Appendix C

Experiments - settings and results

C-1 Experiments - ARIMA - outlier detection

Table C-1: AIC and BIC for different ARIMA models. Standard notation ARIMA(p,d,q) indicates the parameters of the model with p - lag order, d - degree of differencing, q - order of moving average.

	AL0		AL325	
ARIMA model	AIC	BIC	AIC	BIC
(1,0,1)	1108.63	1123.41	1513.87	1528.87
(1,1,1)	1107.31	1122.07	1506.05	1520.81
(2,1,1)	1107.25	1125.70	1496.43	1514.89
(1,1,2)	1107.44	1125.90	1506.09	1524.54

C-2 Experiments - CNN - raw data input

Table C-2: Results of experiments on CNN model with the raw data input on validation set.

	threshold	recall	precision	F_1-score
Experiment 1	0.0001	0.38	0.17	0.23
	0.001	0.24	0.42	0.31
	0.005	0.17	0.69	0.27
	0.01	0.14	0.78	0.24
Experiment 1a	0.001	0.44	0.18	0.25

	threshold	recall	precision	F_1-score
	0.005	0.26	0.49	0.34
	0.01	0.21	0.68	0.32
	0.02	0.16	0.84	0.27
	0.0001	0.27	0.35	0.30
Experiment 2	0.001	0.16	0.68	0.26
	0.005	0.12	0.88	0.20
	0.001	0.50	0.16	0.24
Experiment 3	0.005	0.29	0.47	0.36
	0.01	0.23	0.67	0.34
	0.02	0.17	0.89	0.29
	0.01	0.41	0.33	0.37
Experiment 4	0.02	0.34	0.49	0.40
(Model D)	0.03	0.30	0.59	0.40
	0.05	0.25	0.70	0.37
	0.02	0.48	0.25	0.33
Experiment 4a	0.03	0.41	0.33	0.37
	0.05	0.34	0.49	0.40
	0.1	0.25	0.73	0.37
Experiment 5	0.03	0.24	0.13	0.17
	0.05	0.11	0.21	0.14
	0.02	0.49	0.12	0.19
Experiment 6	0.03	0.34	0.17	0.23
	0.05	0.19	0.29	0.23
	0.02	0.53	0.11	0.18
Experiment 7	0.03	0.36	0.16	0.22
	0.05	0.21	0.27	0.24
	0.02	0.56	0.11	0.18
Experiment 8	0.03	0.42	0.17	0.24
	0.05	0.27	0.29	0.28
	0.02	0.61	0.11	0.19
Experiment 9	0.03	0.48	0.16	0.24
	0.05	0.33	0.27	0.30
	0.1	0.18	0.54	0.27
	0.02	0.46	0.23	0.31
Experiment 10	0.03	0.38	0.37	0.37
	0.05	0.27	0.56	0.36
	0.1	0.17	0.82	0.28
	0.02	0.49	0.22	0.30
Experiment 11	0.03	0.40	0.33	0.36
	0.05	0.29	0.51	0.37

	threshold	recall	precision	F_1-score
	0.1	0.18	0.79	0.27
Experiment 12	0.02	0.52	0.19	0.28
	0.03	0.41	0.29	0.34
	0.05	0.31	0.51	0.39
	0.1	0.20	0.83	0.33
	0.2	0.12	0.97	0.21
Experiment 13	0.02	0.53	0.20	0.19
	0.03	0.42	0.31	0.36
	0.05	0.31	0.54	0.40
	0.1	0.18	0.83	0.30
Experiment 13a	0.005	0.42	0.33	0.37
	0.01	0.36	0.43	0.39
	0.02	0.31	0.56	0.40
	0.03	0.28	0.63	0.39
Experiment 13b (Model B)	0.02	0.49	0.27	0.35
	0.03	0.44	0.33	0.38
	0.05	**0.40**	**0.43**	**0.42**
	0.1	**0.32**	**0.59**	**0.42**
Experiment 14	0.02	0.53	0.20	0.19
	0.03	0.42	0.31	0.36
	0.05	0.31	0.54	0.40
	0.1	0.18	0.83	0.30
Experiment 15	0.02	0.45	0.14	0.21
	0.03	0.29	0.20	0.24
	0.05	0.15	0.37	0.22
Experiment 16	0.02	0.55	0.16	0.25
	0.03	0.43	0.26	0.32
	0.05	0.30	0.44	0.36
	0.1	0.17	0.72	0.28
Experiment 17	0.02	0.57	0.11	0.19
	0.03	0.41	0.16	0.24
	0.05	0.24	0.29	0.27
Experiment 17a	0.02	0.35	0.23	0.28
	0.03	0.26	0.33	0.28
	0.05	0.20	0.51	0.29
	0.1	0.12	0.74	0.20
Experiment 17a (Model A)	0.01	0.27	0.31	0.29
	0.02	0.22	0.44	0.29
	0.03	0.18	0.51	0.27
	0.05	0.14	0.59	0.23

	threshold	recall	precision	F_1-score
Experiment 18	0.02	0.55	0.13	0.21
	0.03	0.40	0.19	0.26
	0.05	0.25	0.32	0.28
	0.1	0.12	0.61	0.20
Experiment 19	0.02	0.36	0.22	0.27
	0.03	0.27	0.35	0.30
	0.05	0.18	0.57	0.28
Experiment 20	0.02	0.35	0.18	0.24
	0.03	0.24	0.31	0.27
	0.05	0.14	0.56	0.22
Experiment 21	0.02	0.54	0.14	0.22
	0.03	0.38	0.23	0.28
	0.05	0.25	0.45	0.32
Experiment 22	0.02	0.41	0.17	0.25
	0.03	0.29	0.27	0.28
	0.05	0.18	0.48	0.26
	0.1	0.07	0.77	0.14
Experiment 23	0.02	0.46	0.17	0.25
	0.03	0.33	0.29	0.31
	0.05	0.22	0.54	0.31
	0.1	0.12	0.85	0.22
Experiment 24	0.02	0.54	0.16	0.24
	0.03	0.44	0.24	0.31
	0.05	0.33	0.43	0.37
	0.1	0.22	0.80	0.34
Experiment 24a (Model C)	0.02	0.45	0.24	0.31
	0.03	0.40	0.30	0.34
	0.05	0.36	0.39	0.37
	0.1	0.28	0.56	0.38
	0.2	0.23	0.73	0.35

List of experiments' settings

Experiment #1
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2

Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #1a
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #2
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 256, kernel: 5
Batch normalization
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #3
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU

Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 5
Batch normalization
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #4
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 5
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 256, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #4a
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 5
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 256, kernel: 3
Batch normalization
Activation: ReLU

Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #5
Input: 297
Convolutional layer 1D: filters: 64, kernel: 15
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #6
Input: 297
Convolutional layer 1D: filters: 64, kernel: 21
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #7
Input: 297
Convolutional layer 1D: filters: 64, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #8
Input: 297
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization

Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #9
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #10
Input: 297
Convolutional layer 1D: filters: 64, kernel: 25
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #11
Input: 297
Convolutional layer 1D: filters: 64, kernel: 25
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 15
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU

Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #12
Input: 297
Convolutional layer 1D: filters: 64, kernel: 25
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 31
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #13
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #13a
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3

Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #13b
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #14
Input: 297
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #15
Input: 297
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024

Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #16
Input: 297
Convolutional layer 1D: filters: 32, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #17
Input: 297
Convolutional layer 1D: filters: 32, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #17a
Input: 297
Convolutional layer 1D: filters: 32, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #17b
Input: 297
Convolutional layer 1D: filters: 32, kernel: 25

Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #18
Input: 297
Convolutional layer 1D: filters: 32, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #19
Input: 297
Convolutional layer 1D: filters: 32, kernel: 45
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #20
Input: 297
Convolutional layer 1D: filters: 64, kernel: 45
Batch normalization
Activation: ReLU

Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 45
Batch normalization
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #21
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 25
Batch normalization
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #22
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU

Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #23
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 25
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #24
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 25
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 256, kernel: 7
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU

Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0005

Experiment #24a
Input: 297
Convolutional layer 1D: filters: 64, kernel: 60
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 45
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 192, kernel: 25
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 256, kernel: 7
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 2048
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

C-3 Experiments - FCNN - raw data input

Table C-3: Results of experiments on FCNN model with the raw data input on validation set.

	threshold	recall	precision	F_1-score
Experiment 1	0.005	0.94	0.03	0.06
	0.01	0.75	0.05	0.10
	0.02	0.24	0.11	0.15
	0.03	0.07	0.15	0.09
Experiment 2	0.03	0.45	0.12	0.20
	0.05	0.37	0.15	0.21
	0.1	0.26	0.18	0.21
	0.2	0.18	0.23	0.20

	threshold	recall	precision	F_1-score
Experiment 3	0.02	0.61	0.10	0.17
	0.03	0.47	0.13	0.20
	0.05	0.31	0.19	0.23
	0.1	0.14	0.33	0.19
Experiment 4 (Model E)	0.03	0.63	0.11	0.18
	0.05	0.44	0.18	0.26
	0.1	0.29	0.28	0.29
	0.2	0.16	0.43	0.23
Experiment 5 (Model F)	0.03	0.49	0.16	0.25
	0.05	0.40	0.22	0.29
	0.1	**0.28**	**0.33**	**0.31**
	0.2	0.17	0.47	0.25
Experiment 6	0.02	0.60	0.10	0.17
	0.03	0.49	0.14	0.21
	0.05	0.33	0.20	0.25
	0.1	0.16	0.33	0.21
Experiment 7	0.03	0.51	0.15	0.23
	0.05	0.40	0.19	0.26
	0.1	0.27	0.30	0.28
	0.2	0.14	0.45	0.22
Experiment 8	0.03	0.48	0.16	0.24
	0.05	0.41	0.22	0.28
	0.1	0.30	0.32	0.31
	0.2	0.18	0.43	0.25
Experiment 9	0.02	0.54	0.12	0.20
	0.03	0.44	0.15	0.23
	0.05	0.32	0.19	0.24
	0.1	0.18	0.27	0.21
Experiment 10	0.001	1.0	0.02	0.04
	0.005	0.86	0.04	0.07
	0.01	0.08	0.08	0.08
	0.02	0.01	0.23	0.01

List of experiments' settings

Experiment #1
Input: 297
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 256
Dropout: 0.3

Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 384
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #2
Input: 297
Fully-connected layer: 256
Activation: ReLU
Fully-connected layer: 512
Activation: ReLU
Fully-connected layer: 1024
Activation: ReLU
Fully-connected layer: 384
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #3
Input: 297
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 384
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #4
Input: 297
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3

Activation: ReLU
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #5
Input: 297
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 4096
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #6
Input: 297
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 4096
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #7
Input: 297
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 4096
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1536
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #8
Input: 297
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 2048
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 4096
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #9
Input: 297
Fully-connected layer: 512
Activation: ReLU
Fully-connected layer: 1024
Activation: ReLU
Fully-connected layer: 4096
Activation: ReLU
Fully-connected layer: 512
Activation: ReLU

Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #10
Input: 297
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 4096
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Output: 297, sigmoid
Optimizer: Adam, learning rate: 0.001

C-4 Experiments - CNN - subseries

Table C-4: Results of experiments on CNN model with subseries input on validation set.

	recall	precision	F_1-score
Experiment 1	0.44	0.38	0.41
Experiment 2	0.45	0.37	0.41
Experiment 2a	0.48	0.33	0.37
Experiment 3	0.44	0.38	0.41
Experiment 4	0.49	0.37	0.42
Experiment 5	0.44	0.43	0.43
Experiment 5a	0.42	0.38	0.40
Experiment 5b	0.47	0.37	0.41
Experiment 6	0.44	0.43	0.44
Experiment 6a	**0.44**	**0.45**	**0.45**
Experiment 7	0.37	0.37	0.37
Experiment 8	0.34	0.40	0.37
Experiment 9	0.32	0.39	0.35
Experiment 10	0.48	0.34	0.40
Experiment 11	0.41	0.40	0.40
Experiment 12	0.50	0.35	0.41

List of experiments' settings

Experiment #1
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #2
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.5
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #2a
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 1024
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #3
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7

Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256
Dropout: 0.5
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #4
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #5
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #5a
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0005

Experiment #5b
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #6
Input: 30
Convolutional layer 1D: filters: 64, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256

Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0005

Experiment #6a
Input: 30
Convolutional layer 1D: filters: 64, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #7
Input: 30
Convolutional layer 1D: filters: 32, kernel: 11
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 128
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #8
Input: 30
Convolutional layer 1D: filters: 64, kernel: 11
Batch normalization
Activation: ReLU

Convolutional layer 1D: filters: 128, kernel: 9
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 128
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #9
Input: 30
Convolutional layer 1D: filters: 32, kernel: 9
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 7
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 128
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #10
Input: 30
Convolutional layer 1D: filters: 64, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 128, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #11
Input: 30

Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 96, kernel: 3
Batch normalization
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #12
Input: 30
Convolutional layer 1D: filters: 32, kernel: 7
Batch normalization
Activation: ReLU
Convolutional layer 1D: filters: 64, kernel: 5
Batch normalization
Activation: ReLU
Max pooling: 2
Convolutional layer 1D: filters: 96, kernel: 5
Batch normalization
Activation: ReLU
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0005

C-5 Experiments - FCNN - subseries - automatically generated features

Table C-5: Results of experiments on FCNN model with subseries input and automatically generated features on validation set.

	recall	precision	F_1-score
Experiment 1	0.50	0.41	0.45
Experiment 2	0.52	0.38	0.44
Experiment 3	0.50	0.40	0.45
Experiment 4	0.48	0.40	0.44
Experiment 5	0.54	0.34	0.41
Experiment 5a	0.37	0.40	0.39
Experiment 6	0.55	0.38	0.45
Experiment 7	0.54	0.37	0.44
Experiment 8	**0.46**	**0.48**	**0.47**
Experiment 9	0.47	0.41	0.44
Experiment 10	0.50	0.41	0.45
Experiment 11	0.47	0.40	0.43
Experiment 12	0.48	0.43	0.45

List of experiments' settings

Experiment #1
Input: 242
Fully-connected layer: 384
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 192
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #2
Input: 242
Fully-connected layer: 384
Dropout: 0.5
Activation: ReLU

Fully-connected layer: 512
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 256
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 192
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.5
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #3
Input: 242
Fully-connected layer: 384
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #4
Input: 242
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #5
Input: 242
Fully-connected layer: 512
Dropout: 0.3

Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: SGD, learning rate: 0.01

Experiment #5a
Input: 242
Fully-connected layer: 512
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: SGD, learning rate: 0.001

Experiment #6
Input: 242
Fully-connected layer: 256
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 384
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #7
Input: 242
Fully-connected layer: 256
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 384
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #8

Input: 242
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 196
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #9
Input: 242
Fully-connected layer: 128
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 196
Dropout: 0.5
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.5
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #10
Input: 242
Fully-connected layer: 128
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 196
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #11
Input: 242
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64

Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #12
Input: 242
Fully-connected layer: 128
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

C-6 Experiments - FCNN - subseries - simple features

Table C-6: Results of experiments on FCNN model with subseries input and simple features on validation set.

	recall	precision	F_1-score
Experiment 1	0.51	0.31	0.39
Experiment 2	0.44	0.41	0.43
Experiment 3	0.56	0.25	0.35
Experiment 4	0.41	0.34	0.38
Experiment 5	0.36	0.38	0.37
Experiment 6	0.39	0.39	0.39
Experiment 7	0.58	0.29	0.39
Experiment 8	**0.45**	**0.42**	**0.44**
Experiment 9	0.30	0.51	0.38
Experiment 10	0.36	0.45	0.40
Experiment 11	0.52	0.30	0.38
Experiment 12	0.41	0.41	0.41

List of experiments' settings

Experiment #1
Input: 45

Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #2
Input: 45
Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #3
Input: 45
Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 96
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #4
Input: 45
Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 96
Activation: ReLU
Fully-connected layer: 32
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #5
Input: 45
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 96
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32

Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #6
Input: 45
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 96
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #7
Input: 45
Fully-connected layer: 32
Activation: ReLU
Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 16
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #8
Input: 45
Fully-connected layer: 32
Activation: ReLU
Fully-connected layer: 64
Activation: ReLU
Fully-connected layer: 16
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #9
Input: 45
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64

Dropout: 0.3
Activation: ReLU
Fully-connected layer: 16
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #10
Input: 45
Fully-connected layer: 32
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.3
Activation: ReLU
Fully-connected layer: 16
Dropout: 0.3
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001

Experiment #11
Input: 45
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 16
Dropout: 0.1
Activation: ReLU
Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.001

Experiment #12
Input: 45
Fully-connected layer: 32
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 64
Dropout: 0.1
Activation: ReLU
Fully-connected layer: 16
Dropout: 0.1
Activation: ReLU

Output: 1, sigmoid
Optimizer: Adam, learning rate: 0.0001