

Assignment 4: Neural Network

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NOTE:

1. Train Accu: This is Training Set Accuracy in percentage (%)
2. Test Accu: This is Test Set Accuracy in percentage (%)
3. Train Error: This is Training Set Error.
4. Test Error: This is Test Set Error.

PART1

Build a neural network with 1 hidden layer and perform the text classification task

Epoch 1=>	Train Accu: 89.12752	Test Accu: 87.56806	Train Error: 0.36511	Test Error: 0.45006
Epoch 2=>	Train Accu: 92.70694	Test Accu: 91.65154	Train Error: 0.23144	Test Error: 0.28578
Epoch 3=>	Train Accu: 94.22819	Test Accu: 92.92196	Train Error: 0.18101	Test Error: 0.22425
Epoch 4=>	Train Accu: 94.98881	Test Accu: 94.19238	Train Error: 0.15360	Test Error: 0.19189
Epoch 5=>	Train Accu: 95.68233	Test Accu: 94.73684	Train Error: 0.13603	Test Error: 0.17203
Epoch 6=>	Train Accu: 96.08501	Test Accu: 95.19056	Train Error: 0.12362	Test Error: 0.15905
Epoch 7=>	Train Accu: 96.37584	Test Accu: 95.46279	Train Error: 0.11446	Test Error: 0.15035
Epoch 8=>	Train Accu: 96.73378	Test Accu: 95.82577	Train Error: 0.10738	Test Error: 0.14424
Epoch 9=>	Train Accu: 96.95749	Test Accu: 96.18875	Train Error: 0.10160	Test Error: 0.13962
Epoch 10=>	Train Accu: 97.11409	Test Accu: 96.37024	Train Error: 0.09665	Test Error: 0.13592
Epoch 20=>	Train Accu: 98.12081	Test Accu: 97.00544	Train Error: 0.06715	Test Error: 0.11812
Epoch 30=>	Train Accu: 98.81432	Test Accu: 97.54991	Train Error: 0.05089	Test Error: 0.11257
Epoch 40=>	Train Accu: 99.23937	Test Accu: 97.64065	Train Error: 0.04024	Test Error: 0.11169
Epoch 50=>	Train Accu: 99.37360	Test Accu: 97.91289	Train Error: 0.03287	Test Error: 0.11330
Epoch 60=>	Train Accu: 99.46309	Test Accu: 98.00363	Train Error: 0.02742	Test Error: 0.11594
Epoch 70=>	Train Accu: 99.57494	Test Accu: 98.00363	Train Error: 0.02312	Test Error: 0.11938
Epoch 80=>	Train Accu: 99.68680	Test Accu: 98.00363	Train Error: 0.01962	Test Error: 0.12342
Epoch 90=>	Train Accu: 99.70917	Test Accu: 98.00363	Train Error: 0.01666	Test Error: 0.12798
Epoch 100=>	Train Accu: 99.70917	Test Accu: 98.00363	Train Error: 0.01415	Test Error: 0.13303
Epoch 200=>	Train Accu: 99.91051	Test Accu: 97.82214	Train Error: 0.00539	Test Error: 0.17216
Epoch 300=>	Train Accu: 99.91051	Test Accu: 97.64065	Train Error: 0.00398	Test Error: 0.18901
Epoch 400=>	Train Accu: 99.91051	Test Accu: 97.64065	Train Error: 0.00345	Test Error: 0.19866
Epoch 500=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00317	Test Error: 0.20570
Epoch 600=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00300	Test Error: 0.21136
Epoch 700=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00289	Test Error: 0.21616
Epoch 800=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00282	Test Error: 0.22037
Epoch 900=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00276	Test Error: 0.22409
Epoch 1000=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00272	Test Error: 0.22738
Epoch 1100=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00269	Test Error: 0.23029
Epoch 1200=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00266	Test Error: 0.23301
Epoch 1300=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00264	Test Error: 0.23544
Epoch 1400=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00262	Test Error: 0.23763
Epoch 1500=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00260	Test Error: 0.23971
Epoch 1600=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00259	Test Error: 0.24154
Epoch 1700=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00258	Test Error: 0.24331
Epoch 1800=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00257	Test Error: 0.24498
Epoch 1900=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00256	Test Error: 0.24653
Epoch 2000=>	Train Accu: 99.91051	Test Accu: 97.54991	Train Error: 0.00255	Test Error: 0.24799

Test Set Accuracy: 97.54990925589837%

PART2

Build a neural network with 2 hidden layer

Epoch 1=>	Train Accu: 86.73884	Test Accu: 85.67663	Train Error: 0.36079	Test Error: 0.37925
Epoch 2=>	Train Accu: 86.85160	Test Accu: 85.76450	Train Error: 0.34298	Test Error: 0.36031
Epoch 3=>	Train Accu: 87.07713	Test Accu: 86.02812	Train Error: 0.32671	Test Error: 0.34284
Epoch 4=>	Train Accu: 87.59585	Test Accu: 86.64323	Train Error: 0.31152	Test Error: 0.32642
Epoch 5=>	Train Accu: 88.20478	Test Accu: 87.52197	Train Error: 0.29725	Test Error: 0.31090
Epoch 6=>	Train Accu: 88.81371	Test Accu: 87.87346	Train Error: 0.28386	Test Error: 0.29626
Epoch 7=>	Train Accu: 89.53541	Test Accu: 88.40070	Train Error: 0.27137	Test Error: 0.28253
Epoch 8=>	Train Accu: 90.18945	Test Accu: 89.27944	Train Error: 0.25980	Test Error: 0.26977
Epoch 9=>	Train Accu: 90.55029	Test Accu: 89.63093	Train Error: 0.24911	Test Error: 0.25796
Epoch 10=>	Train Accu: 91.15922	Test Accu: 90.94903	Train Error: 0.23926	Test Error: 0.24708
Epoch 20=>	Train Accu: 93.91069	Test Accu: 93.93673	Train Error: 0.17277	Test Error: 0.17488
Epoch 30=>	Train Accu: 95.62472	Test Accu: 95.51845	Train Error: 0.13841	Test Error: 0.13988
Epoch 40=>	Train Accu: 96.32386	Test Accu: 96.22144	Train Error: 0.11773	Test Error: 0.12066
Epoch 50=>	Train Accu: 96.77492	Test Accu: 96.66081	Train Error: 0.10336	Test Error: 0.10846
Epoch 60=>	Train Accu: 97.18088	Test Accu: 96.83656	Train Error: 0.09235	Test Error: 0.09977
Epoch 70=>	Train Accu: 97.54172	Test Accu: 97.01230	Train Error: 0.08345	Test Error: 0.09311
Epoch 80=>	Train Accu: 97.63194	Test Accu: 97.01230	Train Error: 0.07605	Test Error: 0.08777
Epoch 90=>	Train Accu: 97.99278	Test Accu: 97.45167	Train Error: 0.06981	Test Error: 0.08338
Epoch 100=>	Train Accu: 98.19576	Test Accu: 97.71529	Train Error: 0.06449	Test Error: 0.07971
Epoch 200=>	Train Accu: 99.09788	Test Accu: 98.41828	Train Error: 0.03552	Test Error: 0.06283
Epoch 300=>	Train Accu: 99.41362	Test Accu: 98.24253	Train Error: 0.02217	Test Error: 0.06145
Epoch 400=>	Train Accu: 99.68426	Test Accu: 98.24253	Train Error: 0.01527	Test Error: 0.06617
Epoch 500=>	Train Accu: 99.84213	Test Accu: 98.41828	Train Error: 0.01174	Test Error: 0.07191
Epoch 600=>	Train Accu: 99.88724	Test Accu: 98.24253	Train Error: 0.00974	Test Error: 0.07707
Epoch 700=>	Train Accu: 99.88724	Test Accu: 98.24253	Train Error: 0.00847	Test Error: 0.08170
Epoch 800=>	Train Accu: 99.88724	Test Accu: 98.33040	Train Error: 0.00762	Test Error: 0.08573
Epoch 900=>	Train Accu: 99.88724	Test Accu: 98.15466	Train Error: 0.00703	Test Error: 0.08908
Epoch 1000=>	Train Accu: 99.90979	Test Accu: 98.15466	Train Error: 0.00659	Test Error: 0.09186
Epoch 1100=>	Train Accu: 99.90979	Test Accu: 98.15466	Train Error: 0.00625	Test Error: 0.09421
Epoch 1200=>	Train Accu: 99.90979	Test Accu: 98.15466	Train Error: 0.00597	Test Error: 0.09624
Epoch 1300=>	Train Accu: 99.90979	Test Accu: 98.15466	Train Error: 0.00574	Test Error: 0.09805
Epoch 1400=>	Train Accu: 99.90979	Test Accu: 98.06678	Train Error: 0.00554	Test Error: 0.09969
Epoch 1500=>	Train Accu: 99.90979	Test Accu: 98.06678	Train Error: 0.00537	Test Error: 0.10121
Epoch 1600=>	Train Accu: 99.90979	Test Accu: 97.97891	Train Error: 0.00521	Test Error: 0.10264
Epoch 1700=>	Train Accu: 99.90979	Test Accu: 97.97891	Train Error: 0.00507	Test Error: 0.10402
Epoch 1800=>	Train Accu: 99.90979	Test Accu: 97.97891	Train Error: 0.00495	Test Error: 0.10535
Epoch 1900=>	Train Accu: 99.90979	Test Accu: 97.97891	Train Error: 0.00483	Test Error: 0.10665
Epoch 2000=>	Train Accu: 99.90979	Test Accu: 97.97891	Train Error: 0.00473	Test Error: 0.10792

Test Set Accuracy: 97.97891036906854%

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