NOTE

Reference papers:

[Neural Network Training Using Particle Swarm Optimization - a Case Study | IEEE Conference Public1ation | IEEE Xplore](https://ieeexplore.ieee.org/document/8864679)

[Electronics | Free Full-Text | Artificial Neural Networks Based Optimization Techniques: A Review (mdpi.com)](https://www.mdpi.com/2079-9292/10/21/2689)

[(PDF) Comparison of Genetic Algorithm, Particle Swarm Optimization and improved Ant Colony Optimization for Scheduling of Heterogeneous Systems (researchgate.net)](https://www.researchgate.net/publication/351477806_Comparison_of_Genetic_Algorithm_Particle_Swarm_Optimization_and_improved_Ant_Colony_Optimization_for_Scheduling_of_Heterogeneous_Systems)

[Training neural networks with ant colony optimization algorithms for pattern classification | SpringerLink](https://link.springer.com/article/10.1007/s00500-014-1334-5)

[Genetic Algorithm-Artificial Neural Network (GA-ANN) Hybrid Intelligence for Cancer Diagnosis | IEEE Conference Publication | IEEE Xplore](https://ieeexplore.ieee.org/document/5614106)

Introduction:

Genetic Algorithm (GA): based on the process of natural selection and uses the principles of crossover and mutation to evolve a population of potential solutions over many generations. GAs is useful for finding global optima in large, complex search spaces. However, they can be computationally expensive and require many evaluations.

Cultural Algorithm (CA): combines the principles of evolution and cultural transmission. It uses a cultural memory mechanism that stores information about successful solutions. It can be sensitive to parameter tuning and may not perform well for problems with complex or dynamic environments.

Particle Swarm Optimization (PSO): In PSO, a swarm of particles moves through the search space, adjusting their position and velocity based on their own experience and the experience of their neighbours. PSO is useful for problems with continuous search spaces and non-linear constraints. However, it can be prone to premature convergence and can get stuck in local optima.

Ant Colony Optimization (ACO): In ACO, a colony of artificial ants explores the search space, laying down pheromone trails to mark good solutions. This method is useful for combinatorial optimization problems, such as the traveling salesman problem. However, it can be computationally expensive and may require many iterations to converge.

In general, the performance of these methods can depend on the specific problem being solved, as well as the parameter settings and implementation details. It is often recommended to test multiple methods on a given problem to determine which one performs the best.

Conclusion:

* The vanilla neural network worked well to give an accuracy of 90.5% on the banking-loan-dataset.
* GA, PSO and ACO for weight optimization gave a very close accuracy of about 89.5% on the dataset.
* GA was the easiest to model and implement while CA is an extension of GA.
* GA required a sightly higher mutation rate than expected as it was stuck at the local minima.
* PSO and ACO are slightly less expensive computation-wise.