

Supplementary Materials

Table S1. Results of accuracy, precision and recall obtained from the artificial neural network using scaled conjugate gradient (SCG), gradient descent momentum and an adaptive learning rate (GDX) and gradient descent with adaptive learning rate (GDA) learning algorithms for the dataset with 80% training and 20% testing samples.

Experiment	SCG	GDX	GDA
1	100	100	100
2	100	100	100
3	100	100	100
4	100	100	100
5	100	100	100
6	100	100	100
7	100	100	100
8	100	100	100
9	100	100	100
10	100	100	100
Best	100	100	100
Average	100	100	100
Standard Deviation	0	0	0

Table S2. Results of accuracy obtained from the ANN using SCG, GDX and GDA algorithms for the dataset with 50% training and 50% testing samples.

Experiment	SCG	GDX	GDA
1	100	100	99.38
2	100	100	99.08
3	100	99.69	98.77
4	100	99.69	98.77
5	100	99.69	98.46
6	100	99.38	98.46
7	100	99.38	98.46
8	100	99.38	98.15
9	100	99.08	98.15
10	100	99.08	97.85
Best	100	100	99.38
Average	100	99.39	98.46
Standard Deviation	0	0.223	0.353

Table S3. Results of accuracy obtained from the ANN using SCG, GDX and GDA algorithms for the dataset with 20% training and 80% testing samples.

Experiment	SCG	GDX	GDA
1	99.81	88.27	81.15
2	98.08	86.35	78.65
3	97.5	84.81	77.88
4	97.31	84.04	77.31
5	96.35	83.85	76.92
6	95.96	83.27	76.92
7	95.77	82.88	76.54
8	95.58	82.12	76.35
9	95.19	81.92	75.96
10	95	81.54	75.58

Best	99.81	88.27	81.15
Average	96.38	83.52	76.95
Standard Deviation	1.255	1.754	1.364

Table S4. Results of precision for the best accuracy obtained for each class from the ANN of the Tables 4, 5 and 6, using SCG, GDX and GDA learning algorithms for the datasets with 80% training and 20% testing samples (80/20), 50% training and 50% testing (50/50) and 20% training and 80% testing (20/80).

Class	80/20 (%)			50/50 (%)			20/80 (%)		
	SCG	GDX	GDA	SCG	GDX	GDA	SCG	GDX	GDA
1	100	100	100	100	100	100	100	100	100
2	100	100	100	100	100	100	100	100	100
3	100	100	100	100	100	96.15	100	87.50	97.50
4	100	100	100	100	100	100	100	62.50	90
5	100	100	100	100	100	96.15	100	97.50	100
6	100	100	100	100	100	100	100	77.50	90
7	100	100	100	100	100	100	100	95	97.50
8	100	100	100	100	100	100	100	77.50	55
9	100	100	100	100	100	100	100	95	95
10	100	100	100	100	100	100	97.50	90	17.50
11	100	100	100	100	100	100	100	82.50	62.50
12	100	100	100	100	100	100	100	100	100
13	100	100	100	100	100	100	100	82.50	50
Average	100	100	100	100	100	99.4	99.81	88.27	81.15

Table S5. Results of recall for the best accuracy obtained for each sample class from the ANN of the Tables S1, S2 and S3, using SCG, GDX and GDA learning algorithms for the datasets with 80% training and 20% testing samples (80/20), 50% training and 50% testing (50/50) and 20% training and 80% testing (20/80).

Class	80/20 (%)			50/50 (%)			20/80 (%)		
	SCG	GDX	GDA	SCG	GDX	GDA	SCG	GDX	GDA
1	100	100	100	100	100	100	100	100	100
2	100	100	100	100	100	100	100	100	100
3	100	100	100	100	100	96.1	100	87.5	97.5
4	100	100	100	100	100	100	100	62.5	90
5	100	100	100	100	100	96.1	100	97.5	100
6	100	100	100	100	100	100	100	77.5	90
7	100	100	100	100	100	100	100	95	97.5
8	100	100	100	100	100	100	100	77.5	55
9	100	100	100	100	100	100	100	95	95
10	100	100	100	100	100	100	97.5	90	17.5
11	100	100	100	100	100	100	100	82.5	62.5
12	100	100	100	100	100	100	100	100	100
13	100	100	100	100	100	100	100	82.5	50
Average	100	100	100	100	100	99.4	99.81	88.2	81.15

Table S6. Results of accuracy for the 10-fold cross validation obtained from the ANN using SCG for the three datasets.

Experiment	80/20 (%)	50/50 (%)	20/80 (%)
1	99.85	99.45	96.13
2	99.85	99.32	95.85
3	99.77	84.81	95.63
4	99.77	99.26	95.5
5	99.77	99.23	95.44
6	99.77	99.23	95.37
7	99.69	99.20	95.35
8	99.69	99.17	95.35
9	99.69	99.14	95.33
10	99.69	99.11	95.29
Best	99.85	99.45	96.13
Average	99.76	99.18	95.44
Standard Deviation	0.0553	0.0653	0.1748