EPART Lab 3 Report

Rustenis Tolpeznikas

December 13, 2024

2 Implementing Perceptron

3 One versus One

3.1 Original Data Set

3.1.1 Training

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	5698	1	21	13	6	56	23	2	15	4	84
2	0	6518	29	13	2	7	0	16	55	7	95
3	22	14	5388	56	45	14	61	32	84	9	233
4	10	11	69	5436	1	195	11	28	108	35	227
5	6	8	41	3	5348	5	30	23	17	188	173
6	23	7	25	168	12	4669	62	9	127	37	282
7	24	4	54	1	28	82	5565	1	19	0	140
8	5	8	45	29	25	11	1	5794	11	141	195
9	13	59	58	116	8	115	30	16	5108	56	272
0	9	13	25	51	164	29	1	206	37	5210	204

3.1.2 Testing

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	946	0	2	2	0	6	6	2	0	0	16
2	0	1108	5	1	0	3	0	0	7	0	11
3	4	5	947	7	4	3	9	7	12	1	33
4	0	0	10	918	2	25	0	7	12	3	33
5	1	0	7	1	907	0	6	6	3	29	22
6	8	0	5	39	3	767	6	1	21	4	38
7	7	2	15	1	4	16	889	0	3	0	21
8	0	4	18	7	5	0	0	936	5	22	31
9	4	4	3	27	3	24	6	5	862	2	34
0	4	4	1	7	35	6	0	28	13	883	28

3.2 Extended Data Set

3.2.1 Training

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	5891	0	1	1	0	0	6	0	0	2	22
2	0	6714	2	0	0	0	0	6	6	2	12
3	1	4	5936	0	0	0	1	8	0	1	7
4	1	0	0	6111	0	8	0	4	0	1	6
5	1	2	1	0	5829	0	1	2	0	2	4
6	0	2	0	1	0	5410	3	0	1	0	4
7	3	2	0	0	3	3	5904	0	0	0	3
8	1	6	9	5	2	0	0	6208	2	9	23
9	0	7	0	1	0	2	0	1	5839	1	0
0	4	1	0	3	2	0	0	9	0	5925	5

3.2.2 Testing

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	965	0	0	0	0	0	4	1	0	0	10
2	0	1121	1	1	1	0	3	1	1	0	6
3	5	1	1000	2	1	0	4	5	5	1	8
4	0	0	2	976	0	5	0	4	5	1	17
5	1	0	3	1	942	0	4	2	1	10	18
6	2	0	1	11	0	849	4	0	6	2	17
7	1	2	2	0	5	8	932	0	1	0	7
8	0	4	7	2	2	0	0	986	1	11	15
9	2	1	2	11	1	3	2	3	932	2	15
0	1	4	1	3	7	5	1	1	0	970	16

4 One versus Rest

4.1 Original Data Set

4.1.1 Training

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	4795	0	4	2	5	31	11	3	3	3	1066
2	2	6011	23	9	3	32	1	7	61	13	580
3	10	19	4496	39	38	21	35	36	66	26	1172
4	19	6	58	3773	1	250	13	19	39	62	1891
5	8	7	14	2	4233	17	14	7	33	176	1331
6	34	12	14	58	38	3545	31	8	45	28	1608
7	13	8	20	1	18	104	4854	1	15	2	882
8	17	9	52	11	19	17	0	4572	8	148	1412
9	20	57	20	66	3	171	17	9	3460	58	1970
0	16	8	17	36	69	66	0	75	14	4445	1203

4.1.2 Testing

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	814	0	0	1	0	6	1	1	0	1	156
2	0	1026	0	2	0	3	3	1	11	0	89
3	2	2	757	7	7	2	4	8	21	4	218
4	2	0	4	646	0	40	2	3	9	6	298
5	1	0	1	1	729	1	3	1	5	33	207
6	7	1	1	9	3	589	4	2	8	4	264
7	8	1	2	1	3	13	794	0	3	0	133
8	3	2	19	1	3	1	0	736	0	14	249
9	9	5	4	12	4	22	5	3	589	5	316
0	3	2	2	2	12	11	0	7	1	737	232

4.2 Extended Data Set

4.2.1 Training

Class	1	2	3	4	5	6	7	8	9	0	Rejected
1	5891	0	1	1	0	0	6	0	0	2	22
2	0	6714	2	0	0	0	0	6	6	2	12
3	1	4	5936	0	0	0	1	8	0	1	7
4	1	0	0	6111	0	8	0	4	0	1	6
5	1	2	1	0	5829	0	1	2	0	2	4
6	0	2	0	1	0	5410	3	0	1	0	4
7	3	2	0	0	3	3	5904	0	0	0	3
8	1	6	9	5	2	0	0	6208	2	9	23
9	0	7	0	1	0	2	0	1	5839	1	0
0	4	1	0	3	2	0	0	9	0	5925	5

4.2.2 Testing

5 Further Improvements