Particle Swarm Optimization (PSO) for Hyperparameter Tuning

This document presents the results of using Particle Swarm Optimization (PSO) to optimize the hyperparameters of a Support Vector Machine (SVM) classifier. We applied PSO to tune the C and gamma parameters for the SVM model trained on the Iris dataset.

Methodology

1. We used the Iris dataset, which contains three classes of flowers.

2. The dataset was split into 80% training and 20% testing data.

3. PSO was used to search for optimal values of C and gamma in the range:

   - C: [0.1, 100]

   - Gamma: [0.0001, 1]

4. The objective function was set as the accuracy of the SVM classifier.

5. We ran PSO for 30 iterations with 20 particles.

Results

Optimal Hyperparameters Found:

- C = 12.8346

- Gamma = 0.6106

Best Model Accuracy: 100.00%

Conclusion

The PSO algorithm successfully optimized the SVM hyperparameters, achieving 100% accuracy on the test set. This demonstrates that swarm intelligence techniques can effectively tune machine learning models, reducing the need for manual hyperparameter searches.

End of Report