \{\text{apples, oranges, cherries, mangoes}\}$

$$A = \{a_1, a_2, a_3\}$$

$$A = \{2, 4, 6, 8, \dots\}$$

Formulas:  $A = \{x \mid x \text{ is an even natural number}\}$

$$A = \{x \mid x = 2n, n \text{ is a natural number}\}$$

Membership or characteristic function

$$\chi_A(x) = \begin{cases} 1 & \text{if } x \in A \\ 0 & \text{if } x \notin A \end{cases}$$

# Can they see each other?

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YES



NO

Binary logic



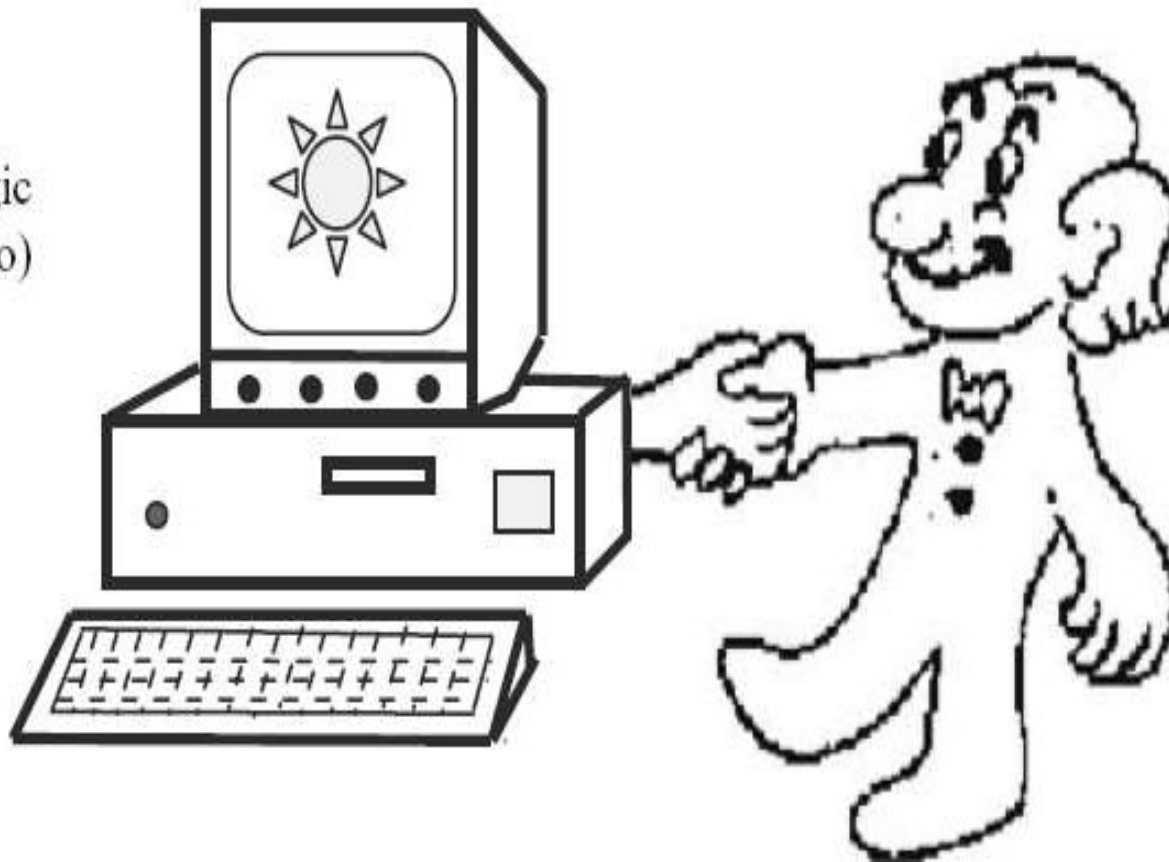
MAYBE

Fuzzy logic

# Binary logic Vs. Fuzzy logic

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Binary logic  
(Yes or No)



Human  
Reasoning  
/Fuzzy logic  
(maybe, more or  
less, very hot,  
heavy etc.)

# Fuzzy sets

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- It has an ability to classify elements into a continuous set using the concept of **degree of membership**.
- Fuzzy set is defined as a set whose elements have degrees of membership.
- The characteristics function or membership function not only gives 0 or 1 but can also give values between 0 and 1.
- Value 0-> non-membership
- Value 1->complete membership
- Value between 0 and 1-> degree of membership