# SOFTCOMPUTNG

PRESENTED BY

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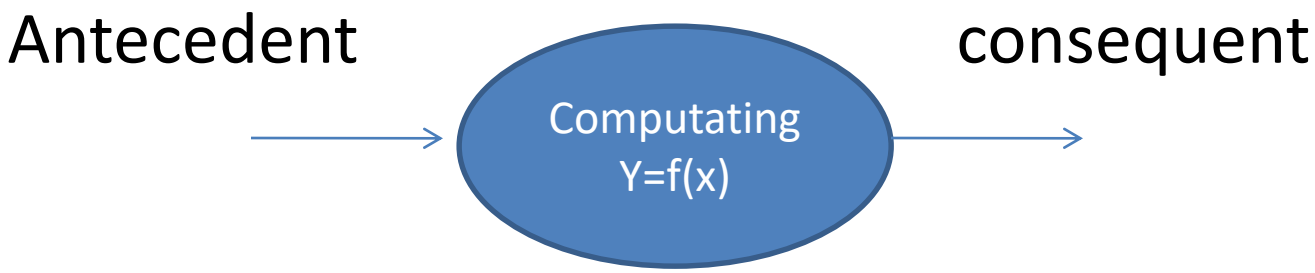
DEPT OF EE

# INTRODUCTION TO SOFT COMPUTING

- Concept of computation
- Hard Computing
- Soft Computing
- How soft Computing
- Hard Vs Soft Computing
- Hybrid Computing

# Concept of computation




Y=f(x),f is a mapping function

f is also called a formal method or an algorithm to solve a problem

# IMPORTANT CHARACTERISTICS OF COMPUTING

- ✓Should provide precise solution.
- ✓Control action should be unambiguous and accurate.
- ✓Suitable for problem which is easy to model mathematically.

# Hard computing

In 1996 L A Zade introduced the term hard computing.

According to him we term a computing a hard computing if

- Precise result is guaranteed.
- Control action is unambiguous.
- Control action is formally defined (i.e with mathematically model or algorithm)

# Examples of Hard Computing

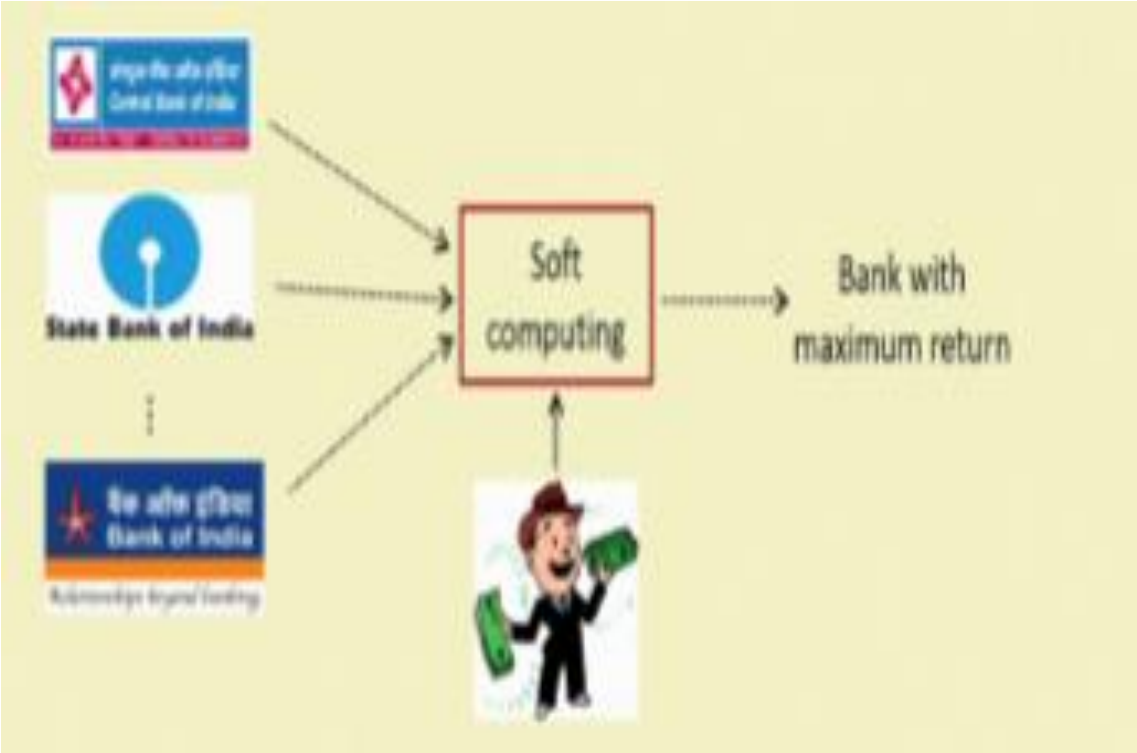
- Solving numerical problems.
- Searching and sorting techniques.
- Solving Computational geometry problems.(eg: shortest tour in a graph, finding closest pair of points given a set of points.)

# Soft Computing

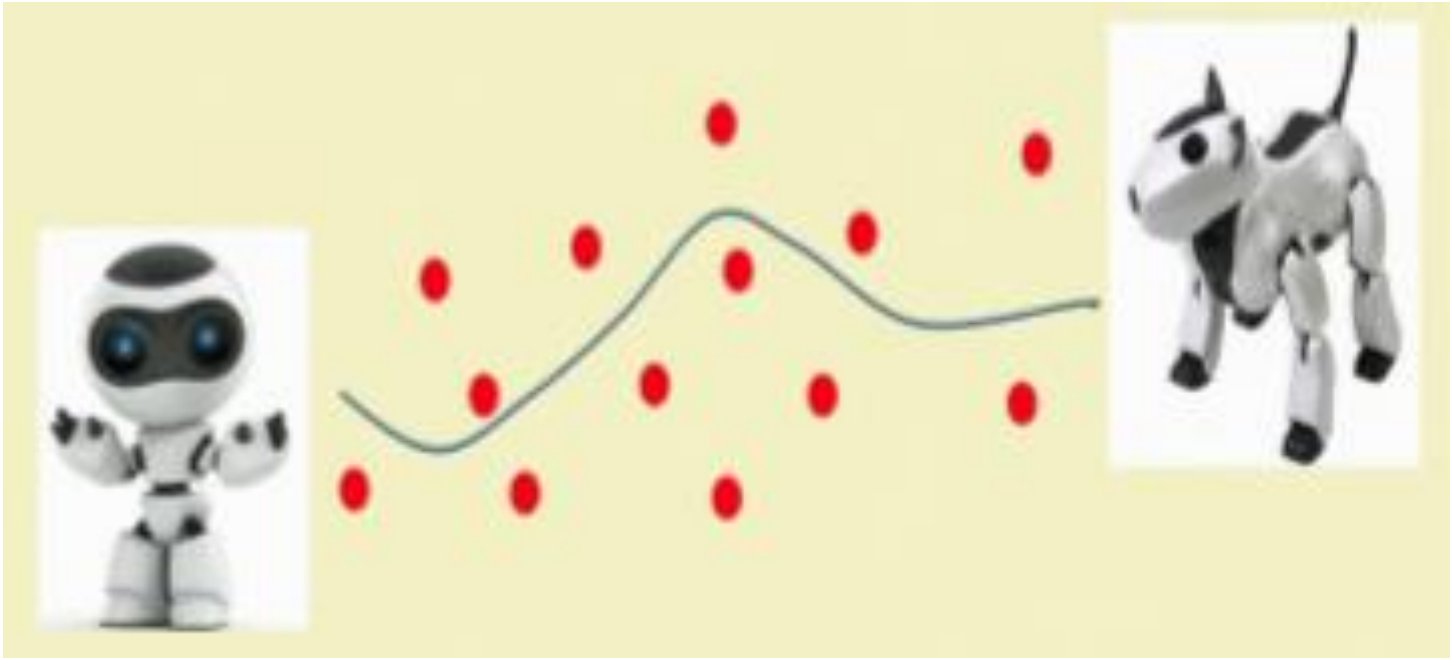
Soft Computing is a collection of methodologies that aim to exploit the tolerance for imprecision and uncertainty to achieve tractability, robustness and low solution cost. Its principal constituents are fuzzy logic , neuro computing and probabilistic reasoning. The role model of soft computing is human mind.

# Characteristics of soft computing

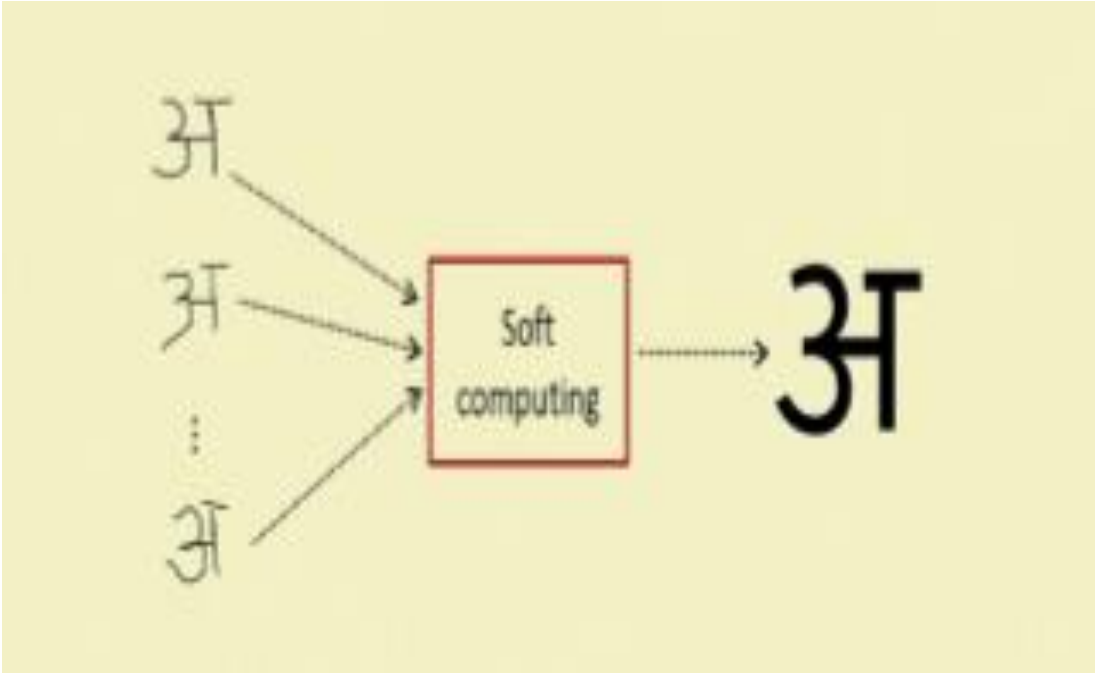
I. It does not require any mathematical modeling of problem solving.
II. It may not yield the precise solution.
III. Algorithms are adaptive i.e it can adjust to the change of dynamic environment .
IV. Use some biological inspired methodologies.




# Evolutionary algorithm



# Fuzzy Logic




# Artificial Neural Network

# How Soft Computing

- How a student learns from his teacher?
  - Teacher asks questions and tell the answers then.
  - Teacher puts questions and hints answers and asks whether the answers are correct or not.
  - Student thus learn a topic and store in his memory.
  - Based on the knowledge he solves new problems.
- This is the way how human brain works.
- Based on this concept Artificial Neural Network is used to solve problems.

# How Soft Computing

- How world selects the best?
  - It starts with a population (random).
  - Reproduces another population (next generation).
  - Rank the population and selects the superior individuals.
- Genetic algorithm is based on this natural phenomena.
  - Population is synonymous to solutions.
  - Selection of superior solution is synonymous to exploring the optimal solution.

# How Soft Computing

- How a doctor treats his patient?
  - Doctor asks the patient about suffering.
  - Doctor find the symptoms of diseases.
  - Doctor prescribed tests and medicines.
- This is exactly the way Fuzzy Logic works.
  - Symptoms are correlated with diseases with uncertainty .
  - Doctor prescribes tests/medicines fuzzily.

# Hard computing Vs Soft Computing

| Hard Computing | Soft Computing |
|---|---|
| 1. **Hard computing**, i.e., conventional computing, requires a precisely stated analytic model and often a lot of computation time | **1**.It is tolerant of imprecision, uncertainty, partial truth, and approximation. In effect, the role model for soft computing is the human mind. |
| **2.Hard computing** based on binary logic, crisp systems, numerical analysis and crisp software | 2.**soft computing** based on fuzzy logic, neural nets and probabilistic reasoning. |
| **3.Hard computing** has the characteristics of precision and categoricity. | **3.soft computing**, has characteristic of approximation and dispositionality |
| **4.**It is deterministic. | **4.**It incorporates stochasticity. |
| **5**.It requires exact input data. | **5.**It can deal with ambiguous and noisy data |
| **6.**It is strictly sequential. | **6**.It allows parallel computation. |
| **7.**It produces precise answers. | **7**.It can yield approximate answers. |

THANK U