



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



## ARTIFICIAL INTELLIGENCE FOR ELECTRICAL ENGINEERING

TOPIC : **CROSS OVER AND MUTATION, GENERATIONAL  
CYCLE**





# INTRODUCTION

- After scientists became disillusioned with classical and neo-classical attempts at modeling intelligence, they looked in other directions.
- Two prominent fields arose, connectionism (neural networking, parallel processing) and evolutionary computing.
- It is the latter that this essay deals with - genetic algorithms and genetic programming.



# WHAT IS GA

- A genetic algorithm (or GA) is a search technique used in computing to find true or approximate solutions to optimization and search problems.
- Genetic algorithms are categorized as global search heuristics.
- Genetic algorithms are a particular class of evolutionary algorithms that use techniques inspired by evolutionary biology such as inheritance, mutation, selection, and crossover (also called recombination).



# EVOLVING NEURAL NETWORKS

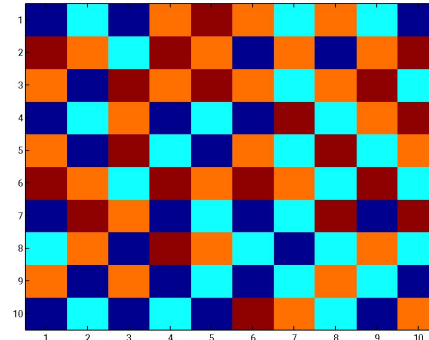
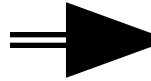
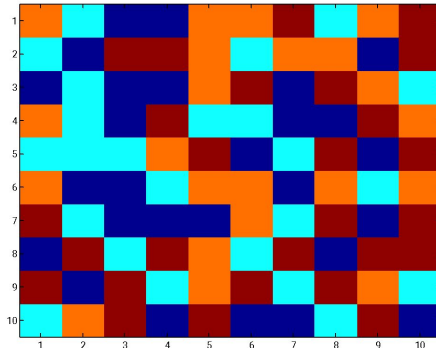


- Many would think that a learning function could be evolved via genetic programming. Unfortunately, genetic programming combined with neural networks could be *incredibly* slow, thus impractical.
- As with many problems, you have to constrain what you are attempting to create.
- For example, in 1990, David Chalmers attempted to evolve a function as good as the delta rule.
- He did this by creating a general equation based upon the delta rule with 8 unknowns, which the genetic algorithm then evolved.



# CHECKBOARD EXAMPLE

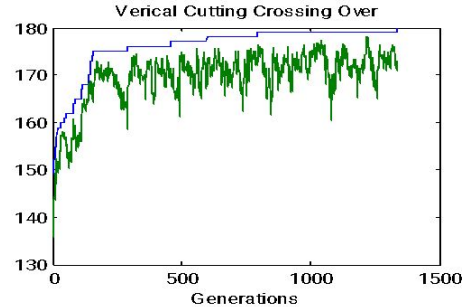
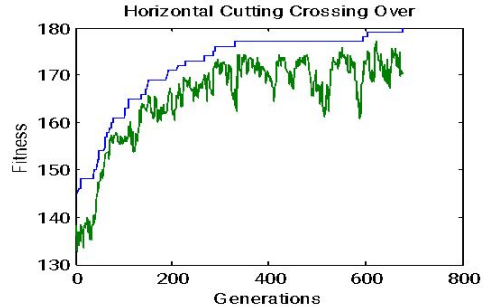
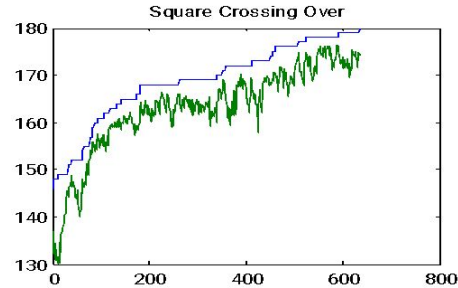
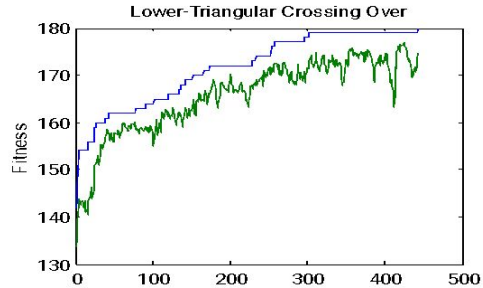
- We are given an  $n$  by  $n$  checkboard in which every field can have a different colour from a set of four colors.
- Goal is to achieve a checkboard in a way that there are no neighbours with the same color (not diagonal)





# CHECKBOARD EXAMPLE CONT'D

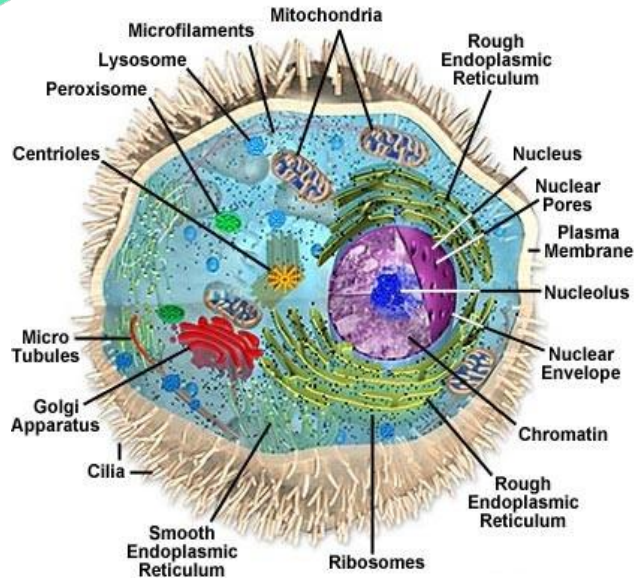
- Fitness curves for different cross-over rules:





# THANK YOU

Anatomy of the Animal Cell



The Cell Nucleus

