ML HW 1 Report

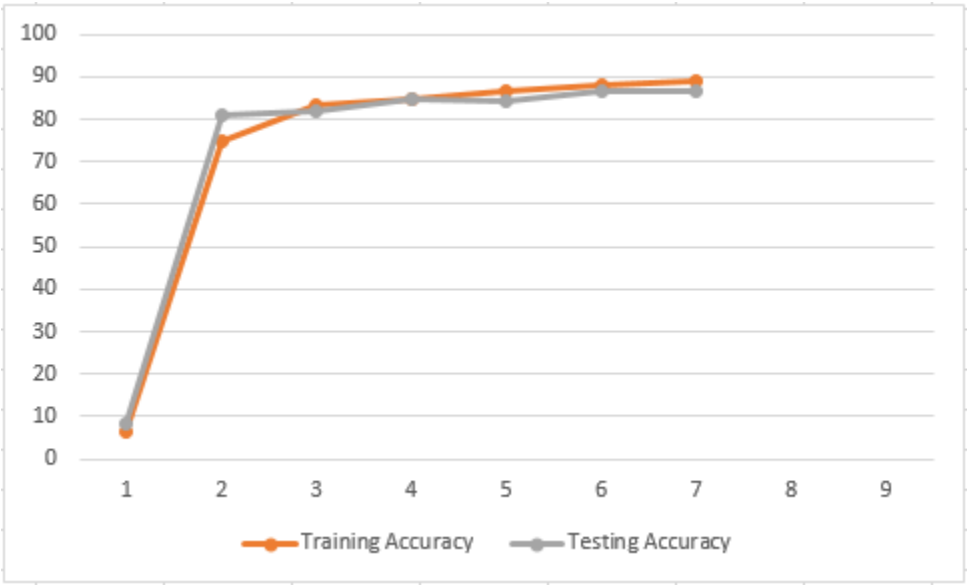
Submitted by – FNU Akanksha

Experiment perfomed-

To classify the mnist data for the hand written digit recognition we have created a perceptron and have trained it further for 70 epochs or if the accuracy stops increasing (have checked for the difference in previous and new as .01) updated weight after each mini batch which in this case is one training example and then tested for the those weights .It has been trained and tested for 3 different learning rates(.1,.01,.001).It Has been observed that as the learning rate is increased, high accuracy can be achieved in less epochs as compared to the one with lesser learning rates. Some times for set of weights the accuracy starts to oscillate between two accuracies and never converges even after 70 epochs.Below are the some of the observed stats.

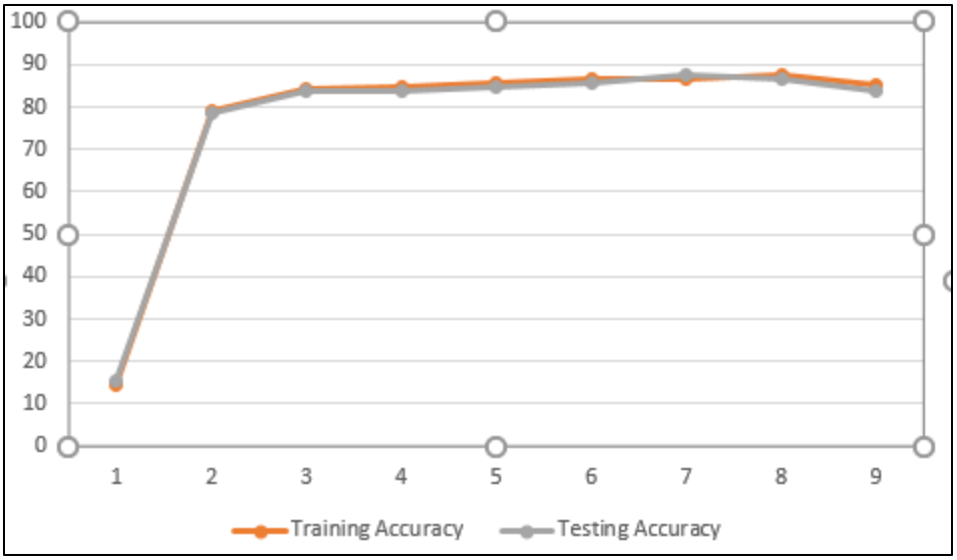
Graphs and Confusion Matrix for-

a) Learning Rate- .1



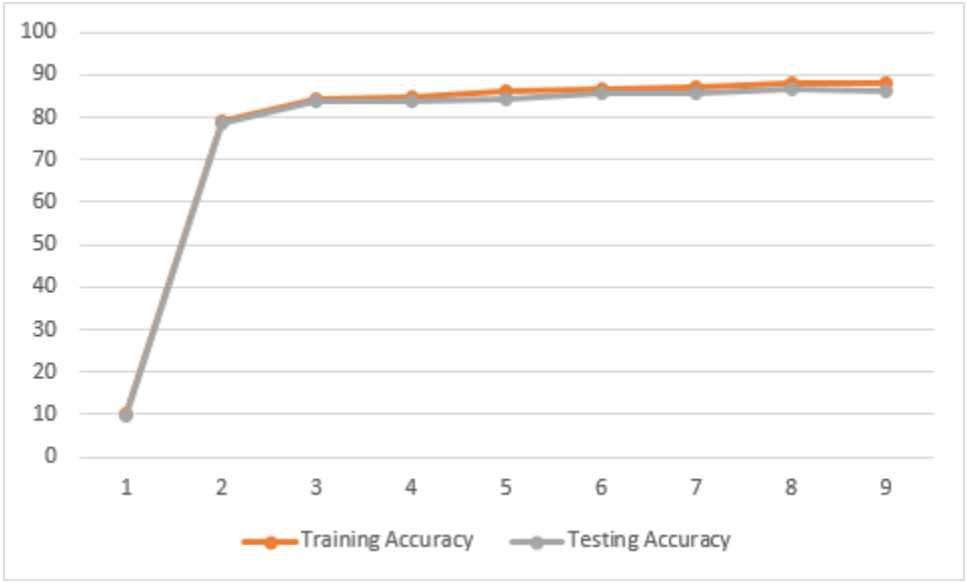
940	0	7	3	0	20	3	1	6	0
0	994	1	14	2	42	2	2	74	4
5	0	871	87	2	21	5	4	33	4
0	0	9	916	0	69	1	3	10	2
0	0	24	18	777	14	4	0	41	104
5	0	16	17	4	821	0	2	20	7
4	4	33	5	2	69	822	4	15	0
1	0	31	54	6	11	0	848	19	58
1	0	19	68	4	48	1	0	825	8
0	0	29	41	12	21	0	5	35	866

b) Learning Rate -.01



922	0	38	0	0	14	1	1	4	0
0	1038	3	0	1	53	0	1	39	0
3	5	940	0	0	33	8	16	25	2
3	2	87	492	0	351	1	32	37	5
2	1	56	6	753	37	6	9	27	85
5	2	29	0	1	834	2	6	9	4
8	3	32	0	2	135	762	1	15	0
1	6	27	1	3	7	1	964	7	11
2	1	50	4	3	92	0	10	808	4
8	4	60	10	5	38	1	80	13	790

c) Learning Rate- .001



909	0	24	0	2	23	8	1	13	0
0	1023	4	0	3	60	0	1	44	0
2	1	978	1	11	10	3	2	23	1
3	0	112	514	5	312	1	15	38	10
0	0	21	0	911	6	11	0	19	14
5	0	39	1	9	807	3	3	20	5
4	2	76	0	7	50	810	2	7	0
1	2	47	2	20	7	0	927	13	9
1	0	32	3	10	39	0	1	887	1
3	4	63	4	95	30	1	26	42	741