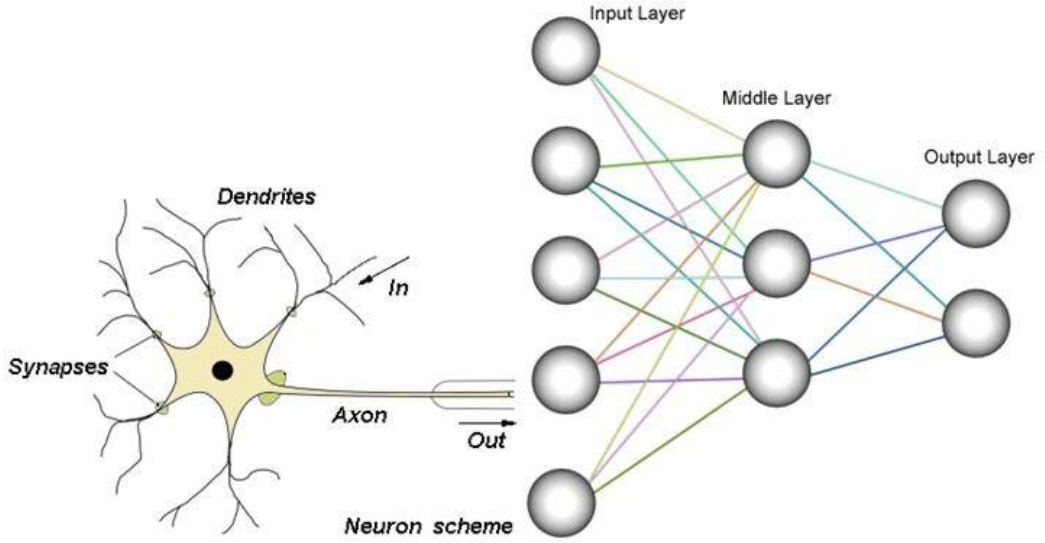
MULTI OBJECTIVE NEURO-EVOLUTION WITH BACK PROPAGATION ASSISTED LOCAL SEARCH

MINI PROJECT (SEMESTER V)

INTRODUCTION

THE ADVENT OF ARTIFICIAL NEURAL NETWORKS AND IMPORTANCE OF EVOLUTIONARY ALGORITHMS



ARTIFICIAL NEURAL NETWORKS

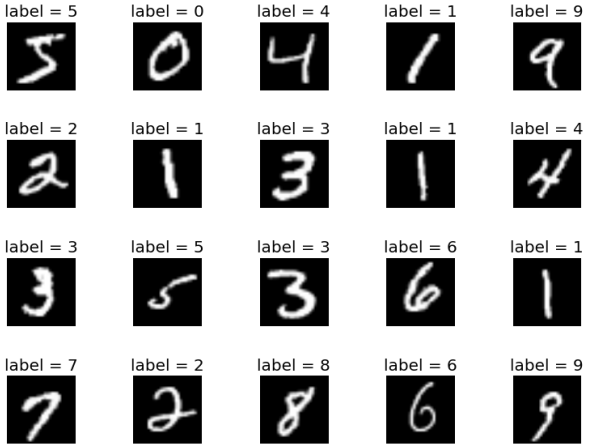
MODELLING HUMAN BRAIN WITH FEED-FORWARD AND BACK-PROPAGATION

DATASETS

Iris

Cards

MNIST

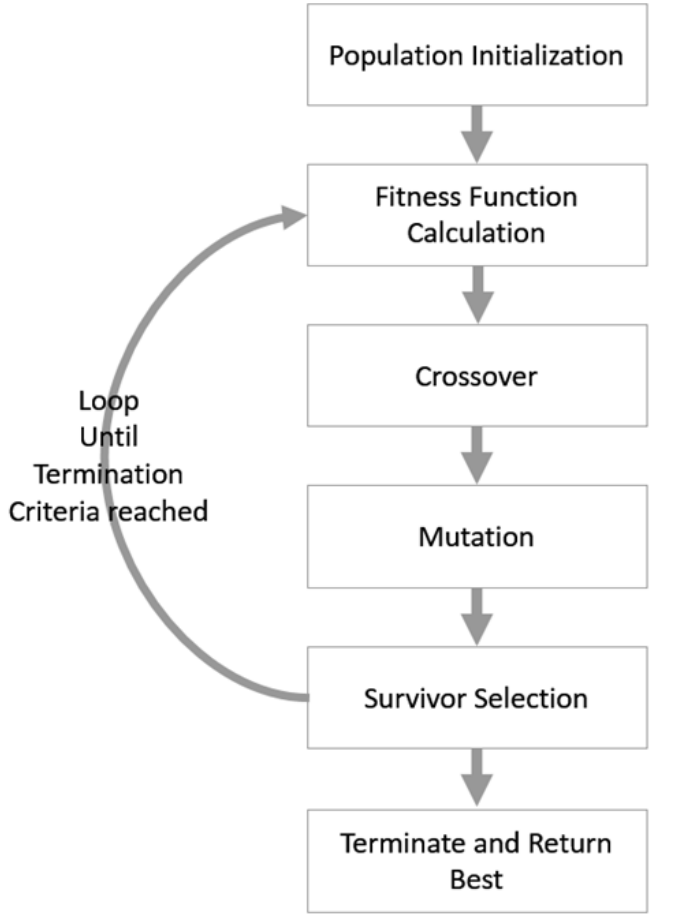


PIMA

COPING WITH OVERFITTING - REGULARIZATION

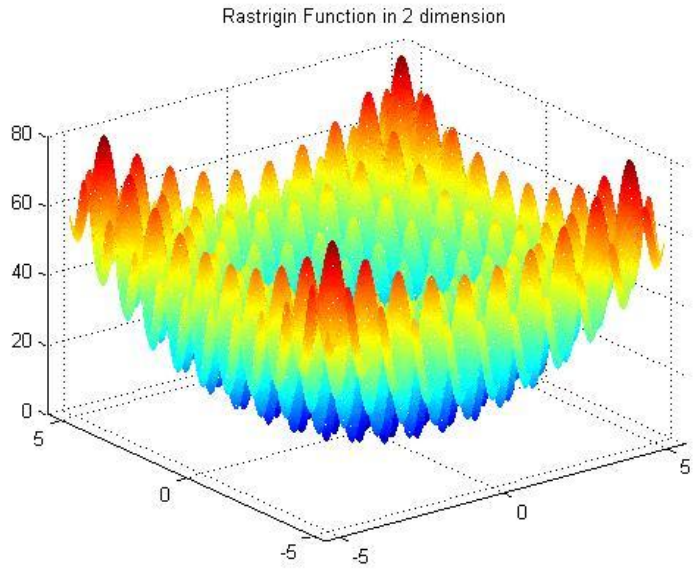
GENETIC ALGORITHMS

OPTIMIZATION USING INFLUENCE OF THE PRINCIPLES OF NATURE

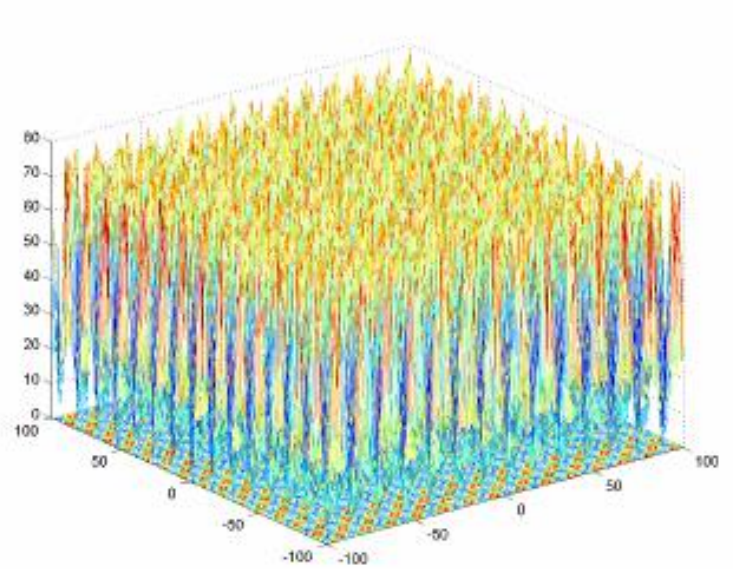


GENETIC ALGORITHMS – REAL VALUED CHROMOSOMES

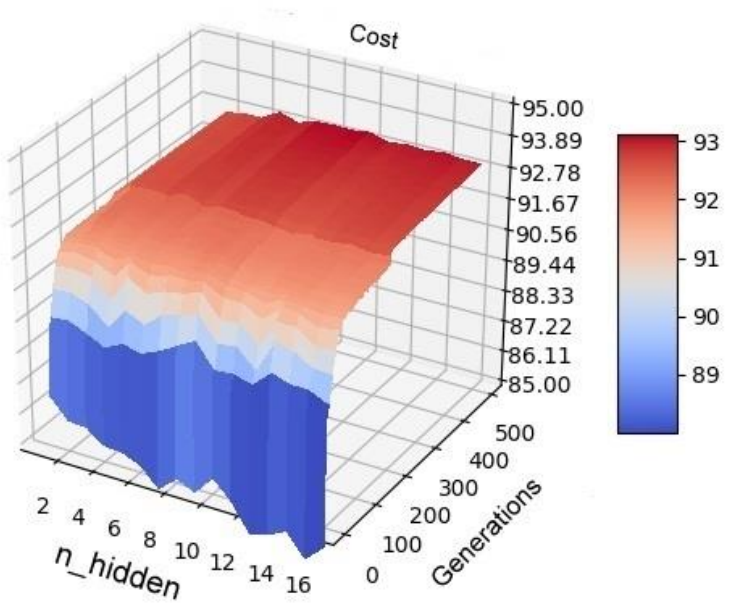
Rastrigin Function



Katsuura Function

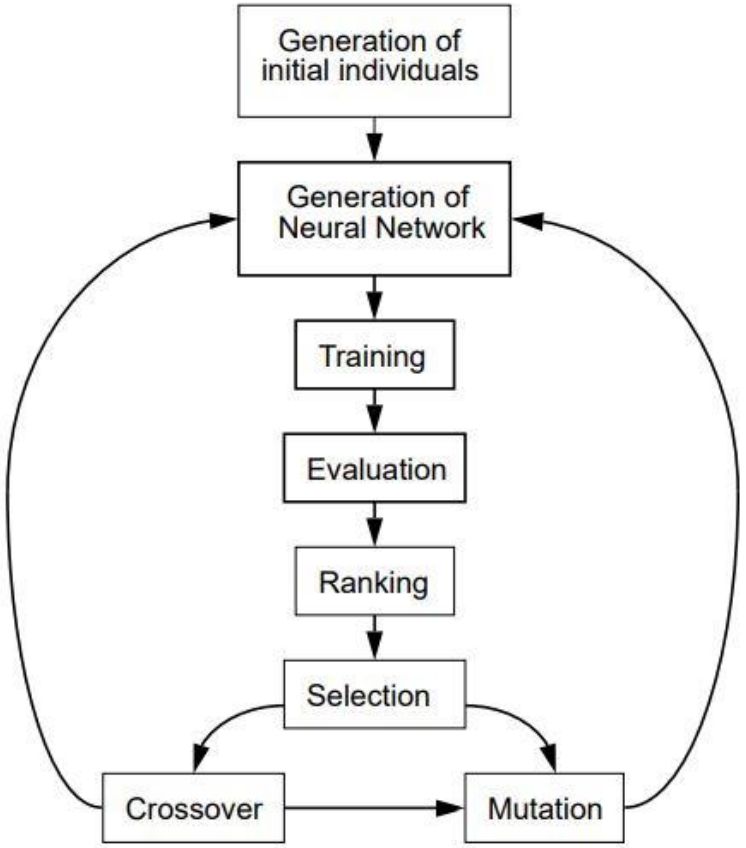


GENETIC ALGORITHMS – VARIABLE LENGTH CHROMOSOMES



Variation of no. of hidden nodes on PIMA dataset

COMBINING NN AND GA



INITIAL RESULTS

IMPLEMENTING HYBRID GIVES MUCH BETTER RESULTS

INITIAL RESULTS

Back Propagation Only

Hidden Units	Testing Accuracy			Validation
	Average	Best	Standard Deviation	Best
20	66.99%	75.20%	6.7%	68.10%
60	72.20%	76.33%	4.2%	71.20%

Hybrid Algorithm (On < 20 Hidden Units)

Testing Accuracy			Validation Accuracy
Average	Best	Standard Deviation	Best
74.74%	79.45%	2.0%	77.32%

INITIAL RESULTS – PAIRWISE T-TEST

Hidden Units (for BPA)	T Value	P Value
20	9.703	8.522×10^{-9}
60	7.202	7.690×10^{-7}

CONCLUSION AND FUTURE WORK

- Structural Mutation
- Clustering Algorithm
- Multi-Objective Optimization
- Multi-threaded Architecture
- Evolutionary Algorithms - Genetic Programming, Evolutionary Robotics, etc.