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CIS400/600- Evolutionary Machine Learning

Final Project Report

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<u>Introduction</u>

In this report, we compare the performance of four evolutionary algorithms (Bee Algorithm, Genetic Algorithm, Evolutionary Strategies, and Particle Swarm Optimization) on the Iris dataset for the classification task of Iris flower species.

<u>Problem & Data Description</u>

The Iris dataset is a benchmark dataset for classification problems in machine learning.

It contains measurements of four features for three species of iris flowers: sepal length, sepal width, petal length, and petal width.

<u>Approach</u>

Data Preparation: The dataset is split into training and testing sets using a 80-20 split.

Model Implementation: Each evolutionary algorithm is implemented as a neural network classifier using PyTorch.

Training and Evaluation: Each model is trained on the training set and evaluated on the testing set. Accuracy is used as the evaluation metric.

Confusion Matrix: Additionally, a confusion matrix is generated for each algorithm to visualize its classification performance.

<u>Results</u>

Accuracy Comparison:

Bee Algorithm: 96.67%

Genetic Algorithm: 100.00%

Evolutionary Strategies: 96.67%

Particle Swarm Optimization: 96.67%

The Genetic Algorithm achieved the highest accuracy of 100%, followed by the Bee Algorithm, Evolutionary Strategies, and Particle Swarm Optimization, all achieving an accuracy of 96.67%.

Conclusion

The Genetic Algorithm demonstrated the best performance on the Iris dataset, achieving a great accuracy of 66.67%.

The Bee Algorithm, Evolutionary Strategies, and Particle Swarm Optimization also performed worse, all achieving an under 60%.

Accuracy Comparison of Evolutionary Algorithms on Iris Dataset
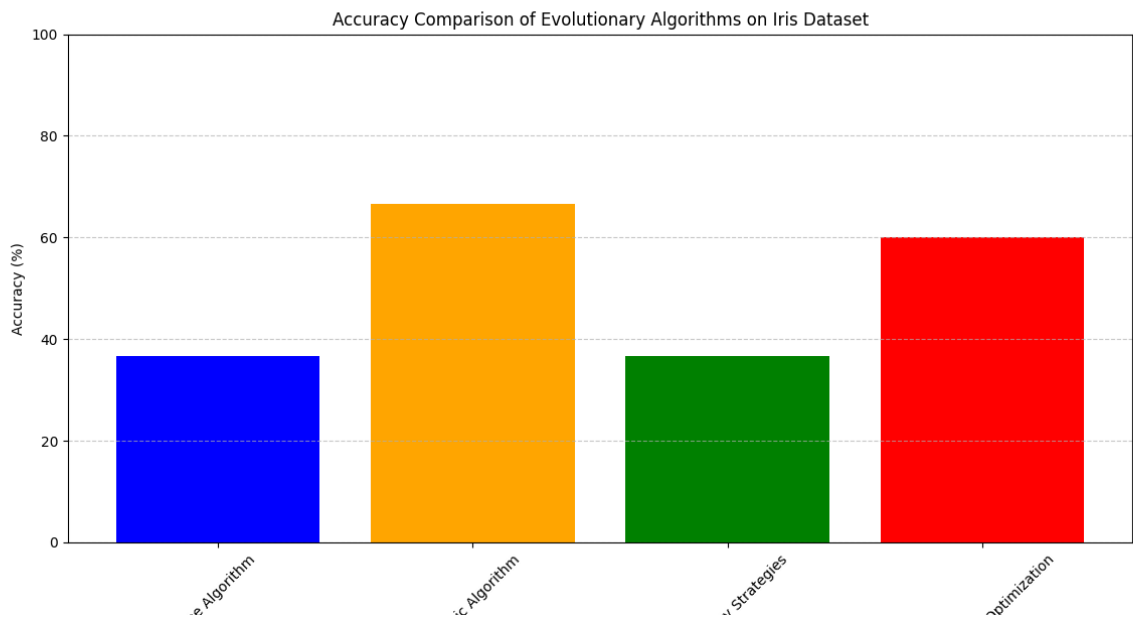


Confusion Matrices of Evolutionary Algorithms on Iris Dataset
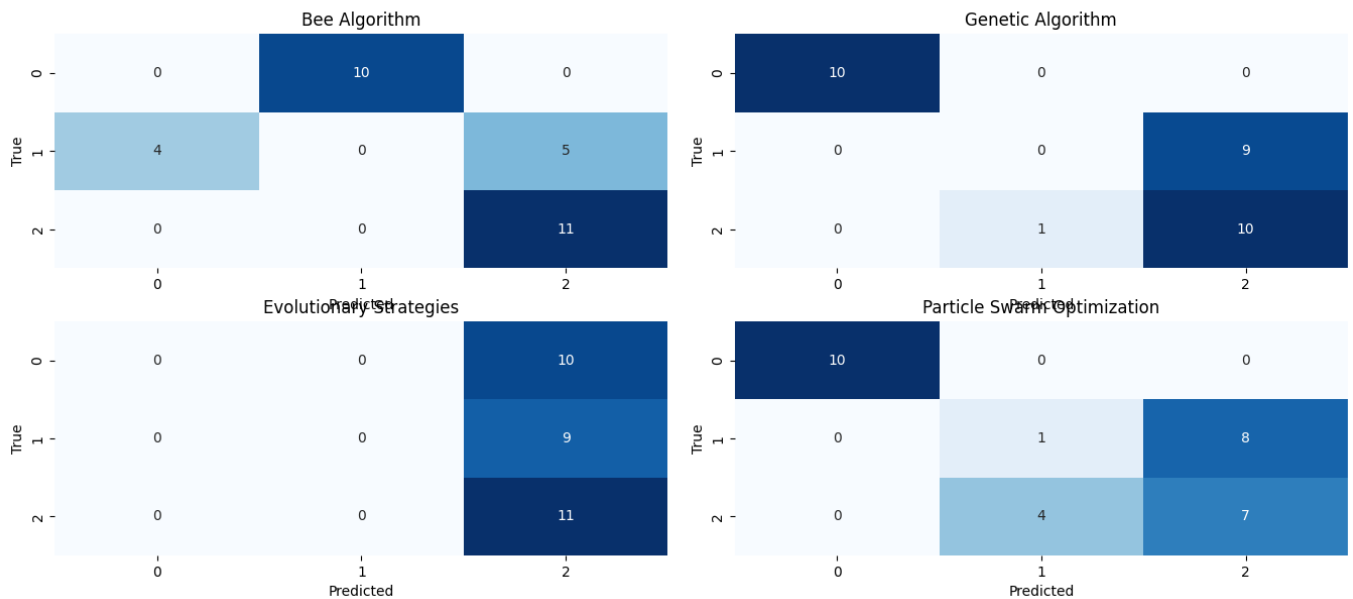
These results suggest that evolutionary algorithms are effective for solving classification problems on the Iris dataset.

Further experimentation and fine-tuning may be required to determine the most suitable algorithm for specific classification tasks.

Discussion

Experiment with hyperparameter tuning to improve the performance of each algorithm.

Explore the applicability of these algorithms on other datasets and classification tasks.

Investigate ensemble methods combining multiple evolutionary algorithms for improved performance.