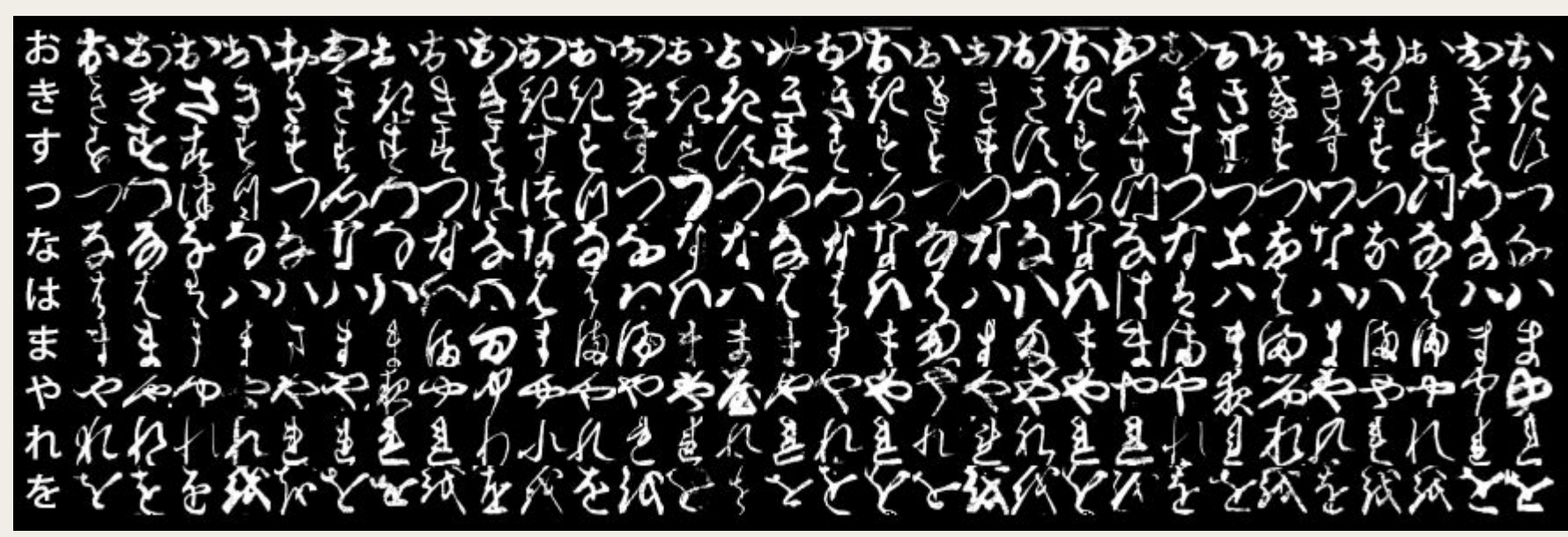


Evolutionary Algorithms to Evolve SNN Hyperparameters

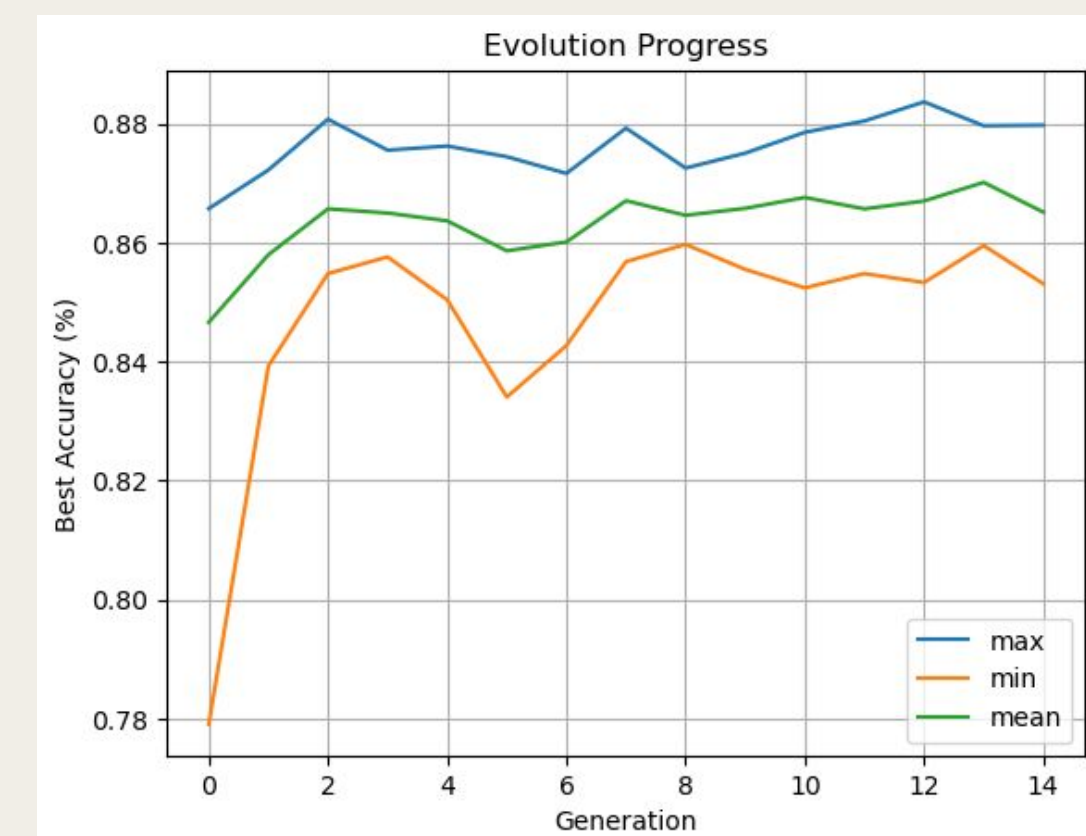
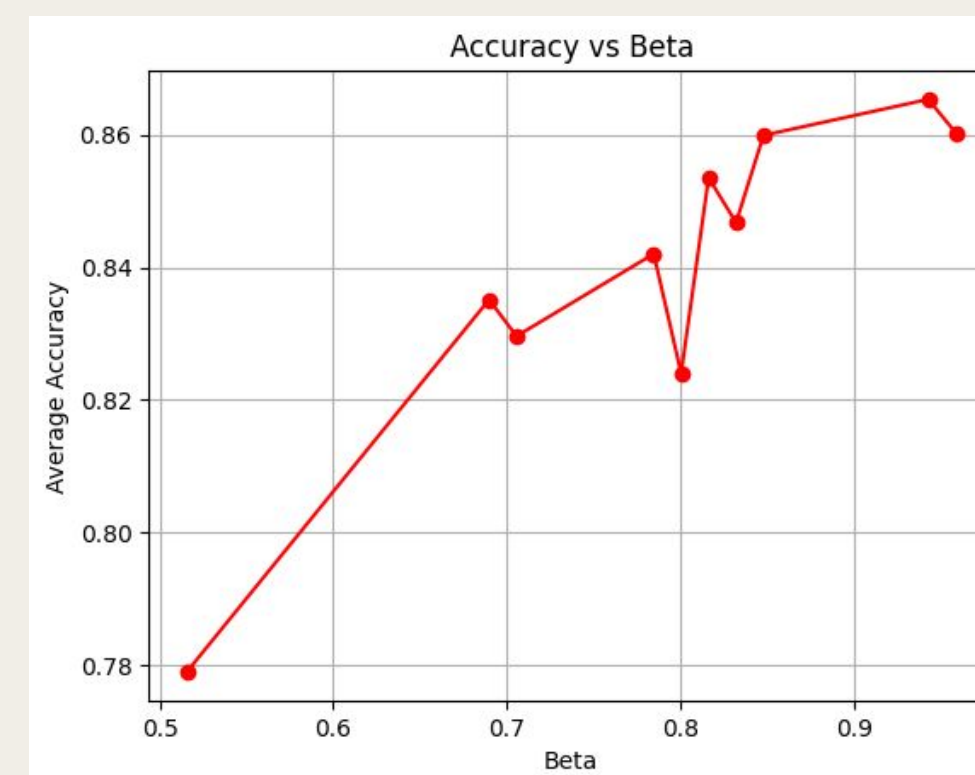
Anant Sahoo, Deep Patel, Sulaiman Mohyuddin

Introduction

- Spiking Neural Networks (SNNs) can perform well in classification tasks but are highly sensitive to hyperparameters.
- Utilizing Evolutionary Algorithms (EAs) can ease the process of hyperparameter selection and lead to better performance.
- We examined the effectiveness of the EAs in generating optimal hyperparameters to classify cursive Japanese using the Kuzushiji-MNIST (KMNIST) data set.

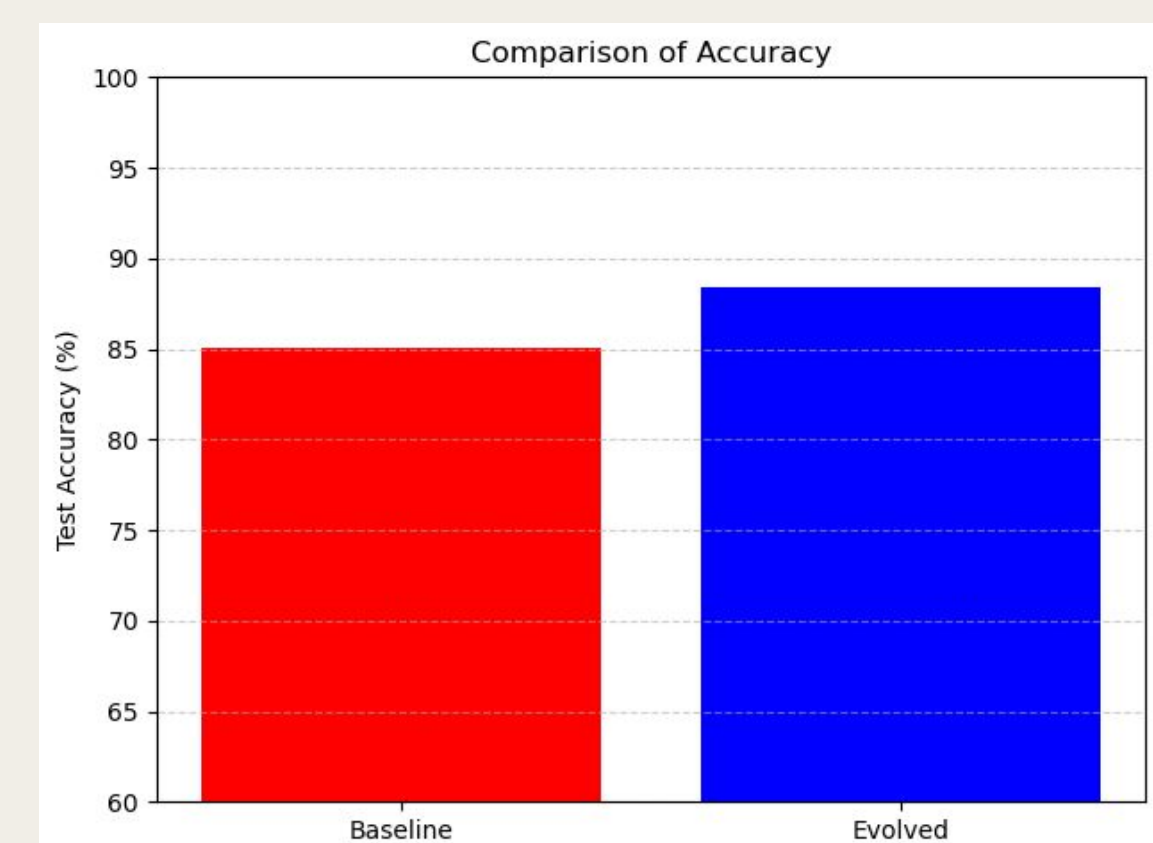


Results



Methodology

- Created a baseline model using snn with default hyperparameters for batch size, number of nodes in hidden layer, beta value, and number of time steps.
- Set up evolutionary algorithm genome to evolve values for the hyperparameters being varied.
 - Batch size: 64 to 256 in increments of 32
 - Number of Nodes: 200 to 1000 in increments of 10
 - Beta: 0.5 to 0.99 in 32 even increments
 - Number of time steps: 10 to 50 in increments of 10
- Ran the evolutionary algorithm for 15 generations with 10 individuals per generation with the fitness being the accuracy of the trained model.



Conclusion

- Even with a limited gene pool, EAs can adequately improve model performance
- With further testing with the evolutionary parameters, performance can be improved, demonstrating the potential of EAs in SNN optimizations.



THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

References

- Code: <https://github.com/open-neuromorphic/hands-on-session-snn-torch-230302>
- Dataset: <https://github.com/rois-codh/kmnist>