

# ON THE EVOLUTION OF NEURON COMMUNITIES IN A DEEP LEARNING ARCHITECTURE

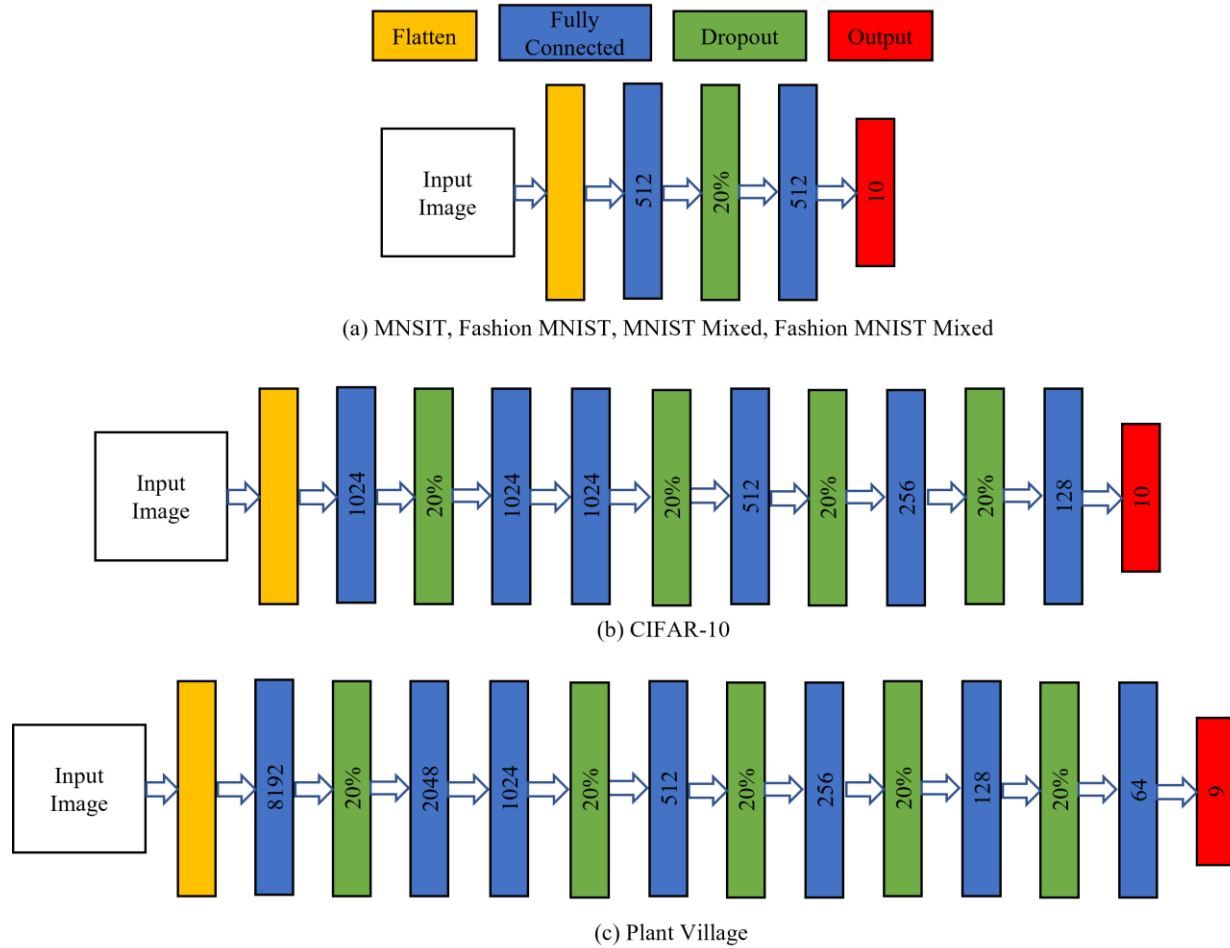


Figure 1: Graphical Representation of the deep learning model architecture used in the study.



Figure 2: Change of normalized entropy, training and testing accuracy for different classes of the MNIST dataset over different iterations.

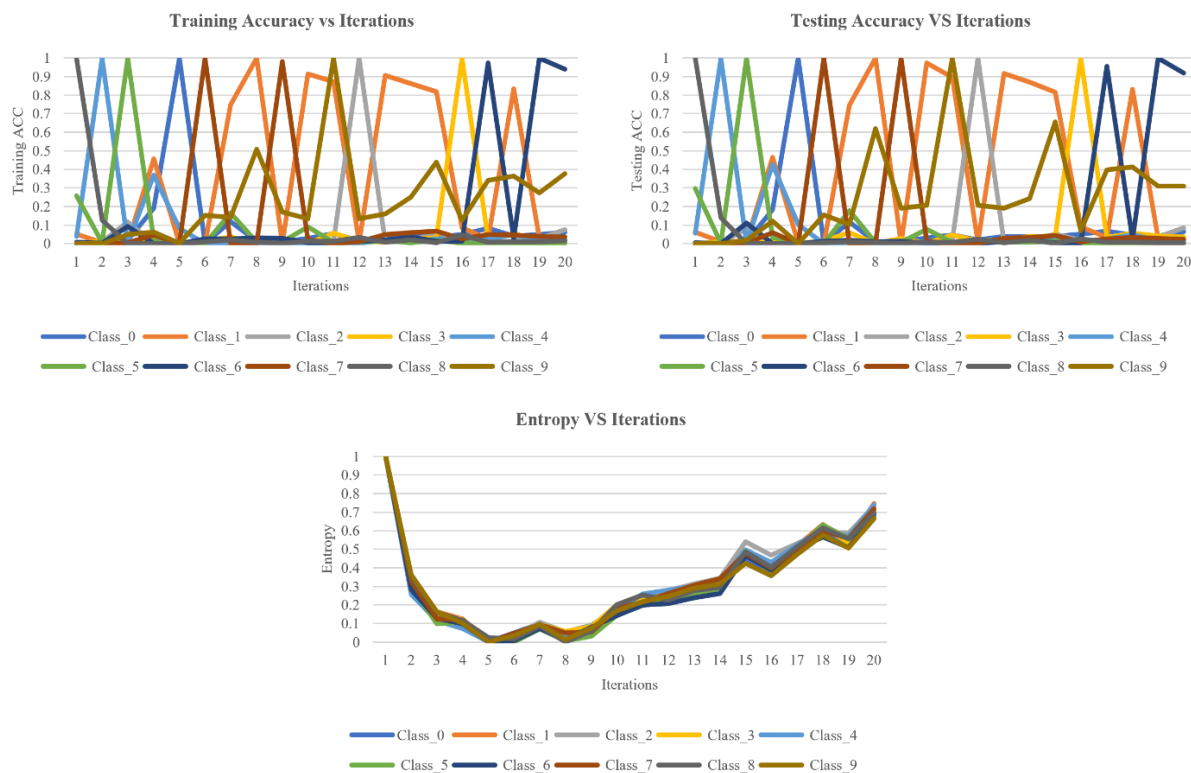
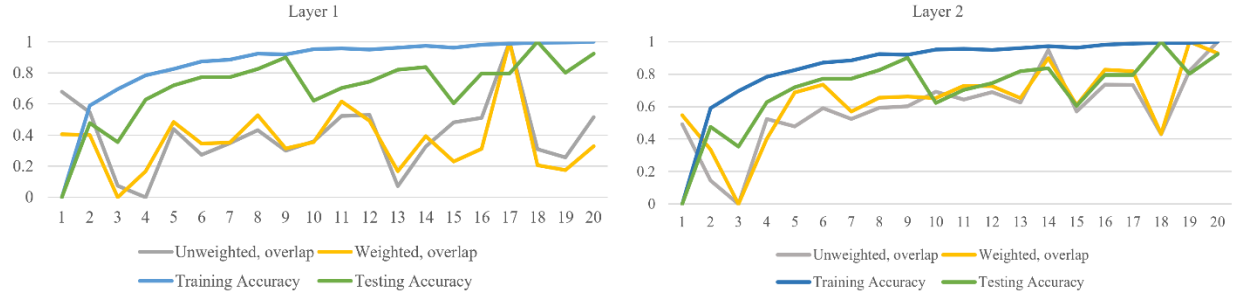
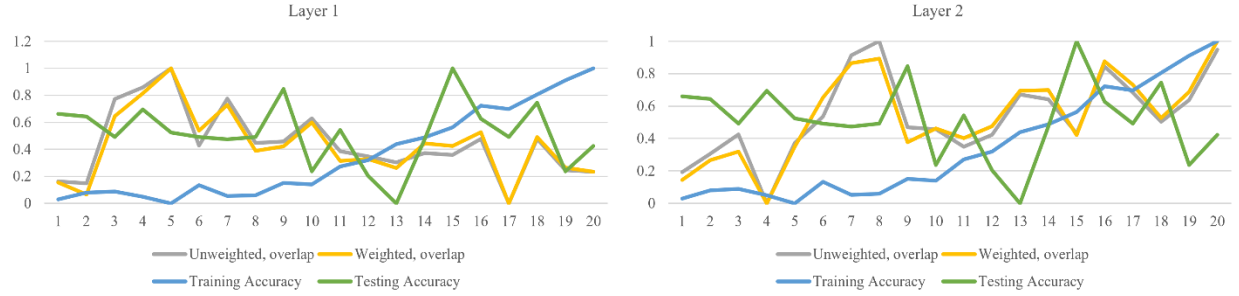


Figure 3: Change of normalized entropy, training, and testing accuracy of the MNIST Mixed dataset over different iterations.

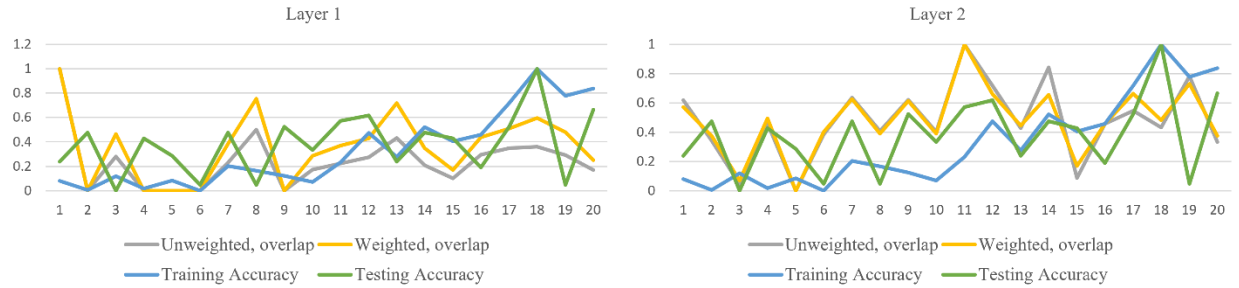


(a) MNIST

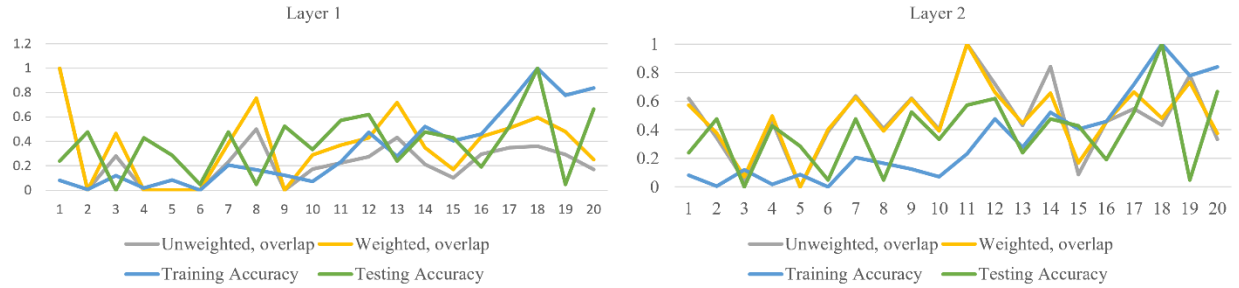


(a) MNIST Mixed

Figure 4: Change of normalized modularity, training, and testing accuracy of the MNIST and MNIST Mixed dataset over different iterations.



(a) Fashion MNIST



(a) Fashion MNIST Mixed

Figure 5: Change of normalized modularity, training, and testing accuracy of the Fashion MNIST and Fashion MNIST Mixed dataset over different iterations.

Table 1: Pearson correlation coefficient between modularity and testing accuracy for different layers. Darker blue represents higher values, and darker red represents lower values.

	MNIST		MNIST Mixed		Fashion MNIST		Fashion MNIST Mixed	
	L1	L2	L1	L2	L1	L2	L1	L2
KLB	0.22	0.28	-0.13	0.16	-0.08	0.48	-0.12	-0.44
No-overlap	0.23	0.30	0.05	-0.08	0.28	0.45	-0.10	-0.04
Unweighted, overlap	0.26	0.60	0.18	-0.25	0.64	0.66	-0.05	0.27
Weighted, overlap	0.26	0.61	0.24	-0.31	0.56	0.69	-0.04	0.34
CIFAR-10								
		L1	L2	L3	L4	L5	L6	
KLB		0.13	0.65	0.65	-0.14	-0.28	0.01	
No-overlap		-0.03	0.66	0.30	0.04	-0.02	-0.45	
Unweighted, overlap		0.36	0.86	0.72	0.80	0.59	-0.37	
Weighted, overlap		0.43	0.76	0.70	0.69	0.64	0.02	
Plant Village								
		L1	L2	L3	L4	L5	L6	L7
KLB		0.25	0.58	0.78	0.84	-0.15	-0.31	-0.19
No-overlap		0.25	0.06	0.34	-0.16	0.06	0.00	0.42
Unweighted, overlap		0.14	0.49	0.79	0.92	0.59	0.41	0.69
Weighted, overlap		0.24	0.59	0.81	0.90	0.68	0.62	0.56

Table 2: Pearson correlation coefficient between the entropy and testing accuracy. Darker blue represents higher values, and darker red represents lower values

	MNIST	MNIST Mixed	Fashion MNIST	Fashion MNIST Mixed	CIFAR-10	Plant Village
<b>PCC</b>	-0.79	0.17	-0.93	0.35	-0.95	-0.93

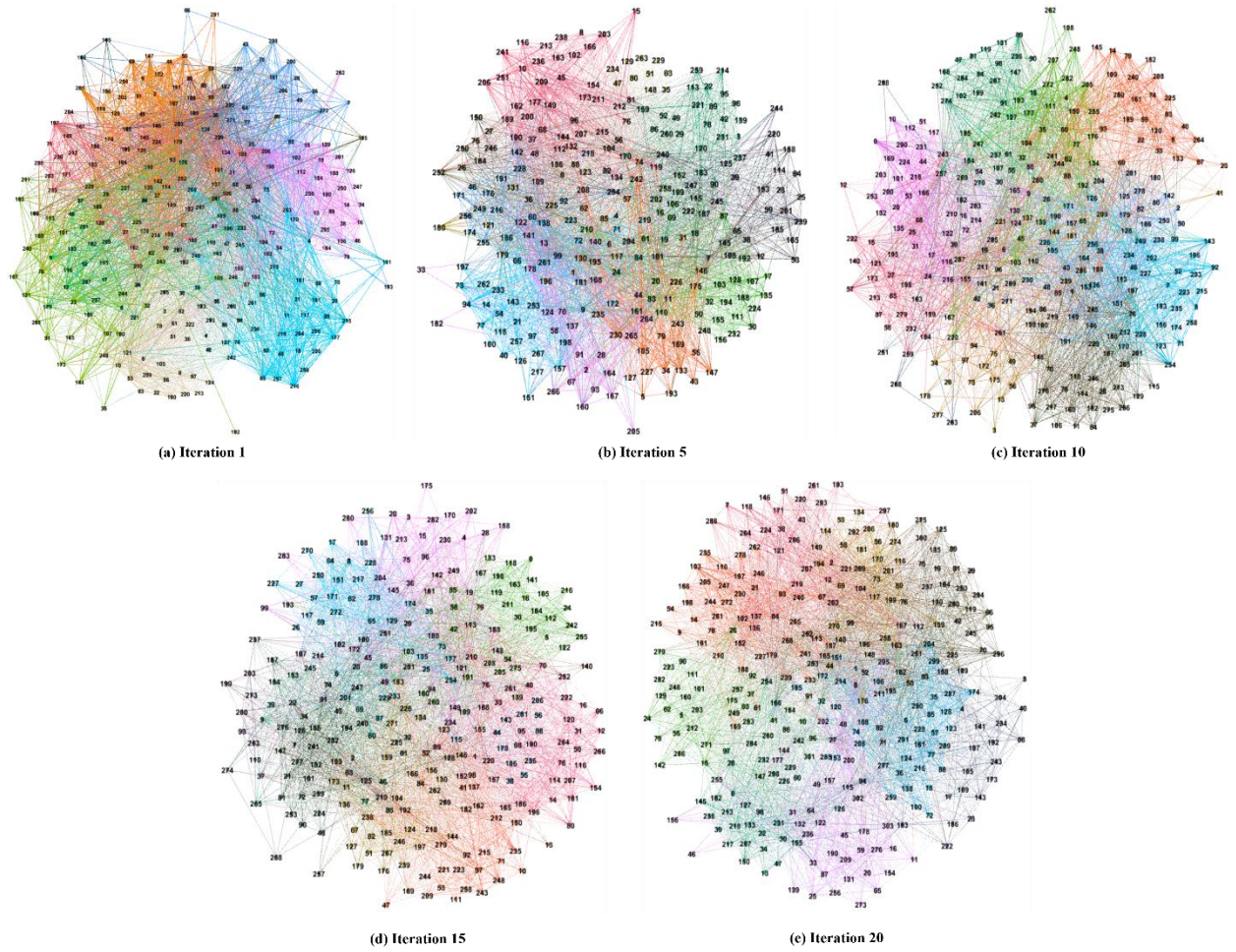


Figure 6; Visualizations for activation pattern graphs of layer 2 for the MNIST dataset. (a) Iteration 1, (b) Iteration 5, (c) Iteration 10, (d) Iteration 15, (e) Iteration 20. The label of each node represents the classes for which the node was frequently activated with high activation value