



**RAMA
UNIVERSITY**

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FACULTY OF ENGINEERING AND TECHNOLOGY

Soft Computing

LECTURE -20

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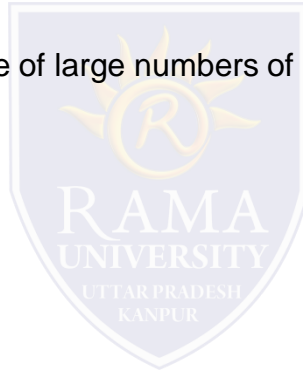
OUTLINE

- **Simulated Annealing**
- **Implementation of SA**
- **Advantages of Simulated Annealing**
- **Algorithm Overview**
- **References**



Simulated Annealing

- ❑ simulated Annealing (SA) is an effective and general form of optimization.
- ❑ “Annealing” refers to an analogy with thermodynamics, specifically with the way that metals cool and anneal. Simulated annealing uses the objective function of an optimization problem instead of the energy of a material.
- ❑ It is useful in finding global optima in the presence of large numbers of local optima.



Implementation of SA

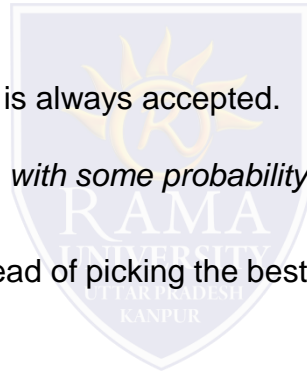
Implementation of SA is surprisingly simple.

The probability decreases exponentially with the “badness” of the move, which is the amount ΔE by which the solution is worsened (i.e., energy is increased.)

If the selected move improves the solution, then it is always accepted.

Otherwise, the algorithm makes the move anyway *with some probability* less than 1.

The algorithm is basically hill-climbing except instead of picking the best move, it picks a random move.



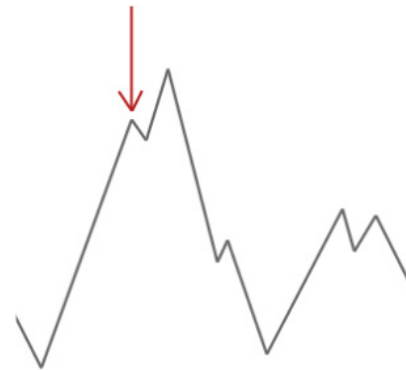
DATA CLUSTERING

Advantages of Simulated Annealing

You may be wondering if there is any real advantage to implementing simulated annealing over something like a simple hill climber.

As we previously determined, the simulated annealing algorithm is excellent at avoiding this problem and is much better on average at finding an approximate global optimum.

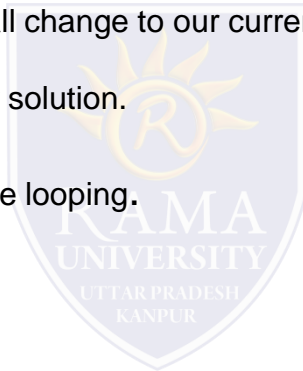
Although hill climbers can be surprisingly effective at finding a good solution, they also have a tendency to get stuck in local optimums.



DECISION TREE

Algorithm Overview

- ❑ First we need set the initial temperature and create a random initial solution.
- ❑ Then we begin looping until our stop condition is met.
- ❑ Usually either the system has sufficiently cooled, or a good-enough solution has been found.
- ❑ From here we select a neighbor by making a small change to our current solution.
- ❑ We then decide whether to move to that neighbor solution.
- ❑ Finally, we decrease the temperature and continue looping.



MULTIPLE CHOICE QUESTION

6. Selective retention occurs when?

- a) we process, store, and retrieve information that we have already selected, organized, and interpreted
- b) we make choices to experience particular stimuli
- c) we make choices to avoid particular stimuli
- d) we focus on specific stimuli while ignoring other stimuli

7. Which of the following strategies would NOT be effective at improving your communication competence?

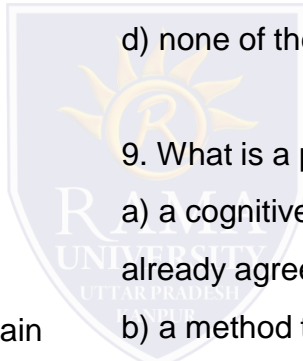
- a) Recognize the people, objects, and situations remain stable over time
- b) Recognize that each person's frame of perception is unique
- c) Be active in perceiving
- d) Distinguish facts from inference

8. _____ is measured by the number of mental structures we use, how abstract they are, and how elaborate they interact to shape our perceptions.

- a) intrapersonal structure
- b) perceptual set
- c) self-justification
- d) none of the mentioned

9. What is a perception check?

- a) a cognitive bias that makes us listen only to information we already agree with
- b) a method teachers use to reward good listeners in the classroom
- c) any factor that gets in the way of good listening and decreases our ability to interpret correctly
- d) a response that allows you to state your interpretation and ask your partner whether or not that interpretation is correct



REFERENCES

- ❑ <http://www.theprojectspot.com/tutorial-post/simulated-annealing-algorithm-for-beginners/6>

