IMPLEMENTATION

All things implemented

EXPERIMENTS WITH SPAMBASE DATABASE

2.1) Divergence occurs when we increase eta above 0.03
2.2) convergence occurs for eta 0.005 for Linear Model and 0.001 for Logistic Model
2.3) Stopping criteria is implemented in file trainer.lua. It is by default commented and when uncommented, will out put whenever convergence is achieved. Note that this is done as soon as convergence is achieved (while training itself) and the program doesn't continue the work any further in that case.

2.4) learning rate used = 0.001

10	30	100	500	1000	3000				
Average Loss				0.34	0.39	0.41	0.46	0.72	0.66
Classification Error				0.1	0.06	0.07	0.08	0.12	0.08
Average Loss				5.21	4.69	4.39	1.14	0.83	0.74
Classification Error				0.36	0.22	0.14	0.11	0.13	0.10
Iteration				NA	NA	39	39	36	47

2.5) Training Error ~0.09
Testing Error ~0.11

L2 AND L1 REGULARIZATION

3.1) The use of L2 regularization on direct solution of linear regression has no effect on the total error.
For lambda = 0.05,
Without L2
Loss=0.22458942406725
Error=0.11022727272727
With L2
Loss=0.22458948374481
Error=0.11022727272727

3.2)
L2 Regularization

10	30	100	
Test Loss	20	12.05	6.7
Test Error	0.418	0.45	0.37
Training Loss	4.86	3.19	3.35
Training Error	0.3	0.3	0.32
Lambda	0.05	0.05	0.05

L1 Regularization

	10	30	100
Test Loss	9.54	8.28	5.27
Test Error	0.37	0.37	0.32
Training Loss	6.46	3.77	1.36
Training Error	0.4	0.36	0.4
Lambda	0.01	0.01	0.01

MULTINOMIAL LOGISTIC REGRESSION

4.1) This is with L2 Regularization

	100	500	1000	6000
Error Training	0.58	0.28	0.90	0.90
Error Testing	0.72	0.4	0.91	0.91

4.2) with L1 Regularization

	100	500	1000	6000
Error Training	0.49	0.26	0.90	0.90
Error Testing	0.70	0.4	0.91	0.91