Supplementary Material: Complete Model Performance Results

I. Complete Model Configurations and Test Performance Evaluation Results

This supplementary material presents two sets of experimental results: (1) the average performance of 120 model configurations ranked by validation F1 score, each averaged over five random seeds, and (2) the complete set of 600 individual results from 120 models × 5 seeds. To facilitate model selection for real-world (held-out) data, the models are ranked by their test set performance in descending order. Due to space constraints in the main paper, the full results are provided here across multiple tables.

TABLE I
AVERAGE CLASSIFICATION PERFORMANCE - PART 1 (RANKS 1-40)

Rank	Model	Weight	US	OS	Val F1	Val AUC	Test F1	Test AUC
1	**LightGBM**	**1:3**	**Tomek**	**–**	0.5971 ± 0.0045	0.8959 ± 0.0019	0.5905 ± 0.0033	0.9064 ± 0.0019
2	LightGBM	1:3	–	–	0.5969 ± 0.0006	0.8927 ± 0.0030	0.5909 ± 0.0034	0.9054 ± 0.0018
3	LightGBM	1:Log	–	–	0.5955 ± 0.0041	0.8998 ± 0.0013	0.5972 ± 0.0069	0.9054 ± 0.0014
4	LightGBM	1:Log	Tomek	–	0.5935 ± 0.0021	0.8936 ± 0.0028	0.5843 ± 0.0010	0.9021 ± 0.0009
5	LightGBM	1:Log	OSS	–	0.5904 ± 0.0075	0.8930 ± 0.0024	0.5816 ± 0.0039	0.9033 ± 0.0017
6	LightGBM	1:3	OSS	–	0.5898 ± 0.0095	0.8949 ± 0.0020	0.5884 ± 0.0037	0.9039 ± 0.0013
7	CatBoost	1:Log	–	–	0.5885 ± 0.0073	0.8882 ± 0.0037	0.5762 ± 0.0107	0.8794 ± 0.0012
8	LightGBM	1:5	OSS	–	0.5882 ± 0.0042	0.8973 ± 0.0021	0.5801 ± 0.0020	0.9052 ± 0.0015
9	CatBoost	1:3	OSS	–	0.5869 ± 0.0077	0.8848 ± 0.0019	0.5863 ± 0.0064	0.8854 ± 0.0043
10	CatBoost	1:3	Tomek	–	0.5865 ± 0.0059	0.8797 ± 0.0025	0.5809 ± 0.0101	0.8827 ± 0.0033
11	XGBoost	1:Log	OSS	–	0.5850 ± 0.0093	0.8963 ± 0.0026	0.5824 ± 0.0068	0.8939 ± 0.0026
12	CatBoost	1:Log	OSS	–	0.5824 ± 0.0092	0.8823 ± 0.0031	0.5686 ± 0.0091	0.8804 ± 0.0024
13	XGBoost	1:3	OSS	–	0.5820 ± 0.0090	0.8950 ± 0.0036	0.5821 ± 0.0065	0.8962 ± 0.0033
14	XGBoost	1:Log	–	–	0.5815 ± 0.0032	0.8881 ± 0.0037	0.5575 ± 0.0046	0.8949 ± 0.0030
15	CatBoost	1:Log	Tomek	–	0.5814 ± 0.0043	0.8799 ± 0.0031	0.5595 ± 0.0074	0.8812 ± 0.0030
16	CatBoost	1:3	–	–	0.5810 ± 0.0036	0.8865 ± 0.0028	0.5741 ± 0.0092	0.8863 ± 0.0022
17	LightGBM	1:5	Tomek	–	0.5805 ± 0.0019	0.8965 ± 0.0023	0.5853 ± 0.0020	0.9039 ± 0.0010
18	LightGBM	1:5	–	–	0.5776 ± 0.0045	0.8963 ± 0.0021	0.5923 ± 0.0050	0.9022 ± 0.0023
19	XGBoost	1:Log	Tomek	–	0.5740 ± 0.0076	0.8946 ± 0.0013	0.5714 ± 0.0033	0.8922 ± 0.0023
20	XGBoost	1:5	OSS	–	0.5731 ± 0.0052	0.8966 ± 0.0011	0.5645 ± 0.0085	0.8978 ± 0.0036
21	XGBoost	1:3	Tomek	–	0.5711 ± 0.0101	0.8911 ± 0.0007	0.5962 ± 0.0021	0.8914 ± 0.0031
22	CatBoost	1:3	Tomek	SMOTE	0.5702 ± 0.0077	0.8783 ± 0.0033	0.5624 ± 0.0071	0.8828 ± 0.0045
23	CatBoost	1:3	OSS	SMOTE	0.5700 ± 0.0154	0.8832 ± 0.0048	0.5522 ± 0.0159	0.8820 ± 0.0024
24	XGBoost	1:3	–	–	0.5643 ± 0.0115	0.8888 ± 0.0017	0.6012 ± 0.0000	0.8977 ± 0.0047
25	CatBoost	1:Log	–	SMOTE	0.5620 ± 0.0063	0.8834 ± 0.0031	0.5552 ± 0.0066	0.8788 ± 0.0048
26	XGBoost	1:3	Tomek	SMOTE	0.5617 ± 0.0101	0.8925 ± 0.0022	0.5725 ± 0.0063	0.8872 ± 0.0034
27	XGBoost	1:3	OSS	SMOTE	0.5617 ± 0.0078	0.8937 ± 0.0022	0.5748 ± 0.0076	0.8882 ± 0.0025
28	CatBoost	1:5	OSS	–	0.5603 ± 0.0089	0.8801 ± 0.0036	0.5439 ± 0.0105	0.8727 ± 0.0044
29	LightGBM	1:3	Tomek	SMOTE	0.5601 ± 0.0067	0.8940 ± 0.0034	0.5785 ± 0.0063	0.8957 ± 0.0010
30	XGBoost	1:5	–	–	0.5595 ± 0.0065	0.8959 ± 0.0014	0.5642 ± 0.0062	0.8949 ± 0.0051
31	CatBoost	1:5	–	–	0.5594 ± 0.0101	0.8827 ± 0.0034	0.5506 ± 0.0091	0.8823 ± 0.0031
32	LightGBM	1:3	–	SMOTE	0.5590 ± 0.0074	0.8917 ± 0.0025	0.5827 ± 0.0064	0.8961 ± 0.0009
33	XGBoost	1:Log	–	SMOTE	0.5588 ± 0.0097	0.8928 ± 0.0005	0.5709 ± 0.0063	0.8871 ± 0.0036
34	XGBoost	1:5	Tomek	–	0.5583 ± 0.0037	0.8966 ± 0.0002	0.5495 ± 0.0045	0.8924 ± 0.0028
35	CatBoost	1:Log	Tomek	SMOTE	0.5580 ± 0.0082	0.8781 ± 0.0026	0.5585 ± 0.0062	0.8874 ± 0.0038
36	XGBoost	–	–	–	0.5575 ± 0.0123	0.8922 ± 0.0044	0.5630 ± 0.0036	0.8959 ± 0.0009
37	XGBoost	1:3	–	SMOTE	0.5573 ± 0.0126	0.8933 ± 0.0026	0.5742 ± 0.0045	0.8914 ± 0.0035
38	LightGBM	1:Log	–	SMOTE	0.5572 ± 0.0030	0.8903 ± 0.0025	0.5691 ± 0.0064	0.8964 ± 0.0018
39	XGBoost	1:Log	Tomek	SMOTE	0.5567 ± 0.0074	0.8930 ± 0.0013	0.5727 ± 0.0062	0.8883 ± 0.0031
40	LightGBM	1:Log	OSS	SMOTE	0.5558 ± 0.0076	0.8930 ± 0.0028	0.5689 ± 0.0066	0.8973 ± 0.0012

* "–" = Not Applied

TABLE II
AVERAGE CLASSIFICATION PERFORMANCE - PART 2 (RANKS 41-80)

Rank	Model	Weight	US	OS	Val F1	Val AUC	Test F1	Test AUC
41	XGBoost	1:Log	OSS	SMOTE	0.5541 ± 0.0065	0.8883 ± 0.0035	0.5680 ± 0.0069	0.8872 ± 0.0019
42	XGBoost	1:5	–	SMOTE	0.5514 ± 0.0113	0.8887 ± 0.0018	0.5543 ± 0.0115	0.8901 ± 0.0037
43	LightGBM	1:3	OSS	SMOTE	0.5514 ± 0.0044	0.8922 ± 0.0036	0.5797 ± 0.0046	0.8951 ± 0.0017
44	LightGBM	1:Log	Tomek	SMOTE	0.5513 ± 0.0083	0.8925 ± 0.0025	0.5696 ± 0.0045	0.8938 ± 0.0009
45	CatBoost	1:3	–	SMOTE	0.5488 ± 0.0082	0.8750 ± 0.0036	0.5442 ± 0.0062	0.8859 ± 0.0030
46	CatBoost	–	Tomek	–	0.5488 ± 0.0124	0.8840 ± 0.0032	0.5638 ± 0.0077	0.8913 ± 0.0031
47	XGBoost	1:5	Tomek	SMOTE	0.5481 ± 0.0059	0.8899 ± 0.0009	0.5530 ± 0.0077	0.8851 ± 0.0030
48	XGBoost	–	OSS	–	0.5476 ± 0.0106	0.8931 ± 0.0031	0.5594 ± 0.0055	0.8965 ± 0.0022
49	CatBoost	1:5	Tomek	–	0.5473 ± 0.0059	0.8847 ± 0.0035	0.5603 ± 0.0090	0.8778 ± 0.0028
50	CatBoost	–	OSS	SMOTE	0.5465 ± 0.0092	0.8828 ± 0.0016	0.5566 ± 0.0053	0.8892 ± 0.0029
51	CatBoost	–	Tomek	SMOTE	0.5460 ± 0.0106	0.8848 ± 0.0028	0.5404 ± 0.0059	0.8872 ± 0.0029
52	LightGBM	–	Tomek	–	0.5452 ± 0.0114	0.8885 ± 0.0042	0.5659 ± 0.0036	0.9028 ± 0.0018
53	CatBoost	–	–	–	0.5452 ± 0.0124	0.8803 ± 0.0035	0.5678 ± 0.0075	0.8900 ± 0.0020
54	CatBoost	1:Log	OSS	SMOTE	0.5447 ± 0.0107	0.8821 ± 0.0018	0.5517 ± 0.0112	0.8864 ± 0.0032
55	CatBoost	–	OSS	–	0.5437 ± 0.0115	0.8842 ± 0.0022	0.5653 ± 0.0085	0.8931 ± 0.0016
56	XGBoost	–	Tomek	–	0.5417 ± 0.0102	0.8957 ± 0.0012	0.5749 ± 0.0012	0.8971 ± 0.0032
57	XGBoost	–	–	SMOTE	0.5413 ± 0.0071	0.8887 ± 0.0018	0.5783 ± 0.0055	0.8907 ± 0.0021
58	XGBoost	–	OSS	SMOTE	0.5381 ± 0.0111	0.8877 ± 0.0037	0.5747 ± 0.0040	0.8942 ± 0.0036
59	LightGBM	–	OSS	–	0.5372 ± 0.0144	0.8914 ± 0.0024	0.5555 ± 0.0057	0.9024 ± 0.0029
60	CatBoost	1:5	OSS	SMOTE	0.5361 ± 0.0114	0.8763 ± 0.0015	0.5288 ± 0.0075	0.8798 ± 0.0046
61	CatBoost	1:5	–	SMOTE	0.5354 ± 0.0028	0.8708 ± 0.0043	0.5224 ± 0.0052	0.8794 ± 0.0023
62	XGBoost	–	Tomek	SMOTE	0.5353 ± 0.0070	0.8906 ± 0.0018	0.5720 ± 0.0075	0.8926 ± 0.0032
63	CatBoost	–	–	SMOTE	0.5345 ± 0.0045	0.8830 ± 0.0042	0.5440 ± 0.0087	0.8945 ± 0.0027
64	XGBoost	1:5	OSS	SMOTE	0.5342 ± 0.0100	0.8916 ± 0.0020	0.5426 ± 0.0032	0.8856 ± 0.0041
65	LightGBM	1:5	–	SMOTE	0.5323 ± 0.0077	0.8921 ± 0.0022	0.5443 ± 0.0100	0.8944 ± 0.0008
66	LightGBM	–	OSS	SMOTE	0.5312 ± 0.0136	0.8905 ± 0.0024	0.5644 ± 0.0061	0.8955 ± 0.0019
67	LightGBM	–	–	–	0.5284 ± 0.0181	0.8896 ± 0.0022	0.5591 ± 0.0076	0.8993 ± 0.0011
68	LightGBM	–	Tomek	SMOTE	0.5279 ± 0.0116	0.8904 ± 0.0030	0.5599 ± 0.0038	0.8955 ± 0.0011
69	LightGBM	–	–	SMOTE	0.5275 ± 0.0150	0.8906 ± 0.0032	0.5654 ± 0.0029	0.8967 ± 0.0014
70	LightGBM	1:5	Tomek	SMOTE	0.5254 ± 0.0045	0.8927 ± 0.0031	0.5376 ± 0.0095	0.8966 ± 0.0013
71	CatBoost	1:5	Tomek	SMOTE	0.5211 ± 0.0067	0.8772 ± 0.0017	0.5207 ± 0.0070	0.8840 ± 0.0034
72	LightGBM	1:5	OSS	SMOTE	0.5187 ± 0.0045	0.8942 ± 0.0022	0.5431 ± 0.0083	0.8943 ± 0.0008
73	RandomForest	–	OSS	SMOTE	0.4668 ± 0.0142	0.8540 ± 0.0041	0.4896 ± 0.0058	0.8561 ± 0.0017
74	RandomForest	–	Tomek	SMOTE	0.4631 ± 0.0168	0.8609 ± 0.0038	0.4902 ± 0.0062	0.8510 ± 0.0039
75	RandomForest	–	–	SMOTE	0.4511 ± 0.0212	0.8543 ± 0.0050	0.4920 ± 0.0061	0.8530 ± 0.0022
76	RandomForest	–	OSS	–	0.4489 ± 0.0221	0.8541 ± 0.0031	0.4806 ± 0.0023	0.8543 ± 0.0019
77	RandomForest	–	–	–	0.4487 ± 0.0230	0.8539 ± 0.0035	0.4727 ± 0.0027	0.8538 ± 0.0032
78	RandomForest	1:3	–	SMOTE	0.4477 ± 0.0193	0.8589 ± 0.0021	0.4764 ± 0.0083	0.8500 ± 0.0017
79	RandomForest	1:Log	OSS	SMOTE	0.4411 ± 0.0159	0.8610 ± 0.0016	0.4755 ± 0.0087	0.8558 ± 0.0042
80	RandomForest	1:Log	Tomek	SMOTE	0.4409 ± 0.0186	0.8588 ± 0.0023	0.4771 ± 0.0059	0.8527 ± 0.0057

* "–" = Not Applied

TABLE III
AVERAGE CLASSIFICATION PERFORMANCE - PART 3 (RANKS 81-120)

Rank	Model	Weight	US	OS	Val F1	Val AUC	Test F1	Test AUC
81	RandomForest	1:5	OSS	SMOTE	0.4401 ± 0.0171	0.8582 ± 0.0046	0.4664 ± 0.0065	0.8559 ± 0.0031
82	RandomForest	–	Tomek	–	0.4389 ± 0.0222	0.8562 ± 0.0044	0.4904 ± 0.0051	0.8532 ± 0.0023
83	RandomForest	1:3	OSS	SMOTE	0.4365 ± 0.0213	0.8603 ± 0.0040	0.4774 ± 0.0062	0.8509 ± 0.0013
84	RandomForest	1:3	Tomek	–	0.4345 ± 0.0224	0.8574 ± 0.0026	0.4730 ± 0.0069	0.8551 ± 0.0008
85	RandomForest	1:5	Tomek	SMOTE	0.4331 ± 0.0146	0.8570 ± 0.0023	0.4681 ± 0.0063	0.8516 ± 0.0028
86	RandomForest	1:3	–	–	0.4309 ± 0.0156	0.8542 ± 0.0031	0.4672 ± 0.0039	0.8505 ± 0.0044
87	RandomForest	1:3	OSS	–	0.4291 ± 0.0170	0.8534 ± 0.0034	0.4693 ± 0.0071	0.8500 ± 0.0014
88	RandomForest	1:Log	OSS	–	0.4285 ± 0.0219	0.8607 ± 0.0030	0.4765 ± 0.0058	0.8526 ± 0.0023
89	RandomForest	1:Log	–	SMOTE	0.4276 ± 0.0142	0.8574 ± 0.0026	0.4818 ± 0.0033	0.8518 ± 0.0031
90	RandomForest	1:Log	Tomek	–	0.4255 ± 0.0167	0.8537 ± 0.0028	0.4694 ± 0.0053	0.8507 ± 0.0020
91	RandomForest	1:Log	–	–	0.4252 ± 0.0165	0.8570 ± 0.0044	0.4680 ± 0.0041	0.8547 ± 0.0034
92	RandomForest	1:5	OSS	–	0.4234 ± 0.0179	0.8564 ± 0.0040	0.4578 ± 0.0065	0.8531 ± 0.0020
93	RandomForest	1:5	Tomek	–	0.4220 ± 0.0135	0.8550 ± 0.0051	0.4642 ± 0.0076	0.8493 ± 0.0009
94	RandomForest	1:5	–	–	0.4220 ± 0.0156	0.8597 ± 0.0020	0.4540 ± 0.0071	0.8539 ± 0.0017
95	RandomForest	1:3	Tomek	SMOTE	0.4199 ± 0.0180	0.8531 ± 0.0042	0.4856 ± 0.0057	0.8488 ± 0.0035
96	RandomForest	1:5	–	SMOTE	0.4193 ± 0.0190	0.8551 ± 0.0031	0.4642 ± 0.0048	0.8501 ± 0.0020
97	LogisticRegression	1:5	OSS	–	0.3741 ± 0.0038	0.8191 ± 0.0009	0.4137 ± 0.0039	0.8185 ± 0.0015
98	LogisticRegression	1:Log	Tomek	–	0.3635 ± 0.0024	0.8173 ± 0.0010	0.4019 ± 0.0033	0.8140 ± 0.0013
99	LogisticRegression	1:5	–	–	0.3612 ± 0.0014	0.8186 ± 0.0014	0.4021 ± 0.0076	0.8154 ± 0.0029
100	LogisticRegression	1:Log	OSS	–	0.3602 ± 0.0047	0.8168 ± 0.0010	0.3892 ± 0.0027	0.8137 ± 0.0020
101	LogisticRegression	1:5	Tomek	–	0.3592 ± 0.0137	0.8195 ± 0.0015	0.4076 ± 0.0061	0.8173 ± 0.0018
102	LogisticRegression	1:3	OSS	–	0.3586 ± 0.0047	0.8144 ± 0.0007	0.3858 ± 0.0080	0.8126 ± 0.0015
103	LogisticRegression	1:Log	–	–	0.3530 ± 0.0117	0.8166 ± 0.0004	0.3881 ± 0.0072	0.8113 ± 0.0021
104	LogisticRegression	1:3	–	–	0.3409 ± 0.0092	0.8137 ± 0.0011	0.3670 ± 0.0072	0.8091 ± 0.0019
105	LogisticRegression	1:3	Tomek	–	0.3333 ± 0.0176	0.8152 ± 0.0013	0.3533 ± 0.0217	0.8119 ± 0.0016
106	LogisticRegression	1:3	Tomek	SMOTE	0.3091 ± 0.0077	0.8030 ± 0.0032	0.3405 ± 0.0040	0.8110 ± 0.0041
107	LogisticRegression	1:5	–	SMOTE	0.3070 ± 0.0072	0.8040 ± 0.0015	0.3301 ± 0.0054	0.8100 ± 0.0054
108	LogisticRegression	1:Log	Tomek	SMOTE	0.3070 ± 0.0064	0.7941 ± 0.0019	0.3407 ± 0.0062	0.7978 ± 0.0014
109	LogisticRegression	1:5	OSS	SMOTE	0.3039 ± 0.0013	0.8021 ± 0.0022	0.3324 ± 0.0024	0.8125 ± 0.0045
110	LogisticRegression	1:Log	OSS	SMOTE	0.3035 ± 0.0051	0.7991 ± 0.0030	0.3383 ± 0.0074	0.8108 ± 0.0042
111	LogisticRegression	1:5	Tomek	SMOTE	0.3026 ± 0.0070	0.7991 ± 0.0027	0.3230 ± 0.0098	0.8119 ± 0.0037
112	LogisticRegression	1:3	–	SMOTE	0.3025 ± 0.0052	0.7997 ± 0.0011	0.3287 ± 0.0040	0.8095 ± 0.0046
113	LogisticRegression	1:Log	–	SMOTE	0.3024 ± 0.0034	0.8030 ± 0.0017	0.3274 ± 0.0070	0.8119 ± 0.0034
114	LogisticRegression	1:3	OSS	SMOTE	0.2962 ± 0.0039	0.7993 ± 0.0009	0.3406 ± 0.0052	0.8060 ± 0.0035
115	LogisticRegression	–	OSS	SMOTE	0.2417 ± 0.0183	0.7887 ± 0.0021	0.2710 ± 0.0112	0.7863 ± 0.0023
116	LogisticRegression	–	–	SMOTE	0.2322 ± 0.0236	0.7856 ± 0.0032	0.2532 ± 0.0107	0.7875 ± 0.0043
117	LogisticRegression	–	OSS	–	0.2266 ± 0.0092	0.8054 ± 0.0005	0.2439 ± 0.0107	0.7985 ± 0.0024
118	LogisticRegression	–	–	–	0.2212 ± 0.0099	0.8030 ± 0.0013	0.2437 ± 0.0125	0.7966 ± 0.0017
119	LogisticRegression	–	Tomek	–	0.2212 ± 0.0091	0.8050 ± 0.0008	0.2520 ± 0.0077	0.8020 ± 0.0013
120	LogisticRegression	–	Tomek	SMOTE	0.2052 ± 0.0159	0.7865 ± 0.0018	0.2449 ± 0.0074	0.7876 ± 0.0022

* "–" = Not Applied

TABLE IV
TEST SET CLASSIFICATION PERFORMANCE - PART 1

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
RandomForest	–	–	–	0.7281	0.8424	0.9888	0.4674	0.9800	0.8095	0.9977	0.3285	A
RandomForest	–	–	–	0.7360	0.8598	0.9890	0.4830	0.9805	0.8161	0.9977	0.3430	B
RandomForest	–	–	–	0.7300	0.8591	0.9886	0.4714	0.9803	0.7778	0.9971	0.3382	C
RandomForest	–	–	–	0.7299	0.8566	0.9888	0.4710	0.9802	0.8023	0.9975	0.3333	D
RandomForest	–	–	–	0.7299	0.8511	0.9888	0.4710	0.9802	0.8023	0.9975	0.3333	E
RandomForest	–	–	SMOTE	0.7361	0.8477	0.9887	0.4834	0.9807	0.7684	0.9968	0.3527	A
RandomForest	–	–	SMOTE	0.7327	0.8543	0.9885	0.4768	0.9806	0.7579	0.9966	0.3478	B
RandomForest	–	–	SMOTE	0.7502	0.8608	0.9890	0.5113	0.9816	0.7745	0.9966	0.3816	C
RandomForest	–	–	SMOTE	0.7445	0.8510	0.9890	0.5000	0.9812	0.7835	0.9969	0.3671	D
RandomForest	–	–	SMOTE	0.7386	0.8512	0.9888	0.4884	0.9809	0.7708	0.9968	0.3575	E
RandomForest	–	Tomek	–	0.7360	0.8589	0.9888	0.4832	0.9806	0.7912	0.9972	0.3478	A
RandomForest	–	Tomek	–	0.7403	0.8519	0.9888	0.4918	0.9810	0.7653	0.9966	0.3623	B
RandomForest	–	Tomek	–	0.7327	0.8552	0.9885	0.4768	0.9806	0.7579	0.9966	0.3478	C
RandomForest	–	Tomek	–	0.7480	0.8452	0.9893	0.5067	0.9812	0.8172	0.9975	0.3671	D
RandomForest	–	Tomek	–	0.7412	0.8546	0.9890	0.4933	0.9809	0.7957	0.9972	0.3575	E
RandomForest	–	Tomek	SMOTE	0.7443	0.8488	0.9887	0.5000	0.9814	0.7429	0.9961	0.3768	A
RandomForest	–	Tomek	SMOTE	0.7294	0.8402	0.9883	0.4706	0.9806	0.7273	0.9961	0.3478	B
RandomForest	–	Tomek	SMOTE	0.7344	0.8644	0.9885	0.4803	0.9807	0.7526	0.9965	0.3527	C
RandomForest	–	Tomek	SMOTE	0.7436	0.8513	0.9889	0.4984	0.9811	0.7755	0.9968	0.3671	D
RandomForest	–	Tomek	SMOTE	0.7451	0.8502	0.9886	0.5016	0.9816	0.7315	0.9958	0.3816	E
RandomForest	–	OSS	–	0.7360	0.8560	0.9888	0.4832	0.9806	0.7912	0.9972	0.3478	A
RandomForest	–	OSS	–	0.7351	0.8515	0.9889	0.4814	0.9805	0.8068	0.9975	0.3430	B
RandomForest	–	OSS	–	0.7301	0.8600	0.9885	0.4718	0.9804	0.7553	0.9966	0.3430	C
RandomForest	–	OSS	–	0.7369	0.8550	0.9889	0.4848	0.9806	0.8000	0.9974	0.3478	D
RandomForest	–	OSS	–	0.7352	0.8491	0.9888	0.4816	0.9806	0.7826	0.9971	0.3478	E
RandomForest	–	OSS	SMOTE	0.7427	0.8503	0.9887	0.4968	0.9813	0.7476	0.9962	0.3720	A
RandomForest	–	OSS	SMOTE	0.7378	0.8549	0.9885	0.4870	0.9810	0.7426	0.9962	0.3623	B
RandomForest	–	OSS	SMOTE	0.7319	0.8562	0.9883	0.4756	0.9807	0.7300	0.9961	0.3527	C
RandomForest	–	OSS	SMOTE	0.7486	0.8598	0.9890	0.5081	0.9814	0.7800	0.9968	0.3768	D
RandomForest	–	OSS	SMOTE	0.7345	0.8592	0.9884	0.4805	0.9809	0.7327	0.9961	0.3575	E
RandomForest	1:3	–	–	0.7257	0.8544	0.9884	0.4631	0.9802	0.7582	0.9968	0.3333	A
RandomForest	1:3	–	–	0.7282	0.8597	0.9886	0.4678	0.9802	0.7841	0.9972	0.3333	B
RandomForest	1:3	–	–	0.7221	0.8571	0.9884	0.4558	0.9799	0.7701	0.9971	0.3237	C
RandomForest	1:3	–	–	0.7290	0.8452	0.9887	0.4694	0.9802	0.7931	0.9974	0.3333	D
RandomForest	1:3	–	–	0.7343	0.8361	0.9888	0.4797	0.9805	0.7978	0.9974	0.3430	E
RandomForest	1:3	–	SMOTE	0.7243	0.8469	0.9881	0.4605	0.9803	0.7216	0.9961	0.3382	A
RandomForest	1:3	–	SMOTE	0.7227	0.8495	0.9880	0.4575	0.9803	0.7071	0.9958	0.3382	B
RandomForest	1:3	–	SMOTE	0.7378	0.8560	0.9884	0.4872	0.9811	0.7238	0.9958	0.3671	C
RandomForest	1:3	–	SMOTE	0.7453	0.8468	0.9889	0.5016	0.9813	0.7700	0.9966	0.3720	D
RandomForest	1:3	–	SMOTE	0.7319	0.8508	0.9885	0.4752	0.9806	0.7500	0.9965	0.3478	E

* "–" = Not Applied

TABLE V
TEST SET CLASSIFICATION PERFORMANCE - PART 2

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
RandomForest	1:3	Tomek	–	0.7207	0.8561	0.9881	0.4533	0.9800	0.7312	0.9963	0.3285	A
RandomForest	1:3	Tomek	–	0.7378	0.8543	0.9888	0.4867	0.9807	0.7849	0.9971	0.3527	B
RandomForest	1:3	Tomek	–	0.7378	0.8570	0.9887	0.4868	0.9809	0.7629	0.9966	0.3575	C
RandomForest	1:3	Tomek	–	0.7334	0.8558	0.9888	0.4781	0.9805	0.7889	0.9972	0.3430	D
RandomForest	1:3	Tomek	–	0.7241	0.8523	0.9883	0.4600	0.9802	0.7419	0.9965	0.3333	E
RandomForest	1:3	Tomek	SMOTE	0.7353	0.8398	0.9883	0.4823	0.9810	0.7212	0.9958	0.3623	A
RandomForest	1:3	Tomek	SMOTE	0.7345	0.8493	0.9882	0.4808	0.9810	0.7143	0.9956	0.3623	B
RandomForest	1:3	Tomek	SMOTE	0.7402	0.8608	0.9885	0.4920	0.9813	0.7264	0.9958	0.3720	C
RandomForest	1:3	Tomek	SMOTE	0.7460	0.8442	0.9888	0.5032	0.9814	0.7573	0.9963	0.3768	D
RandomForest	1:3	Tomek	SMOTE	0.7287	0.8497	0.9880	0.4695	0.9807	0.7019	0.9955	0.3527	E
RandomForest	1:3	OSS	–	0.7360	0.8514	0.9888	0.4832	0.9806	0.7912	0.9972	0.3478	A
RandomForest	1:3	OSS	–	0.7223	0.8529	0.9883	0.4564	0.9800	0.7473	0.9966	0.3285	B
RandomForest	1:3	OSS	–	0.7181	0.8478	0.9880	0.4482	0.9799	0.7283	0.9963	0.3237	C
RandomForest	1:3	OSS	–	0.7335	0.8523	0.9886	0.4784	0.9806	0.7660	0.9968	0.3478	D
RandomForest	1:3	OSS	–	0.7344	0.8457	0.9885	0.4803	0.9807	0.7526	0.9965	0.3527	E
RandomForest	1:3	OSS	SMOTE	0.7361	0.8503	0.9884	0.4839	0.9810	0.7282	0.9959	0.3623	A
RandomForest	1:3	OSS	SMOTE	0.7255	0.8504	0.9879	0.4630	0.9806	0.6923	0.9953	0.3478	B
RandomForest	1:3	OSS	SMOTE	0.7410	0.8555	0.9884	0.4937	0.9814	0.7156	0.9955	0.3768	C
RandomForest	1:3	OSS	SMOTE	0.7361	0.8472	0.9885	0.4837	0.9809	0.7475	0.9963	0.3575	D
RandomForest	1:3	OSS	SMOTE	0.7255	0.8511	0.9879	0.4630	0.9806	0.6923	0.9953	0.3478	E
RandomForest	1:5	–	–	0.7162	0.8561	0.9880	0.4444	0.9797	0.7333	0.9965	0.3188	A
RandomForest	1:5	–	–	0.7241	0.8520	0.9883	0.4600	0.9802	0.7419	0.9965	0.3333	B
RandomForest	1:5	–	–	0.7101	0.8481	0.9878	0.4324	0.9794	0.7191	0.9963	0.3092	C
RandomForest	1:5	–	–	0.7309	0.8574	0.9885	0.4733	0.9804	0.7634	0.9968	0.3430	D
RandomForest	1:5	–	–	0.7241	0.8558	0.9883	0.4600	0.9802	0.7419	0.9965	0.3333	E
RandomForest	1:5	–	SMOTE	0.7295	0.8445	0.9881	0.4710	0.9807	0.7087	0.9956	0.3527	A
RandomForest	1:5	–	SMOTE	0.7245	0.8459	0.9880	0.4610	0.9804	0.7030	0.9956	0.3430	B
RandomForest	1:5	–	SMOTE	0.7336	0.8539	0.9883	0.4790	0.9808	0.7255	0.9959	0.3575	C
RandomForest	1:5	–	SMOTE	0.7233	0.8533	0.9882	0.4585	0.9802	0.7340	0.9963	0.3333	D
RandomForest	1:5	–	SMOTE	0.7196	0.8529	0.9877	0.4516	0.9803	0.6796	0.9952	0.3382	E
RandomForest	1:5	Tomek	–	0.7199	0.8483	0.9880	0.4518	0.9800	0.7234	0.9962	0.3285	A
RandomForest	1:5	Tomek	–	0.7303	0.8505	0.9882	0.4725	0.9807	0.7157	0.9958	0.3527	B
RandomForest	1:5	Tomek	–	0.7197	0.8516	0.9882	0.4512	0.9799	0.7444	0.9966	0.3237	C
RandomForest	1:5	Tomek	–	0.7394	0.8465	0.9887	0.4902	0.9810	0.7576	0.9965	0.3623	D
RandomForest	1:5	Tomek	–	0.7217	0.8499	0.9880	0.4554	0.9801	0.7188	0.9961	0.3333	E
RandomForest	1:5	Tomek	SMOTE	0.7255	0.8512	0.9879	0.4630	0.9806	0.6923	0.9953	0.3478	A
RandomForest	1:5	Tomek	SMOTE	0.7296	0.8492	0.9880	0.4713	0.9808	0.6916	0.9952	0.3575	B
RandomForest	1:5	Tomek	SMOTE	0.7361	0.8604	0.9884	0.4839	0.9810	0.7282	0.9959	0.3623	C
RandomForest	1:5	Tomek	SMOTE	0.7319	0.8434	0.9883	0.4756	0.9807	0.7300	0.9961	0.3527	D
RandomForest	1:5	Tomek	SMOTE	0.7171	0.8535	0.9876	0.4466	0.9801	0.6765	0.9952	0.3333	E

* "–" = Not Applied

TABLE VI
TEST SET CLASSIFICATION PERFORMANCE - PART 3

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
RandomForest	1:5	OSS	–	0.7302	0.8522	0.9883	0.4721	0.9806	0.7347	0.9962	0.3478	A
RandomForest	1:5	OSS	–	0.7217	0.8528	0.9880	0.4554	0.9801	0.7188	0.9961	0.3333	B
RandomForest	1:5	OSS	–	0.7131	0.8504	0.9877	0.4385	0.9797	0.7021	0.9959	0.3188	C
RandomForest	1:5	OSS	–	0.7191	0.8495	0.9880	0.4503	0.9800	0.7158	0.9961	0.3285	D
RandomForest	1:5	OSS	–	0.7303	0.8608	0.9882	0.4725	0.9807	0.7157	0.9958	0.3527	E
RandomForest	1:5	OSS	SMOTE	0.7270	0.8562	0.9880	0.4660	0.9806	0.7059	0.9956	0.3478	A
RandomForest	1:5	OSS	SMOTE	0.7214	0.8521	0.9877	0.4551	0.9804	0.6762	0.9950	0.3430	B
RandomForest	1:5	OSS	SMOTE	0.7362	0.8661	0.9882	0.4841	0.9811	0.7103	0.9955	0.3671	C
RandomForest	1:5	OSS	SMOTE	0.7328	0.8474	0.9882	0.4774	0.9808	0.7184	0.9958	0.3575	D
RandomForest	1:5	OSS	SMOTE	0.7186	0.8577	0.9877	0.4495	0.9801	0.6900	0.9955	0.3333	E
RandomForest	1:Log	–	–	0.7266	0.8655	0.9885	0.4646	0.9802	0.7667	0.9969	0.3333	A
RandomForest	1:Log	–	–	0.7308	0.8582	0.9887	0.4730	0.9803	0.7865	0.9972	0.3382	B
RandomForest	1:Log	–	–	0.7249	0.8455	0.9883	0.4615	0.9802	0.7500	0.9966	0.3333	C
RandomForest	1:Log	–	–	0.7352	0.8512	0.9888	0.4816	0.9806	0.7826	0.9971	0.3478	D
RandomForest	1:Log	–	–	0.7239	0.8531	0.9884	0.4595	0.9800	0.7640	0.9969	0.3285	E
RandomForest	1:Log	–	SMOTE	0.7353	0.8537	0.9883	0.4823	0.9810	0.7212	0.9958	0.3623	A
RandomForest	1:Log	–	SMOTE	0.7328	0.8481	0.9884	0.4771	0.9807	0.7374	0.9962	0.3527	B
RandomForest	1:Log	–	SMOTE	0.7403	0.8616	0.9886	0.4919	0.9811	0.7451	0.9962	0.3671	C
RandomForest	1:Log	–	SMOTE	0.7369	0.8427	0.9886	0.4852	0.9809	0.7551	0.9965	0.3575	D
RandomForest	1:Log	–	SMOTE	0.7303	0.8529	0.9882	0.4725	0.9807	0.7157	0.9958	0.3527	E
RandomForest	1:Log	Tomek	–	0.7369	0.8506	0.9886	0.4852	0.9809	0.7551	0.9965	0.3575	A
RandomForest	1:Log	Tomek	–	0.7319	0.8543	0.9885	0.4752	0.9806	0.7500	0.9965	0.3478	B
RandomForest	1:Log	Tomek	–	0.7215	0.8487	0.9882	0.4548	0.9800	0.7391	0.9965	0.3285	C
RandomForest	1:Log	Tomek	–	0.7249	0.8446	0.9883	0.4615	0.9802	0.7500	0.9966	0.3333	D
RandomForest	1:Log	Tomek	–	0.7293	0.8555	0.9884	0.4702	0.9804	0.7474	0.9965	0.3430	E
RandomForest	1:Log	Tomek	SMOTE	0.7427	0.8594	0.9885	0.4968	0.9814	0.7290	0.9958	0.3768	A
RandomForest	1:Log	Tomek	SMOTE	0.7262	0.8477	0.9880	0.4645	0.9806	0.6990	0.9955	0.3478	B
RandomForest	1:Log	Tomek	SMOTE	0.7336	0.8716	0.9883	0.4790	0.9808	0.7255	0.9959	0.3575	C
RandomForest	1:Log	Tomek	SMOTE	0.7344	0.8390	0.9885	0.4803	0.9807	0.7526	0.9965	0.3527	D
RandomForest	1:Log	Tomek	SMOTE	0.7264	0.8459	0.9878	0.4650	0.9807	0.6822	0.9950	0.3527	E
RandomForest	1:Log	OSS	–	0.7403	0.8499	0.9889	0.4917	0.9809	0.7872	0.9971	0.3575	A
RandomForest	1:Log	OSS	–	0.7369	0.8458	0.9886	0.4852	0.9809	0.7551	0.9965	0.3575	B
RandomForest	1:Log	OSS	–	0.7277	0.8595	0.9883	0.4671	0.9804	0.7320	0.9962	0.3430	C
RandomForest	1:Log	OSS	–	0.7335	0.8553	0.9886	0.4784	0.9806	0.7660	0.9968	0.3478	D
RandomForest	1:Log	OSS	–	0.7241	0.8527	0.9883	0.4600	0.9802	0.7419	0.9965	0.3333	E
RandomForest	1:Log	OSS	SMOTE	0.7418	0.8501	0.9885	0.4952	0.9814	0.7222	0.9956	0.3768	A
RandomForest	1:Log	OSS	SMOTE	0.7171	0.8514	0.9876	0.4466	0.9801	0.6765	0.9952	0.3333	B
RandomForest	1:Log	OSS	SMOTE	0.7394	0.8724	0.9884	0.4904	0.9813	0.7196	0.9956	0.3720	C
RandomForest	1:Log	OSS	SMOTE	0.7328	0.8545	0.9882	0.4774	0.9808	0.7184	0.9958	0.3575	D
RandomForest	1:Log	OSS	SMOTE	0.7280	0.8504	0.9880	0.4679	0.9807	0.6952	0.9953	0.3527	E

* "–" = Not Applied

TABLE VII
TEST SET CLASSIFICATION PERFORMANCE - PART 4

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
XGBoost	–	–	–	0.7737	0.8947	0.9904	0.5570	0.9822	0.9121	0.9988	0.4010	A
XGBoost	–	–	–	0.7737	0.8947	0.9904	0.5570	0.9822	0.9121	0.9988	0.4010	B
XGBoost	–	–	–	0.7810	0.8961	0.9906	0.5714	0.9826	0.9149	0.9988	0.4155	C
XGBoost	–	–	–	0.7737	0.8947	0.9904	0.5570	0.9822	0.9121	0.9988	0.4010	D
XGBoost	–	–	–	0.7816	0.8993	0.9908	0.5724	0.9825	0.9444	0.9993	0.4106	E
XGBoost	–	–	SMOTE	0.7762	0.8897	0.9903	0.5621	0.9826	0.8687	0.9981	0.4155	A
XGBoost	–	–	SMOTE	0.7818	0.8943	0.9903	0.5732	0.9831	0.8411	0.9975	0.4348	B
XGBoost	–	–	SMOTE	0.7919	0.8828	0.9909	0.5928	0.9833	0.9100	0.9987	0.4396	C
XGBoost	–	–	SMOTE	0.7830	0.8928	0.9908	0.5753	0.9826	0.9348	0.9991	0.4155	D
XGBoost	–	–	SMOTE	0.7895	0.8941	0.9909	0.5882	0.9832	0.9091	0.9987	0.4348	E
XGBoost	–	Tomek	–	0.7830	0.8994	0.9908	0.5753	0.9826	0.9348	0.9991	0.4155	A
XGBoost	–	Tomek	–	0.7830	0.8994	0.9908	0.5753	0.9826	0.9348	0.9991	0.4155	B
XGBoost	–	Tomek	–	0.7844	0.8844	0.9908	0.5781	0.9827	0.9255	0.9990	0.4203	C
XGBoost	–	Tomek	–	0.7830	0.8994	0.9908	0.5753	0.9826	0.9348	0.9991	0.4155	D
XGBoost	–	Tomek	–	0.7806	0.9026	0.9907	0.5705	0.9825	0.9341	0.9991	0.4106	E
XGBoost	–	Tomek	SMOTE	0.7790	0.8975	0.9903	0.5677	0.9829	0.8544	0.9978	0.4251	A
XGBoost	–	Tomek	SMOTE	0.7742	0.8916	0.9904	0.5581	0.9823	0.8936	0.9985	0.4058	B
XGBoost	–	Tomek	SMOTE	0.7945	0.8805	0.9909	0.5981	0.9836	0.8942	0.9984	0.4493	C
XGBoost	–	Tomek	SMOTE	0.7844	0.8972	0.9908	0.5781	0.9827	0.9255	0.9990	0.4203	D
XGBoost	–	Tomek	SMOTE	0.7742	0.8963	0.9904	0.5581	0.9823	0.8936	0.9985	0.4058	E
XGBoost	–	OSS	–	0.7709	0.8937	0.9902	0.5515	0.9822	0.8830	0.9984	0.4010	A
XGBoost	–	OSS	–	0.7713	0.8991	0.9904	0.5522	0.9820	0.9111	0.9988	0.3961	B
XGBoost	–	OSS	–	0.7858	0.8919	0.9908	0.5809	0.9829	0.9167	0.9988	0.4251	C
XGBoost	–	OSS	–	0.7718	0.9041	0.9903	0.5533	0.9822	0.8925	0.9985	0.4010	D
XGBoost	–	OSS	–	0.7747	0.8938	0.9905	0.5589	0.9822	0.9222	0.9990	0.4010	E
XGBoost	–	OSS	SMOTE	0.7846	0.8941	0.9905	0.5788	0.9831	0.8654	0.9980	0.4348	A
XGBoost	–	OSS	SMOTE	0.7889	0.8975	0.9907	0.5871	0.9833	0.8835	0.9982	0.4396	B
XGBoost	–	OSS	SMOTE	0.7786	0.8826	0.9904	0.5668	0.9827	0.8700	0.9981	0.4203	C
XGBoost	–	OSS	SMOTE	0.7781	0.8925	0.9904	0.5658	0.9826	0.8866	0.9984	0.4155	D
XGBoost	–	OSS	SMOTE	0.7829	0.9044	0.9906	0.5752	0.9829	0.8889	0.9984	0.4251	E
XGBoost	1:3	–	–	0.7959	0.9024	0.9906	0.6012	0.9843	0.8235	0.9969	0.4734	A
XGBoost	1:3	–	–	0.7959	0.9024	0.9906	0.6012	0.9843	0.8235	0.9969	0.4734	B
XGBoost	1:3	–	–	0.7957	0.8787	0.9903	0.6012	0.9847	0.7829	0.9959	0.4879	C
XGBoost	1:3	–	–	0.7959	0.9024	0.9906	0.6012	0.9843	0.8235	0.9969	0.4734	D
XGBoost	1:3	–	–	0.7959	0.9024	0.9906	0.6012	0.9843	0.8235	0.9969	0.4734	E
XGBoost	1:3	–	SMOTE	0.7841	0.8932	0.9898	0.5783	0.9840	0.7680	0.9958	0.4638	A
XGBoost	1:3	–	SMOTE	0.7821	0.8949	0.9895	0.5748	0.9842	0.7313	0.9947	0.4734	B
XGBoost	1:3	–	SMOTE	0.7890	0.8779	0.9901	0.5879	0.9841	0.7886	0.9962	0.4686	C
XGBoost	1:3	–	SMOTE	0.7791	0.8933	0.9893	0.5689	0.9841	0.7239	0.9946	0.4686	D
XGBoost	1:3	–	SMOTE	0.7753	0.8978	0.9893	0.5612	0.9837	0.7344	0.9950	0.4541	E

* "–" = Not Applied

TABLE VIII
TEST SET CLASSIFICATION PERFORMANCE - PART 5

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
XGBoost	1:3	Tomek	–	0.7920	0.8944	0.9900	0.5941	0.9847	0.7594	0.9953	0.4879	A
XGBoost	1:3	Tomek	–	0.7920	0.8944	0.9900	0.5941	0.9847	0.7594	0.9953	0.4879	B
XGBoost	1:3	Tomek	–	0.7974	0.8791	0.9901	0.6047	0.9851	0.7591	0.9952	0.5024	C
XGBoost	1:3	Tomek	–	0.7920	0.8944	0.9900	0.5941	0.9847	0.7594	0.9953	0.4879	D
XGBoost	1:3	Tomek	–	0.7920	0.8944	0.9900	0.5941	0.9847	0.7594	0.9953	0.4879	E
XGBoost	1:3	Tomek	SMOTE	0.7804	0.8881	0.9893	0.5714	0.9842	0.7206	0.9944	0.4734	A
XGBoost	1:3	Tomek	SMOTE	0.7837	0.8972	0.9894	0.5780	0.9845	0.7194	0.9943	0.4831	B
XGBoost	1:3	Tomek	SMOTE	0.7914	0.8759	0.9898	0.5930	0.9848	0.7445	0.9949	0.4928	C
XGBoost	1:3	Tomek	SMOTE	0.7727	0.8871	0.9891	0.5562	0.9837	0.7176	0.9946	0.4541	D
XGBoost	1:3	Tomek	SMOTE	0.7765	0.8876	0.9891	0.5640	0.9841	0.7080	0.9942	0.4686	E
XGBoost	1:3	OSS	–	0.7788	0.9022	0.9896	0.5680	0.9837	0.7581	0.9956	0.4541	A
XGBoost	1:3	OSS	–	0.7833	0.9033	0.9900	0.5767	0.9837	0.7899	0.9963	0.4541	B
XGBoost	1:3	OSS	–	0.7985	0.8853	0.9905	0.6066	0.9847	0.8016	0.9963	0.4879	C
XGBoost	1:3	OSS	–	0.7837	0.8968	0.9899	0.5775	0.9838	0.7787	0.9961	0.4589	D
XGBoost	1:3	OSS	–	0.7859	0.8933	0.9900	0.5818	0.9840	0.7805	0.9961	0.4638	E
XGBoost	1:3	OSS	SMOTE	0.7740	0.8885	0.9891	0.5588	0.9838	0.7143	0.9944	0.4589	A
XGBoost	1:3	OSS	SMOTE	0.7935	0.8899	0.9899	0.5971	0.9849	0.7464	0.9949	0.4976	B
XGBoost	1:3	OSS	SMOTE	0.7839	0.8786	0.9896	0.5782	0.9842	0.7424	0.9950	0.4734	C
XGBoost	1:3	OSS	SMOTE	0.7727	0.8911	0.9886	0.5568	0.9842	0.6759	0.9931	0.4734	D
XGBoost	1:3	OSS	SMOTE	0.7863	0.8930	0.9896	0.5831	0.9845	0.7353	0.9947	0.4831	E
XGBoost	1:5	–	–	0.7732	0.9000	0.9883	0.5580	0.9846	0.6516	0.9921	0.4879	A
XGBoost	1:5	–	–	0.7732	0.9000	0.9883	0.5580	0.9846	0.6516	0.9921	0.4879	B
XGBoost	1:5	–	–	0.7891	0.8746	0.9892	0.5889	0.9853	0.6928	0.9931	0.5121	C
XGBoost	1:5	–	–	0.7732	0.9000	0.9883	0.5580	0.9846	0.6516	0.9921	0.4879	D
XGBoost	1:5	–	–	0.7732	0.9000	0.9883	0.5580	0.9846	0.6516	0.9921	0.4879	E
XGBoost	1:5	–	SMOTE	0.7661	0.8840	0.9877	0.5445	0.9846	0.6159	0.9908	0.4879	A
XGBoost	1:5	–	SMOTE	0.7570	0.8934	0.9872	0.5269	0.9842	0.5939	0.9902	0.4734	B
XGBoost	1:5	–	SMOTE	0.7927	0.8794	0.9891	0.5962	0.9859	0.6790	0.9924	0.5314	C
XGBoost	1:5	–	SMOTE	0.7716	0.8937	0.9880	0.5553	0.9849	0.6280	0.9911	0.4976	D
XGBoost	1:5	–	SMOTE	0.7682	0.9000	0.9875	0.5488	0.9850	0.6047	0.9901	0.5024	E
XGBoost	1:5	Tomek	–	0.7664	0.8952	0.9878	0.5450	0.9845	0.6250	0.9912	0.4831	A
XGBoost	1:5	Tomek	–	0.7664	0.8952	0.9878	0.5450	0.9845	0.6250	0.9912	0.4831	B
XGBoost	1:5	Tomek	–	0.7780	0.8812	0.9883	0.5676	0.9852	0.6442	0.9915	0.5072	C
XGBoost	1:5	Tomek	–	0.7664	0.8952	0.9878	0.5450	0.9845	0.6250	0.9912	0.4831	D
XGBoost	1:5	Tomek	–	0.7664	0.8952	0.9878	0.5450	0.9845	0.6250	0.9912	0.4831	E
XGBoost	1:5	Tomek	SMOTE	0.7662	0.8917	0.9875	0.5450	0.9849	0.6023	0.9901	0.4976	A
XGBoost	1:5	Tomek	SMOTE	0.7600	0.8887	0.9867	0.5333	0.9850	0.5683	0.9885	0.5024	B
XGBoost	1:5	Tomek	SMOTE	0.7833	0.8748	0.9884	0.5782	0.9857	0.6412	0.9911	0.5266	C
XGBoost	1:5	Tomek	SMOTE	0.7675	0.8821	0.9872	0.5478	0.9853	0.5889	0.9892	0.5121	D
XGBoost	1:5	Tomek	SMOTE	0.7744	0.8882	0.9881	0.5606	0.9850	0.6341	0.9912	0.5024	E

* "–" = Not Applied

TABLE IX
TEST SET CLASSIFICATION PERFORMANCE - PART 6

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
XGBoost	1:5	OSS	–	0.7643	0.9003	0.9874	0.5411	0.9847	0.6000	0.9901	0.4928	A
XGBoost	1:5	OSS	–	0.7760	0.9001	0.9885	0.5635	0.9848	0.6581	0.9923	0.4928	B
XGBoost	1:5	OSS	–	0.7916	0.8855	0.9891	0.5940	0.9858	0.6813	0.9925	0.5266	C
XGBoost	1:5	OSS	–	0.7740	0.8955	0.9880	0.5600	0.9852	0.6250	0.9908	0.5072	D
XGBoost	1:5	OSS	–	0.7760	0.9074	0.9883	0.5637	0.9850	0.6420	0.9915	0.5024	E
XGBoost	1:5	OSS	SMOTE	0.7678	0.8903	0.9874	0.5483	0.9852	0.5966	0.9896	0.5072	A
XGBoost	1:5	OSS	SMOTE	0.7674	0.8854	0.9875	0.5474	0.9850	0.6012	0.9899	0.5024	B
XGBoost	1:5	OSS	SMOTE	0.7674	0.8728	0.9875	0.5474	0.9850	0.6012	0.9899	0.5024	C
XGBoost	1:5	OSS	SMOTE	0.7600	0.8823	0.9871	0.5330	0.9846	0.5872	0.9896	0.4879	D
XGBoost	1:5	OSS	SMOTE	0.7620	0.8975	0.9872	0.5368	0.9847	0.5896	0.9896	0.4928	E
XGBoost	1:Log	–	–	0.7709	0.8979	0.9889	0.5529	0.9837	0.7068	0.9943	0.4541	A
XGBoost	1:Log	–	–	0.7709	0.8979	0.9889	0.5529	0.9837	0.7068	0.9943	0.4541	B
XGBoost	1:Log	–	–	0.7828	0.8828	0.9898	0.5758	0.9838	0.7724	0.9959	0.4589	C
XGBoost	1:Log	–	–	0.7709	0.8979	0.9889	0.5529	0.9837	0.7068	0.9943	0.4541	D
XGBoost	1:Log	–	–	0.7709	0.8979	0.9889	0.5529	0.9837	0.7068	0.9943	0.4541	E
XGBoost	1:Log	–	SMOTE	0.7799	0.8940	0.9892	0.5706	0.9844	0.7071	0.9940	0.4783	A
XGBoost	1:Log	–	SMOTE	0.7774	0.8852	0.9892	0.5656	0.9841	0.7132	0.9943	0.4686	B
XGBoost	1:Log	–	SMOTE	0.7918	0.8742	0.9900	0.5935	0.9845	0.7692	0.9956	0.4831	C
XGBoost	1:Log	–	SMOTE	0.7719	0.8894	0.9888	0.5549	0.9839	0.6906	0.9937	0.4638	D
XGBoost	1:Log	–	SMOTE	0.7794	0.8927	0.9890	0.5698	0.9845	0.6944	0.9936	0.4831	E
XGBoost	1:Log	Tomek	–	0.7787	0.8945	0.9894	0.5680	0.9840	0.7328	0.9949	0.4638	A
XGBoost	1:Log	Tomek	–	0.7787	0.8945	0.9894	0.5680	0.9840	0.7328	0.9949	0.4638	B
XGBoost	1:Log	Tomek	–	0.7872	0.8831	0.9897	0.5848	0.9845	0.7407	0.9949	0.4831	C
XGBoost	1:Log	Tomek	–	0.7787	0.8945	0.9894	0.5680	0.9840	0.7328	0.9949	0.4638	D
XGBoost	1:Log	Tomek	–	0.7787	0.8945	0.9894	0.5680	0.9840	0.7328	0.9949	0.4638	E
XGBoost	1:Log	Tomek	SMOTE	0.7752	0.8933	0.9889	0.5616	0.9842	0.6901	0.9936	0.4734	A
XGBoost	1:Log	Tomek	SMOTE	0.7768	0.8876	0.9886	0.5651	0.9848	0.6623	0.9924	0.4928	B
XGBoost	1:Log	Tomek	SMOTE	0.7931	0.8772	0.9897	0.5966	0.9852	0.7241	0.9942	0.5072	C
XGBoost	1:Log	Tomek	SMOTE	0.7798	0.8884	0.9889	0.5706	0.9846	0.6871	0.9933	0.4879	D
XGBoost	1:Log	Tomek	SMOTE	0.7794	0.8951	0.9890	0.5698	0.9845	0.6944	0.9936	0.4831	E
XGBoost	1:Log	OSS	–	0.7796	0.9029	0.9895	0.5697	0.9840	0.7385	0.9950	0.4638	A
XGBoost	1:Log	OSS	–	0.7896	0.8925	0.9900	0.5893	0.9844	0.7674	0.9956	0.4783	B
XGBoost	1:Log	OSS	–	0.7978	0.8871	0.9900	0.6057	0.9854	0.7413	0.9946	0.5121	C
XGBoost	1:Log	OSS	–	0.7835	0.8925	0.9897	0.5774	0.9841	0.7519	0.9953	0.4686	D
XGBoost	1:Log	OSS	–	0.7796	0.8943	0.9895	0.5697	0.9840	0.7385	0.9950	0.4638	E
XGBoost	1:Log	OSS	SMOTE	0.7663	0.8877	0.9887	0.5439	0.9835	0.6889	0.9939	0.4493	A
XGBoost	1:Log	OSS	SMOTE	0.7844	0.8927	0.9892	0.5795	0.9848	0.7034	0.9937	0.4928	B
XGBoost	1:Log	OSS	SMOTE	0.7864	0.8806	0.9893	0.5836	0.9849	0.7055	0.9937	0.4976	C
XGBoost	1:Log	OSS	SMOTE	0.7773	0.8864	0.9889	0.5657	0.9844	0.6923	0.9936	0.4783	D
XGBoost	1:Log	OSS	SMOTE	0.7782	0.8884	0.9890	0.5673	0.9844	0.6972	0.9937	0.4783	E

* "–" = Not Applied

TABLE X
TEST SET CLASSIFICATION PERFORMANCE - PART 7

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
CatBoost	–	–	–	0.7757	0.8849	0.9906	0.5608	0.9822	0.9326	0.9991	0.4010	A
CatBoost	–	–	–	0.7791	0.8962	0.9905	0.5677	0.9826	0.8958	0.9985	0.4155	B
CatBoost	–	–	–	0.7939	0.8913	0.9911	0.5967	0.9833	0.9286	0.9990	0.4396	C
CatBoost	–	–	–	0.7722	0.8912	0.9904	0.5541	0.9820	0.9213	0.9990	0.3961	D
CatBoost	–	–	–	0.7752	0.8863	0.9907	0.5597	0.9820	0.9535	0.9994	0.3961	E
CatBoost	–	–	SMOTE	0.7622	0.8920	0.9898	0.5347	0.9819	0.8438	0.9978	0.3913	A
CatBoost	–	–	SMOTE	0.7603	0.8957	0.9900	0.5306	0.9815	0.8966	0.9987	0.3768	B
CatBoost	–	–	SMOTE	0.7723	0.8878	0.9902	0.5545	0.9823	0.8750	0.9982	0.4058	C
CatBoost	–	–	SMOTE	0.7820	0.8929	0.9907	0.5733	0.9826	0.9247	0.9990	0.4155	D
CatBoost	–	–	SMOTE	0.7584	0.9042	0.9899	0.5270	0.9815	0.8764	0.9984	0.3768	E
CatBoost	–	Tomek	–	0.7791	0.8975	0.9905	0.5677	0.9826	0.8958	0.9985	0.4155	A
CatBoost	–	Tomek	–	0.7684	0.8895	0.9901	0.5467	0.9820	0.8817	0.9984	0.3961	B
CatBoost	–	Tomek	–	0.7912	0.8952	0.9908	0.5916	0.9834	0.8846	0.9982	0.4444	C
CatBoost	–	Tomek	–	0.7732	0.8940	0.9905	0.5559	0.9820	0.9318	0.9991	0.3961	D
CatBoost	–	Tomek	–	0.7737	0.8802	0.9904	0.5570	0.9822	0.9121	0.9988	0.4010	E
CatBoost	–	Tomek	SMOTE	0.7647	0.8941	0.9898	0.5395	0.9820	0.8454	0.9978	0.3961	A
CatBoost	–	Tomek	SMOTE	0.7719	0.8849	0.9901	0.5537	0.9824	0.8500	0.9978	0.4106	B
CatBoost	–	Tomek	SMOTE	0.7600	0.8771	0.9899	0.5302	0.9816	0.8681	0.9982	0.3816	C
CatBoost	–	Tomek	SMOTE	0.7573	0.8896	0.9896	0.5249	0.9816	0.8404	0.9978	0.3816	D
CatBoost	–	Tomek	SMOTE	0.7719	0.8900	0.9901	0.5537	0.9824	0.8500	0.9978	0.4106	E
CatBoost	–	OSS	–	0.7762	0.8920	0.9905	0.5619	0.9823	0.9130	0.9988	0.4058	A
CatBoost	–	OSS	–	0.7752	0.8970	0.9904	0.5600	0.9823	0.9032	0.9987	0.4058	B
CatBoost	–	OSS	–	0.7905	0.8882	0.9909	0.5902	0.9832	0.9184	0.9988	0.4348	C
CatBoost	–	OSS	–	0.7647	0.8918	0.9902	0.5392	0.9816	0.9186	0.9990	0.3816	D
CatBoost	–	OSS	–	0.7829	0.8964	0.9906	0.5752	0.9829	0.8889	0.9984	0.4251	E
CatBoost	–	OSS	SMOTE	0.7684	0.8925	0.9901	0.5467	0.9820	0.8817	0.9984	0.3961	A
CatBoost	–	OSS	SMOTE	0.7684	0.8838	0.9901	0.5467	0.9820	0.8817	0.9984	0.3961	B
CatBoost	–	OSS	SMOTE	0.7709	0.8847	0.9902	0.5515	0.9822	0.8830	0.9984	0.4010	C
CatBoost	–	OSS	SMOTE	0.7813	0.8860	0.9904	0.5723	0.9830	0.8558	0.9978	0.4300	D
CatBoost	–	OSS	SMOTE	0.7781	0.8988	0.9904	0.5658	0.9826	0.8866	0.9984	0.4155	E
CatBoost	1:3	–	–	0.7721	0.8837	0.9896	0.5545	0.9830	0.7807	0.9963	0.4300	A
CatBoost	1:3	–	–	0.7765	0.8931	0.9891	0.5640	0.9841	0.7080	0.9942	0.4686	B
CatBoost	1:3	–	–	0.7992	0.8823	0.9903	0.6082	0.9851	0.7704	0.9955	0.5024	C
CatBoost	1:3	–	–	0.7784	0.8826	0.9897	0.5671	0.9835	0.7686	0.9959	0.4493	D
CatBoost	1:3	–	–	0.7832	0.8899	0.9898	0.5766	0.9840	0.7619	0.9956	0.4638	E
CatBoost	1:3	–	SMOTE	0.7706	0.8840	0.9888	0.5523	0.9838	0.6934	0.9939	0.4589	A
CatBoost	1:3	–	SMOTE	0.7693	0.8754	0.9888	0.5497	0.9837	0.6963	0.9940	0.4541	B
CatBoost	1:3	–	SMOTE	0.7706	0.8890	0.9886	0.5527	0.9841	0.6736	0.9931	0.4686	C
CatBoost	1:3	–	SMOTE	0.7539	0.8878	0.9878	0.5200	0.9832	0.6364	0.9924	0.4396	D
CatBoost	1:3	–	SMOTE	0.7674	0.8931	0.9883	0.5465	0.9841	0.6554	0.9925	0.4686	E

* "–" = Not Applied

TABLE XI
TEST SET CLASSIFICATION PERFORMANCE - PART 8

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
CatBoost	1:3	Tomek	–	0.7806	0.8892	0.9898	0.5714	0.9837	0.7705	0.9959	0.4541	A
CatBoost	1:3	Tomek	–	0.7951	0.8861	0.9901	0.6000	0.9848	0.7669	0.9955	0.4928	B
CatBoost	1:3	Tomek	–	0.7911	0.8718	0.9899	0.5924	0.9847	0.7537	0.9952	0.4879	C
CatBoost	1:3	Tomek	–	0.7671	0.8788	0.9887	0.5455	0.9835	0.6940	0.9940	0.4493	D
CatBoost	1:3	Tomek	–	0.7926	0.8877	0.9898	0.5954	0.9849	0.7410	0.9947	0.4976	E
CatBoost	1:3	Tomek	SMOTE	0.7764	0.8771	0.9886	0.5642	0.9846	0.6689	0.9927	0.4879	A
CatBoost	1:3	Tomek	SMOTE	0.7688	0.8865	0.9881	0.5495	0.9845	0.6369	0.9917	0.4831	B
CatBoost	1:3	Tomek	SMOTE	0.7891	0.8683	0.9892	0.5889	0.9853	0.6928	0.9931	0.5121	C
CatBoost	1:3	Tomek	SMOTE	0.7706	0.8934	0.9886	0.5527	0.9841	0.6736	0.9931	0.4686	D
CatBoost	1:3	Tomek	SMOTE	0.7727	0.8885	0.9886	0.5568	0.9842	0.6759	0.9931	0.4734	E
CatBoost	1:3	OSS	–	0.7820	0.8812	0.9900	0.5741	0.9835	0.7949	0.9965	0.4493	A
CatBoost	1:3	OSS	–	0.7969	0.8990	0.9903	0.6036	0.9848	0.7786	0.9958	0.4928	B
CatBoost	1:3	OSS	–	0.7938	0.8740	0.9898	0.5977	0.9851	0.7376	0.9946	0.5024	C
CatBoost	1:3	OSS	–	0.7878	0.8818	0.9898	0.5858	0.9844	0.7557	0.9953	0.4783	D
CatBoost	1:3	OSS	–	0.7801	0.8910	0.9896	0.5706	0.9838	0.7540	0.9955	0.4589	E
CatBoost	1:3	OSS	SMOTE	0.7815	0.8803	0.9891	0.5739	0.9846	0.6966	0.9936	0.4879	A
CatBoost	1:3	OSS	SMOTE	0.7414	0.8841	0.9871	0.4957	0.9826	0.6042	0.9917	0.4203	B
CatBoost	1:3	OSS	SMOTE	0.7891	0.8759	0.9892	0.5889	0.9853	0.6928	0.9931	0.5121	C
CatBoost	1:3	OSS	SMOTE	0.7667	0.8902	0.9880	0.5455	0.9843	0.6346	0.9917	0.4783	D
CatBoost	1:3	OSS	SMOTE	0.7727	0.8798	0.9886	0.5568	0.9842	0.6759	0.9931	0.4734	E
CatBoost	1:5	–	–	0.7613	0.8886	0.9871	0.5354	0.9847	0.5862	0.9895	0.4928	A
CatBoost	1:5	–	–	0.7688	0.8772	0.9881	0.5495	0.9845	0.6369	0.9917	0.4831	B
CatBoost	1:5	–	–	0.7871	0.8746	0.9889	0.5854	0.9856	0.6667	0.9921	0.5217	C
CatBoost	1:5	–	–	0.7670	0.8900	0.9881	0.5460	0.9842	0.6447	0.9921	0.4734	D
CatBoost	1:5	–	–	0.7621	0.8809	0.9875	0.5366	0.9843	0.6111	0.9908	0.4783	E
CatBoost	1:5	–	SMOTE	0.7501	0.8842	0.9855	0.5147	0.9851	0.5224	0.9860	0.5072	A
CatBoost	1:5	–	SMOTE	0.7487	0.8806	0.9852	0.5121	0.9852	0.5121	0.9852	0.5121	B
CatBoost	1:5	–	SMOTE	0.7643	0.8706	0.9868	0.5418	0.9854	0.5691	0.9882	0.5169	C
CatBoost	1:5	–	SMOTE	0.7544	0.8798	0.9861	0.5226	0.9850	0.5445	0.9873	0.5024	D
CatBoost	1:5	–	SMOTE	0.7533	0.8819	0.9858	0.5209	0.9852	0.5300	0.9863	0.5121	E
CatBoost	1:5	Tomek	–	0.7842	0.8838	0.9882	0.5803	0.9862	0.6257	0.9902	0.5411	A
CatBoost	1:5	Tomek	–	0.7600	0.8748	0.9871	0.5330	0.9846	0.5872	0.9896	0.4879	B
CatBoost	1:5	Tomek	–	0.7794	0.8684	0.9880	0.5707	0.9857	0.6229	0.9904	0.5266	C
CatBoost	1:5	Tomek	–	0.7665	0.8823	0.9876	0.5455	0.9847	0.6108	0.9905	0.4928	D
CatBoost	1:5	Tomek	–	0.7803	0.8798	0.9883	0.5722	0.9855	0.6407	0.9912	0.5169	E
CatBoost	1:5	Tomek	SMOTE	0.7466	0.8916	0.9857	0.5075	0.9845	0.5288	0.9868	0.4879	A
CatBoost	1:5	Tomek	SMOTE	0.7588	0.8847	0.9863	0.5313	0.9853	0.5521	0.9874	0.5121	B
CatBoost	1:5	Tomek	SMOTE	0.7644	0.8715	0.9860	0.5429	0.9864	0.5352	0.9855	0.5507	C
CatBoost	1:5	Tomek	SMOTE	0.7496	0.8848	0.9856	0.5136	0.9850	0.5253	0.9863	0.5024	D
CatBoost	1:5	Tomek	SMOTE	0.7467	0.8875	0.9850	0.5084	0.9852	0.5048	0.9848	0.5121	E

* "–" = Not Applied

TABLE XII
TEST SET CLASSIFICATION PERFORMANCE - PART 9

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
CatBoost	1:5	OSS	–	0.7649	0.8825	0.9871	0.5426	0.9851	0.5833	0.9890	0.5072	A
CatBoost	1:5	OSS	–	0.7505	0.8811	0.9865	0.5144	0.9841	0.5632	0.9889	0.4734	B
CatBoost	1:5	OSS	–	0.7832	0.8629	0.9882	0.5781	0.9860	0.6271	0.9904	0.5362	C
CatBoost	1:5	OSS	–	0.7693	0.8617	0.9878	0.5508	0.9849	0.6168	0.9906	0.4976	D
CatBoost	1:5	OSS	–	0.7603	0.8752	0.9872	0.5333	0.9844	0.5952	0.9901	0.4831	E
CatBoost	1:5	OSS	SMOTE	0.7533	0.8730	0.9863	0.5204	0.9847	0.5514	0.9879	0.4928	A
CatBoost	1:5	OSS	SMOTE	0.7501	0.8918	0.9855	0.5147	0.9851	0.5224	0.9860	0.5072	B
CatBoost	1:5	OSS	SMOTE	0.7633	0.8666	0.9860	0.5407	0.9862	0.5355	0.9857	0.5459	C
CatBoost	1:5	OSS	SMOTE	0.7695	0.8799	0.9869	0.5522	0.9860	0.5692	0.9877	0.5362	D
CatBoost	1:5	OSS	SMOTE	0.7506	0.8878	0.9855	0.5158	0.9852	0.5196	0.9857	0.5121	E
CatBoost	1:Log	–	–	0.7616	0.8814	0.9887	0.5345	0.9830	0.7063	0.9946	0.4300	A
CatBoost	1:Log	–	–	0.7842	0.8797	0.9895	0.5789	0.9844	0.7333	0.9947	0.4783	B
CatBoost	1:Log	–	–	0.7914	0.8748	0.9898	0.5930	0.9848	0.7445	0.9949	0.4928	C
CatBoost	1:Log	–	–	0.7887	0.8816	0.9896	0.5879	0.9848	0.7286	0.9944	0.4928	D
CatBoost	1:Log	–	–	0.7881	0.8794	0.9897	0.5865	0.9845	0.7463	0.9950	0.4831	E
CatBoost	1:Log	–	SMOTE	0.7777	0.8763	0.9886	0.5667	0.9848	0.6667	0.9925	0.4928	A
CatBoost	1:Log	–	SMOTE	0.7682	0.8868	0.9884	0.5480	0.9841	0.6599	0.9927	0.4686	B
CatBoost	1:Log	–	SMOTE	0.7811	0.8687	0.9892	0.5731	0.9845	0.7042	0.9939	0.4831	C
CatBoost	1:Log	–	SMOTE	0.7701	0.8691	0.9889	0.5513	0.9837	0.7015	0.9942	0.4541	D
CatBoost	1:Log	–	SMOTE	0.7624	0.8929	0.9881	0.5367	0.9838	0.6463	0.9924	0.4589	E
CatBoost	1:Log	Tomek	–	0.7709	0.8852	0.9889	0.5529	0.9837	0.7068	0.9943	0.4541	A
CatBoost	1:Log	Tomek	–	0.7633	0.8762	0.9885	0.5380	0.9834	0.6815	0.9937	0.4444	B
CatBoost	1:Log	Tomek	–	0.7773	0.8773	0.9887	0.5658	0.9846	0.6733	0.9928	0.4879	C
CatBoost	1:Log	Tomek	–	0.7863	0.8765	0.9896	0.5831	0.9845	0.7353	0.9947	0.4831	D
CatBoost	1:Log	Tomek	–	0.7731	0.8910	0.9888	0.5575	0.9841	0.6879	0.9936	0.4686	E
CatBoost	1:Log	Tomek	SMOTE	0.7680	0.8931	0.9880	0.5479	0.9845	0.6329	0.9915	0.4831	A
CatBoost	1:Log	Tomek	SMOTE	0.7772	0.8915	0.9885	0.5659	0.9849	0.6561	0.9921	0.4976	B
CatBoost	1:Log	Tomek	SMOTE	0.7764	0.8835	0.9882	0.5645	0.9852	0.6364	0.9912	0.5072	C
CatBoost	1:Log	Tomek	SMOTE	0.7812	0.8945	0.9886	0.5738	0.9852	0.6604	0.9921	0.5072	D
CatBoost	1:Log	Tomek	SMOTE	0.7641	0.8744	0.9876	0.5405	0.9845	0.6135	0.9908	0.4831	E
CatBoost	1:Log	OSS	–	0.7685	0.8744	0.9885	0.5486	0.9839	0.6713	0.9931	0.4638	A
CatBoost	1:Log	OSS	–	0.7960	0.8779	0.9898	0.6023	0.9854	0.7310	0.9943	0.5121	B
CatBoost	1:Log	OSS	–	0.7740	0.8780	0.9882	0.5598	0.9849	0.6398	0.9915	0.4976	C
CatBoost	1:Log	OSS	–	0.7756	0.8870	0.9888	0.5625	0.9844	0.6828	0.9933	0.4783	D
CatBoost	1:Log	OSS	–	0.7795	0.8849	0.9892	0.5698	0.9842	0.7153	0.9943	0.4734	E
CatBoost	1:Log	OSS	SMOTE	0.7524	0.8844	0.9871	0.5177	0.9837	0.5938	0.9905	0.4589	A
CatBoost	1:Log	OSS	SMOTE	0.7672	0.8986	0.9879	0.5464	0.9845	0.6289	0.9914	0.4831	B
CatBoost	1:Log	OSS	SMOTE	0.7860	0.8800	0.9889	0.5831	0.9855	0.6687	0.9923	0.5169	C
CatBoost	1:Log	OSS	SMOTE	0.7780	0.8833	0.9883	0.5676	0.9852	0.6442	0.9915	0.5072	D
CatBoost	1:Log	OSS	SMOTE	0.7656	0.8858	0.9878	0.5435	0.9845	0.6211	0.9911	0.4831	E

* "–" = Not Applied

TABLE XIII
TEST SET CLASSIFICATION PERFORMANCE - PART 10

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
LightGBM	–	–	–	0.7786	0.9004	0.9906	0.5667	0.9825	0.9140	0.9988	0.4106	A
LightGBM	–	–	–	0.7786	0.9004	0.9906	0.5667	0.9825	0.9140	0.9988	0.4106	B
LightGBM	–	–	–	0.7594	0.8949	0.9899	0.5288	0.9815	0.8864	0.9985	0.3768	C
LightGBM	–	–	–	0.7786	0.9004	0.9906	0.5667	0.9825	0.9140	0.9988	0.4106	D
LightGBM	–	–	–	0.7786	0.9004	0.9906	0.5667	0.9825	0.9140	0.9988	0.4106	E
LightGBM	–	–	SMOTE	0.7727	0.8947	0.9906	0.5548	0.9819	0.9529	0.9994	0.3913	A
LightGBM	–	–	SMOTE	0.7806	0.8958	0.9907	0.5705	0.9825	0.9341	0.9991	0.4106	B
LightGBM	–	–	SMOTE	0.7806	0.8986	0.9907	0.5705	0.9825	0.9341	0.9991	0.4106	C
LightGBM	–	–	SMOTE	0.7772	0.8935	0.9906	0.5638	0.9823	0.9231	0.9990	0.4058	D
LightGBM	–	–	SMOTE	0.7791	0.9011	0.9907	0.5676	0.9823	0.9438	0.9993	0.4058	E
LightGBM	–	Tomek	–	0.7801	0.9046	0.9906	0.5695	0.9826	0.9053	0.9987	0.4155	A
LightGBM	–	Tomek	–	0.7801	0.9046	0.9906	0.5695	0.9826	0.9053	0.9987	0.4155	B
LightGBM	–	Tomek	–	0.7709	0.8956	0.9902	0.5515	0.9822	0.8830	0.9984	0.4010	C
LightGBM	–	Tomek	–	0.7801	0.9046	0.9906	0.5695	0.9826	0.9053	0.9987	0.4155	D
LightGBM	–	Tomek	–	0.7801	0.9046	0.9906	0.5695	0.9826	0.9053	0.9987	0.4155	E
LightGBM	–	Tomek	SMOTE	0.7782	0.8930	0.9907	0.5657	0.9823	0.9333	0.9991	0.4058	A
LightGBM	–	Tomek	SMOTE	0.7752	0.8960	0.9904	0.5600	0.9823	0.9032	0.9987	0.4058	B
LightGBM	–	Tomek	SMOTE	0.7722	0.8938	0.9904	0.5541	0.9820	0.9213	0.9990	0.3961	C
LightGBM	–	Tomek	SMOTE	0.7806	0.8953	0.9907	0.5705	0.9825	0.9341	0.9991	0.4106	D
LightGBM	–	Tomek	SMOTE	0.7698	0.8995	0.9904	0.5492	0.9819	0.9205	0.9990	0.3913	E
LightGBM	–	OSS	–	0.7767	0.9075	0.9904	0.5629	0.9825	0.8947	0.9985	0.4106	A
LightGBM	–	OSS	–	0.7776	0.9031	0.9905	0.5648	0.9825	0.9043	0.9987	0.4106	B
LightGBM	–	OSS	–	0.7619	0.8912	0.9900	0.5338	0.9816	0.8876	0.9985	0.3816	C
LightGBM	–	OSS	–	0.7728	0.9043	0.9904	0.5552	0.9822	0.9022	0.9987	0.4010	D
LightGBM	–	OSS	–	0.7757	0.9058	0.9904	0.5611	0.9824	0.8854	0.9984	0.4106	E
LightGBM	–	OSS	SMOTE	0.7698	0.8920	0.9904	0.5492	0.9819	0.9205	0.9990	0.3913	A
LightGBM	–	OSS	SMOTE	0.7707	0.8960	0.9904	0.5510	0.9819	0.9310	0.9991	0.3913	B
LightGBM	–	OSS	SMOTE	0.7854	0.8923	0.9909	0.5800	0.9827	0.9355	0.9991	0.4203	C
LightGBM	–	OSS	SMOTE	0.7820	0.8947	0.9907	0.5733	0.9826	0.9247	0.9990	0.4155	D
LightGBM	–	OSS	SMOTE	0.7796	0.9023	0.9906	0.5686	0.9825	0.9239	0.9990	0.4106	E
LightGBM	1:3	–	–	0.7890	0.9072	0.9904	0.5875	0.9837	0.8319	0.9972	0.4541	A
LightGBM	1:3	–	–	0.7890	0.9072	0.9904	0.5875	0.9837	0.8319	0.9972	0.4541	B
LightGBM	1:3	–	–	0.7976	0.8983	0.9908	0.6044	0.9841	0.8509	0.9975	0.4686	C
LightGBM	1:3	–	–	0.7890	0.9072	0.9904	0.5875	0.9837	0.8319	0.9972	0.4541	D
LightGBM	1:3	–	–	0.7890	0.9072	0.9904	0.5875	0.9837	0.8319	0.9972	0.4541	E
LightGBM	1:3	–	SMOTE	0.7857	0.8978	0.9898	0.5816	0.9842	0.7538	0.9953	0.4734	A
LightGBM	1:3	–	SMOTE	0.7805	0.8968	0.9895	0.5714	0.9840	0.7442	0.9952	0.4638	B
LightGBM	1:3	–	SMOTE	0.7990	0.8941	0.9907	0.6074	0.9844	0.8319	0.9971	0.4783	C
LightGBM	1:3	–	SMOTE	0.7832	0.8938	0.9898	0.5766	0.9840	0.7619	0.9956	0.4638	D
LightGBM	1:3	–	SMOTE	0.7833	0.8983	0.9900	0.5767	0.9837	0.7899	0.9963	0.4541	E

* "–" = Not Applied

TABLE XIV
TEST SET CLASSIFICATION PERFORMANCE - PART 11

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
LightGBM	1:3	Tomek	–	0.7887	0.9083	0.9902	0.5872	0.9840	0.8000	0.9965	0.4638	A
LightGBM	1:3	Tomek	–	0.7887	0.9083	0.9902	0.5872	0.9840	0.8000	0.9965	0.4638	B
LightGBM	1:3	Tomek	–	0.7971	0.8989	0.9906	0.6037	0.9844	0.8182	0.9968	0.4783	C
LightGBM	1:3	Tomek	–	0.7887	0.9083	0.9902	0.5872	0.9840	0.8000	0.9965	0.4638	D
LightGBM	1:3	Tomek	–	0.7887	0.9083	0.9902	0.5872	0.9840	0.8000	0.9965	0.4638	E
LightGBM	1:3	Tomek	SMOTE	0.7779	0.8947	0.9895	0.5663	0.9837	0.7520	0.9955	0.4541	A
LightGBM	1:3	Tomek	SMOTE	0.7795	0.8975	0.9892	0.5698	0.9842	0.7153	0.9943	0.4734	B
LightGBM	1:3	Tomek	SMOTE	0.7944	0.8929	0.9900	0.5988	0.9849	0.7518	0.9950	0.4976	C
LightGBM	1:3	Tomek	SMOTE	0.7890	0.8950	0.9901	0.5879	0.9841	0.7886	0.9962	0.4686	D
LightGBM	1:3	Tomek	SMOTE	0.7796	0.8986	0.9895	0.5697	0.9840	0.7385	0.9950	0.4638	E
LightGBM	1:3	OSS	–	0.7841	0.9057	0.9898	0.5783	0.9840	0.7680	0.9958	0.4638	A
LightGBM	1:3	OSS	–	0.7896	0.9063	0.9903	0.5890	0.9840	0.8067	0.9966	0.4638	B
LightGBM	1:3	OSS	–	0.7955	0.8990	0.9903	0.6006	0.9845	0.7937	0.9962	0.4831	C
LightGBM	1:3	OSS	–	0.7874	0.9042	0.9902	0.5846	0.9838	0.8051	0.9966	0.4589	D
LightGBM	1:3	OSS	–	0.7899	0.9043	0.9902	0.5897	0.9841	0.7951	0.9963	0.4686	E
LightGBM	1:3	OSS	SMOTE	0.7791	0.8915	0.9893	0.5689	0.9841	0.7239	0.9946	0.4686	A
LightGBM	1:3	OSS	SMOTE	0.7857	0.8995	0.9898	0.5816	0.9842	0.7538	0.9953	0.4734	B
LightGBM	1:3	OSS	SMOTE	0.7933	0.8919	0.9903	0.5964	0.9844	0.7920	0.9962	0.4783	C
LightGBM	1:3	OSS	SMOTE	0.7832	0.8937	0.9898	0.5766	0.9840	0.7619	0.9956	0.4638	D
LightGBM	1:3	OSS	SMOTE	0.7824	0.8989	0.9899	0.5749	0.9837	0.7833	0.9962	0.4541	E
LightGBM	1:5	–	–	0.7882	0.9045	0.9892	0.5873	0.9853	0.6883	0.9930	0.5121	A
LightGBM	1:5	–	–	0.7882	0.9045	0.9892	0.5873	0.9853	0.6883	0.9930	0.5121	B
LightGBM	1:5	–	–	0.8012	0.8932	0.9900	0.6124	0.9858	0.7315	0.9942	0.5266	C
LightGBM	1:5	–	–	0.7882	0.9045	0.9892	0.5873	0.9853	0.6883	0.9930	0.5121	D
LightGBM	1:5	–	–	0.7882	0.9045	0.9892	0.5873	0.9853	0.6883	0.9930	0.5121	E
LightGBM	1:5	–	SMOTE	0.7643	0.8921	0.9874	0.5411	0.9847	0.6000	0.9901	0.4928	A
LightGBM	1:5	–	SMOTE	0.7603	0.8953	0.9869	0.5337	0.9849	0.5754	0.9889	0.4976	B
LightGBM	1:5	–	SMOTE	0.7847	0.8935	0.9883	0.5812	0.9860	0.6343	0.9906	0.5362	C
LightGBM	1:5	–	SMOTE	0.7653	0.8940	0.9870	0.5436	0.9853	0.5792	0.9887	0.5121	D
LightGBM	1:5	–	SMOTE	0.7542	0.8970	0.9865	0.5220	0.9846	0.5611	0.9885	0.4879	E
LightGBM	1:5	Tomek	–	0.7862	0.9048	0.9891	0.5833	0.9852	0.6863	0.9930	0.5072	A
LightGBM	1:5	Tomek	–	0.7862	0.9048	0.9891	0.5833	0.9852	0.6863	0.9930	0.5072	B
LightGBM	1:5	Tomek	–	0.7913	0.9000	0.9892	0.5934	0.9856	0.6879	0.9928	0.5217	C
LightGBM	1:5	Tomek	–	0.7862	0.9048	0.9891	0.5833	0.9852	0.6863	0.9930	0.5072	D
LightGBM	1:5	Tomek	–	0.7862	0.9048	0.9891	0.5833	0.9852	0.6863	0.9930	0.5072	E
LightGBM	1:5	Tomek	SMOTE	0.7631	0.8954	0.9868	0.5394	0.9853	0.5699	0.9883	0.5121	A
LightGBM	1:5	Tomek	SMOTE	0.7480	0.8992	0.9858	0.5101	0.9845	0.5344	0.9871	0.4879	B
LightGBM	1:5	Tomek	SMOTE	0.7785	0.8928	0.9877	0.5692	0.9860	0.6066	0.9895	0.5362	C
LightGBM	1:5	Tomek	SMOTE	0.7619	0.8958	0.9868	0.5371	0.9851	0.5707	0.9885	0.5072	D
LightGBM	1:5	Tomek	SMOTE	0.7593	0.9001	0.9866	0.5320	0.9850	0.5652	0.9883	0.5024	E

* "–" = Not Applied

TABLE XV
TEST SET CLASSIFICATION PERFORMANCE - PART 12

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision$_0$	Precision$_1$	Recall$_0$	Recall$_1$	Seed
LightGBM	1:5	OSS	–	0.7813	0.9062	0.9889	0.5738	0.9849	0.6776	0.9928	0.4976	A
LightGBM	1:5	OSS	–	0.7837	0.9047	0.9889	0.5785	0.9852	0.6731	0.9925	0.5072	B
LightGBM	1:5	OSS	–	0.7877	0.9002	0.9890	0.5863	0.9855	0.6772	0.9925	0.5169	C
LightGBM	1:5	OSS	–	0.7850	0.9055	0.9891	0.5810	0.9851	0.6887	0.9931	0.5024	D
LightGBM	1:5	OSS	–	0.7850	0.9094	0.9891	0.5810	0.9851	0.6887	0.9931	0.5024	E
LightGBM	1:5	OSS	SMOTE	0.7591	0.8925	0.9869	0.5312	0.9847	0.5763	0.9890	0.4928	A
LightGBM	1:5	OSS	SMOTE	0.7530	0.8963	0.9860	0.5200	0.9850	0.5389	0.9870	0.5024	B
LightGBM	1:5	OSS	SMOTE	0.7781	0.8925	0.9878	0.5685	0.9859	0.6111	0.9898	0.5314	C
LightGBM	1:5	OSS	SMOTE	0.7691	0.8946	0.9872	0.5510	0.9856	0.5838	0.9887	0.5217	D
LightGBM	1:5	OSS	SMOTE	0.7660	0.8957	0.9871	0.5450	0.9853	0.5824	0.9889	0.5121	E
LightGBM	1:Log	–	–	0.7902	0.9069	0.9901	0.5904	0.9843	0.7840	0.9961	0.4734	A
LightGBM	1:Log	–	–	0.7902	0.9069	0.9901	0.5904	0.9843	0.7840	0.9961	0.4734	B
LightGBM	1:Log	–	–	0.8078	0.8997	0.9909	0.6246	0.9851	0.8254	0.9968	0.5024	C
LightGBM	1:Log	–	–	0.7902	0.9069	0.9901	0.5904	0.9843	0.7840	0.9961	0.4734	D
LightGBM	1:Log	–	–	0.7902	0.9069	0.9901	0.5904	0.9843	0.7840	0.9961	0.4734	E
LightGBM	1:Log	–	SMOTE	0.7727	0.8924	0.9889	0.5565	0.9839	0.6957	0.9939	0.4638	A
LightGBM	1:Log	–	SMOTE	0.7778	0.9017	0.9893	0.5664	0.9839	0.7273	0.9947	0.4638	B
LightGBM	1:Log	–	SMOTE	0.7914	0.8968	0.9898	0.5930	0.9848	0.7445	0.9949	0.4928	C
LightGBM	1:Log	–	SMOTE	0.7790	0.8925	0.9891	0.5690	0.9844	0.7021	0.9939	0.4783	D
LightGBM	1:Log	–	SMOTE	0.7748	0.8989	0.9889	0.5607	0.9841	0.6978	0.9939	0.4686	E
LightGBM	1:Log	Tomek	–	0.7866	0.9030	0.9898	0.5833	0.9842	0.7597	0.9955	0.4734	A
LightGBM	1:Log	Tomek	–	0.7866	0.9030	0.9898	0.5833	0.9842	0.7597	0.9955	0.4734	B
LightGBM	1:Log	Tomek	–	0.7890	0.8983	0.9898	0.5882	0.9845	0.7519	0.9952	0.4831	C
LightGBM	1:Log	Tomek	–	0.7866	0.9030	0.9898	0.5833	0.9842	0.7597	0.9955	0.4734	D
LightGBM	1:Log	Tomek	–	0.7866	0.9030	0.9898	0.5833	0.9842	0.7597	0.9955	0.4734	E
LightGBM	1:Log	Tomek	SMOTE	0.7832	0.8903	0.9892	0.5771	0.9846	0.7063	0.9939	0.4879	A
LightGBM	1:Log	Tomek	SMOTE	0.7756	0.8959	0.9888	0.5625	0.9844	0.6828	0.9933	0.4783	B
LightGBM	1:Log	Tomek	SMOTE	0.7841	0.8947	0.9893	0.5788	0.9846	0.7113	0.9940	0.4879	C
LightGBM	1:Log	Tomek	SMOTE	0.7815	0.8936	0.9891	0.5739	0.9846	0.6966	0.9936	0.4879	D
LightGBM	1:Log	Tomek	SMOTE	0.7723	0.8943	0.9887	0.5559	0.9841	0.6831	0.9934	0.4686	E
LightGBM	1:Log	OSS	–	0.7884	0.9022	0.9900	0.5868	0.9842	0.7717	0.9958	0.4734	A
LightGBM	1:Log	OSS	–	0.7810	0.9063	0.9897	0.5723	0.9838	0.7600	0.9956	0.4589	B
LightGBM	1:Log	OSS	–	0.7911	0.8972	0.9899	0.5924	0.9847	0.7537	0.9952	0.4879	C
LightGBM	1:Log	OSS	–	0.7815	0.9051	0.9898	0.5732	0.9837	0.7769	0.9961	0.4541	D
LightGBM	1:Log	OSS	–	0.7866	0.9054	0.9898	0.5833	0.9842	0.7597	0.9955	0.4734	E
LightGBM	1:Log	OSS	SMOTE	0.7789	0.8959	0.9889	0.5690	0.9846	0.6824	0.9931	0.4879	A
LightGBM	1:Log	OSS	SMOTE	0.7702	0.8991	0.9887	0.5517	0.9839	0.6809	0.9934	0.4638	B
LightGBM	1:Log	OSS	SMOTE	0.7902	0.8971	0.9895	0.5909	0.9851	0.7172	0.9940	0.5024	C
LightGBM	1:Log	OSS	SMOTE	0.7810	0.8938	0.9889	0.5730	0.9848	0.6846	0.9931	0.4928	D
LightGBM	1:Log	OSS	SMOTE	0.7744	0.9008	0.9888	0.5600	0.9842	0.6853	0.9934	0.4734	E

* "–" = Not Applied

TABLE XVI
TEST SET CLASSIFICATION PERFORMANCE - PART 13

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
LogisticRegression	–	–	–	0.6329	0.7952	0.9869	0.2789	0.9754	0.7955	0.9987	0.1691	A
LogisticRegression	–	–	–	0.6188	0.7994	0.9866	0.2510	0.9749	0.7750	0.9987	0.1498	B
LogisticRegression	–	–	–	0.6085	0.8012	0.9865	0.2305	0.9745	0.7778	0.9988	0.1353	C
LogisticRegression	–	–	–	0.5954	0.7918	0.9865	0.2043	0.9739	0.8571	0.9994	0.1159	D
LogisticRegression	–	–	–	0.6205	0.7953	0.9869	0.2541	0.9749	0.8378	0.9991	0.1498	E
LogisticRegression	–	–	SMOTE	0.6267	0.7741	0.9858	0.2677	0.9755	0.5806	0.9962	0.1739	A
LogisticRegression	–	–	SMOTE	0.6366	0.7998	0.9863	0.2868	0.9758	0.6552	0.9971	0.1836	B
LogisticRegression	–	–	SMOTE	0.6055	0.7863	0.9847	0.2263	0.9748	0.4627	0.9947	0.1498	C
LogisticRegression	–	–	SMOTE	0.6146	0.7928	0.9861	0.2431	0.9749	0.6458	0.9975	0.1498	D
LogisticRegression	–	–	SMOTE	0.6141	0.7847	0.9860	0.2422	0.9748	0.6327	0.9974	0.1498	E
LogisticRegression	–	Tomek	–	0.6048	0.8003	0.9864	0.2231	0.9743	0.7714	0.9988	0.1304	A
LogisticRegression	–	Tomek	–	0.6218	0.8008	0.9866	0.2570	0.9750	0.7619	0.9985	0.1546	B
LogisticRegression	–	Tomek	–	0.6205	0.8070	0.9869	0.2541	0.9749	0.8378	0.9991	0.1498	C
LogisticRegression	–	Tomek	–	0.6283	0.8010	0.9867	0.2698	0.9753	0.7556	0.9984	0.1643	D
LogisticRegression	–	Tomek	–	0.6213	0.8008	0.9866	0.2560	0.9750	0.7442	0.9984	0.1546	E
LogisticRegression	–	Tomek	SMOTE	0.6170	0.7880	0.9860	0.2481	0.9750	0.6275	0.9972	0.1546	A
LogisticRegression	–	Tomek	SMOTE	0.6245	0.7911	0.9858	0.2632	0.9754	0.5932	0.9965	0.1691	B
LogisticRegression	–	Tomek	SMOTE	0.6015	0.7873	0.9850	0.2180	0.9745	0.4915	0.9956	0.1401	C
LogisticRegression	–	Tomek	SMOTE	0.6153	0.7794	0.9853	0.2454	0.9751	0.5323	0.9958	0.1594	D
LogisticRegression	–	Tomek	SMOTE	0.6178	0.7920	0.9857	0.2500	0.9751	0.5789	0.9965	0.1594	E
LogisticRegression	–	OSS	–	0.5973	0.7978	0.9863	0.2083	0.9741	0.7576	0.9988	0.1208	A
LogisticRegression	–	OSS	–	0.6142	0.7931	0.9864	0.2419	0.9747	0.7317	0.9984	0.1449	B
LogisticRegression	–	OSS	–	0.6194	0.8072	0.9867	0.2520	0.9749	0.7949	0.9988	0.1498	C
LogisticRegression	–	OSS	–	0.6147	0.7954	0.9865	0.2429	0.9747	0.7500	0.9985	0.1449	D
LogisticRegression	–	OSS	–	0.6306	0.7992	0.9866	0.2745	0.9754	0.7292	0.9981	0.1691	E
LogisticRegression	–	OSS	SMOTE	0.6406	0.7779	0.9855	0.2958	0.9763	0.5455	0.9949	0.2029	A
LogisticRegression	–	OSS	SMOTE	0.6322	0.7917	0.9861	0.2782	0.9757	0.6271	0.9968	0.1787	B
LogisticRegression	–	OSS	SMOTE	0.6110	0.7889	0.9847	0.2374	0.9751	0.4648	0.9944	0.1594	C
LogisticRegression	–	OSS	SMOTE	0.6384	0.7853	0.9859	0.2909	0.9761	0.5882	0.9959	0.1932	D
LogisticRegression	–	OSS	SMOTE	0.6194	0.7877	0.9859	0.2529	0.9751	0.6111	0.9969	0.1594	E
LogisticRegression	1:3	–	–	0.6820	0.8028	0.9861	0.3779	0.9786	0.5800	0.9939	0.2802	A
LogisticRegression	1:3	–	–	0.6650	0.8081	0.9856	0.3444	0.9777	0.5474	0.9937	0.2512	B
LogisticRegression	1:3	–	–	0.6846	0.8099	0.9869	0.3823	0.9783	0.6512	0.9956	0.2705	C
LogisticRegression	1:3	–	–	0.6805	0.8103	0.9864	0.3746	0.9783	0.6087	0.9947	0.2705	D
LogisticRegression	1:3	–	–	0.6709	0.8142	0.9861	0.3557	0.9779	0.5824	0.9944	0.2560	E
LogisticRegression	1:3	–	SMOTE	0.6564	0.7989	0.9812	0.3316	0.9792	0.3575	0.9832	0.3092	A
LogisticRegression	1:3	–	SMOTE	0.6507	0.8120	0.9817	0.3198	0.9785	0.3642	0.9849	0.2850	B
LogisticRegression	1:3	–	SMOTE	0.6573	0.7990	0.9833	0.3314	0.9783	0.4161	0.9883	0.2754	C
LogisticRegression	1:3	–	SMOTE	0.6618	0.8164	0.9828	0.3408	0.9788	0.4040	0.9868	0.2947	D
LogisticRegression	1:3	–	SMOTE	0.6507	0.8214	0.9817	0.3198	0.9785	0.3642	0.9849	0.2850	E

* "–" = Not Applied

TABLE XVII
TEST SET CLASSIFICATION PERFORMANCE - PART 14

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
LogisticRegression	1:3	Tomek	–	0.6694	0.8094	0.9867	0.3521	0.9775	0.6494	0.9961	0.2415	A
LogisticRegression	1:3	Tomek	–	0.6935	0.8095	0.9857	0.4012	0.9796	0.5410	0.9918	0.3188	B
LogisticRegression	1:3	Tomek	–	0.6395	0.8177	0.9860	0.2930	0.9761	0.6061	0.9962	0.1932	C
LogisticRegression	1:3	Tomek	–	0.6942	0.8127	0.9870	0.4013	0.9789	0.6522	0.9953	0.2899	D
LogisticRegression	1:3	Tomek	–	0.6520	0.8102	0.9854	0.3186	0.9770	0.5341	0.9940	0.2271	E
LogisticRegression	1:3	Tomek	SMOTE	0.6603	0.8132	0.9842	0.3364	0.9781	0.4583	0.9905	0.2657	A
LogisticRegression	1:3	Tomek	SMOTE	0.6547	0.8160	0.9826	0.3268	0.9784	0.3919	0.9868	0.2802	B
LogisticRegression	1:3	Tomek	SMOTE	0.6644	0.8109	0.9832	0.3456	0.9788	0.4178	0.9876	0.2947	C
LogisticRegression	1:3	Tomek	SMOTE	0.6656	0.8193	0.9821	0.3492	0.9795	0.3860	0.9846	0.3188	D
LogisticRegression	1:3	Tomek	SMOTE	0.6639	0.7956	0.9831	0.3446	0.9788	0.4150	0.9874	0.2947	E
LogisticRegression	1:3	OSS	–	0.6799	0.8100	0.9864	0.3733	0.9783	0.6022	0.9946	0.2705	A
LogisticRegression	1:3	OSS	–	0.6780	0.8124	0.9859	0.3701	0.9784	0.5644	0.9936	0.2754	B
LogisticRegression	1:3	OSS	–	0.7006	0.8175	0.9869	0.4142	0.9794	0.6275	0.9944	0.3092	C
LogisticRegression	1:3	OSS	–	0.6894	0.8142	0.9867	0.3920	0.9787	0.6277	0.9949	0.2850	D
LogisticRegression	1:3	OSS	–	0.6831	0.8091	0.9870	0.3793	0.9782	0.6627	0.9959	0.2657	E
LogisticRegression	1:3	OSS	SMOTE	0.6631	0.7988	0.9827	0.3435	0.9790	0.4026	0.9865	0.2995	A
LogisticRegression	1:3	OSS	SMOTE	0.6674	0.8018	0.9826	0.3523	0.9794	0.4012	0.9858	0.3140	B
LogisticRegression	1:3	OSS	SMOTE	0.6671	0.8027	0.9836	0.3506	0.9789	0.4326	0.9883	0.2947	C
LogisticRegression	1:3	OSS	SMOTE	0.6558	0.8082	0.9831	0.3285	0.9783	0.4071	0.9879	0.2754	D
LogisticRegression	1:3	OSS	SMOTE	0.6562	0.8186	0.9842	0.3282	0.9778	0.4569	0.9908	0.2560	E
LogisticRegression	1:5	–	–	0.6780	0.8100	0.9831	0.3730	0.9800	0.4233	0.9863	0.3333	A
LogisticRegression	1:5	–	–	0.6975	0.8143	0.9835	0.4115	0.9814	0.4463	0.9857	0.3816	B
LogisticRegression	1:5	–	–	0.6966	0.8266	0.9844	0.4088	0.9807	0.4774	0.9882	0.3575	C
LogisticRegression	1:5	–	–	0.6928	0.8120	0.9835	0.4021	0.9809	0.4444	0.9861	0.3671	D
LogisticRegression	1:5	–	–	0.6996	0.8140	0.9842	0.4151	0.9811	0.4695	0.9873	0.3720	E
LogisticRegression	1:5	–	SMOTE	0.6563	0.8152	0.9765	0.3361	0.9814	0.2945	0.9716	0.3913	A
LogisticRegression	1:5	–	SMOTE	0.6570	0.8126	0.9777	0.3362	0.9809	0.3068	0.9746	0.3720	B
LogisticRegression	1:5	–	SMOTE	0.6525	0.8026	0.9774	0.3275	0.9806	0.2988	0.9743	0.3623	C
LogisticRegression	1:5	–	SMOTE	0.6431	0.7941	0.9761	0.3100	0.9802	0.2765	0.9721	0.3527	D
LogisticRegression	1:5	–	SMOTE	0.6588	0.8256	0.9772	0.3404	0.9813	0.3042	0.9732	0.3865	E
LogisticRegression	1:5	Tomek	–	0.6995	0.8182	0.9830	0.4160	0.9819	0.4323	0.9841	0.4010	A
LogisticRegression	1:5	Tomek	–	0.6895	0.8110	0.9848	0.3942	0.9799	0.4928	0.9898	0.3285	B
LogisticRegression	1:5	Tomek	–	0.7010	0.8208	0.9840	0.4180	0.9814	0.4620	0.9865	0.3816	C
LogisticRegression	1:5	Tomek	–	0.6875	0.8162	0.9839	0.3912	0.9803	0.4551	0.9876	0.3430	D
LogisticRegression	1:5	Tomek	–	0.7009	0.8204	0.9834	0.4184	0.9818	0.4432	0.9849	0.3961	E
LogisticRegression	1:5	Tomek	SMOTE	0.6350	0.8059	0.9767	0.2933	0.9793	0.2716	0.9741	0.3188	A
LogisticRegression	1:5	Tomek	SMOTE	0.6535	0.8185	0.9782	0.3288	0.9803	0.3080	0.9760	0.3527	B
LogisticRegression	1:5	Tomek	SMOTE	0.6416	0.8053	0.9755	0.3077	0.9804	0.2701	0.9708	0.3575	C
LogisticRegression	1:5	Tomek	SMOTE	0.6615	0.8069	0.9780	0.3450	0.9812	0.3147	0.9749	0.3816	D
LogisticRegression	1:5	Tomek	SMOTE	0.6586	0.8231	0.9769	0.3403	0.9814	0.3011	0.9725	0.3913	E

* "–" = Not Applied

TABLE XVIII
TEST SET CLASSIFICATION PERFORMANCE - PART 15

Model	Class Weight	Undersampling	Oversampling	Macro $F1$	AUC	$F1_0$	$F1_1$	Precision_0	Precision_1	Recall_0	Recall_1	Seed
LogisticRegression	1:5	OSS	–	0.7010	0.8156	0.9840	0.4180	0.9814	0.4620	0.9865	0.3816	A
LogisticRegression	1:5	OSS	–	0.7046	0.8162	0.9840	0.4252	0.9817	0.4655	0.9864	0.3913	B
LogisticRegression	1:5	OSS	–	0.6947	0.8205	0.9840	0.4054	0.9808	0.4601	0.9871	0.3623	C
LogisticRegression	1:5	OSS	–	0.6994	0.8167	0.9834	0.4154	0.9816	0.4426	0.9851	0.3913	D
LogisticRegression	1:5	OSS	–	0.6944	0.8236	0.9843	0.4044	0.9806	0.4740	0.9882	0.3527	E
LogisticRegression	1:5	OSS	SMOTE	0.6581	0.7997	0.9785	0.3378	0.9806	0.3165	0.9763	0.3623	A
LogisticRegression	1:5	OSS	SMOTE	0.6575	0.8265	0.9767	0.3382	0.9814	0.2978	0.9721	0.3913	B
LogisticRegression	1:5	OSS	SMOTE	0.6526	0.8133	0.9789	0.3263	0.9799	0.3153	0.9778	0.3382	C
LogisticRegression	1:5	OSS	SMOTE	0.6539	0.8162	0.9782	0.3296	0.9803	0.3093	0.9762	0.3527	D
LogisticRegression	1:5	OSS	SMOTE	0.6525	0.8066	0.9749	0.3301	0.9818	0.2781	0.9681	0.4058	E
LogisticRegression	1:Log	–	–	0.6814	0.8130	0.9859	0.3770	0.9787	0.5566	0.9931	0.2850	A
LogisticRegression	1:Log	–	–	0.6926	0.8090	0.9864	0.3987	0.9791	0.5962	0.9939	0.2995	B
LogisticRegression	1:Log	–	–	0.6783	0.8183	0.9867	0.3699	0.9780	0.6353	0.9955	0.2609	C
LogisticRegression	1:Log	–	–	0.6860	0.8054	0.9866	0.3854	0.9786	0.6170	0.9947	0.2802	D
LogisticRegression	1:Log	–	–	0.6975	0.8106	0.9855	0.4095	0.9800	0.5308	0.9911	0.3333	E
LogisticRegression	1:Log	–	SMOTE	0.6651	0.8143	0.9820	0.3483	0.9795	0.3837	0.9845	0.3188	A
LogisticRegression	1:Log	–	SMOTE	0.6489	0.8120	0.9823	0.3155	0.9781	0.3784	0.9865	0.2705	B
LogisticRegression	1:Log	–	SMOTE	0.6534	0.8002	0.9816	0.3253	0.9788	0.3631	0.9844	0.2947	C
LogisticRegression	1:Log	–	SMOTE	0.6464	0.8214	0.9825	0.3103	0.9778	0.3830	0.9873	0.2609	D
LogisticRegression	1:Log	–	SMOTE	0.6586	0.8114	0.9799	0.3373	0.9800	0.3365	0.9798	0.3382	E
LogisticRegression	1:Log	Tomek	–	0.6936	0.8133	0.9859	0.4012	0.9795	0.5556	0.9924	0.3140	A
LogisticRegression	1:Log	Tomek	–	0.6981	0.8163	0.9862	0.4099	0.9797	0.5739	0.9928	0.3188	B
LogisticRegression	1:Log	Tomek	–	0.6971	0.8178	0.9865	0.4076	0.9794	0.5981	0.9937	0.3092	C
LogisticRegression	1:Log	Tomek	–	0.6926	0.8113	0.9852	0.4000	0.9799	0.5113	0.9905	0.3285	D
LogisticRegression	1:Log	Tomek	–	0.6887	0.8113	0.9864	0.3909	0.9788	0.6000	0.9942	0.2899	E
LogisticRegression	1:Log	Tomek	SMOTE	0.6651	0.7968	0.9815	0.3487	0.9797	0.3716	0.9832	0.3285	A
LogisticRegression	1:Log	Tomek	SMOTE	0.6539	0.8031	0.9816	0.3262	0.9788	0.3653	0.9845	0.2947	B
LogisticRegression	1:Log	Tomek	SMOTE	0.6526	0.7973	0.9803	0.3250	0.9793	0.3368	0.9813	0.3140	C
LogisticRegression	1:Log	Tomek	SMOTE	0.6668	0.7951	0.9820	0.3517	0.9796	0.3851	0.9844	0.3237	D
LogisticRegression	1:Log	Tomek	SMOTE	0.6675	0.7966	0.9831	0.3520	0.9791	0.4172	0.9871	0.3043	E
LogisticRegression	1:Log	OSS	–	0.6860	0.8106	0.9866	0.3854	0.9786	0.6170	0.9947	0.2802	A
LogisticRegression	1:Log	OSS	–	0.6838	0.8105	0.9870	0.3806	0.9782	0.6707	0.9961	0.2657	B
LogisticRegression	1:Log	OSS	–	0.6906	0.8159	0.9864	0.3948	0.9790	0.5980	0.9940	0.2947	C
LogisticRegression	1:Log	OSS	–	0.6884	0.8108	0.9853	0.3916	0.9795	0.5200	0.9912	0.3140	D
LogisticRegression	1:Log	OSS	–	0.6898	0.8208	0.9857	0.3938	0.9794	0.5424	0.9921	0.3092	E
LogisticRegression	1:Log	OSS	SMOTE	0.6662	0.8128	0.9827	0.3497	0.9792	0.4025	0.9861	0.3092	A
LogisticRegression	1:Log	OSS	SMOTE	0.6566	0.8010	0.9807	0.3325	0.9794	0.3474	0.9819	0.3188	B
LogisticRegression	1:Log	OSS	SMOTE	0.6531	0.8010	0.9818	0.3243	0.9786	0.3681	0.9849	0.2899	C
LogisticRegression	1:Log	OSS	SMOTE	0.6715	0.8178	0.9817	0.3613	0.9802	0.3817	0.9832	0.3430	D
LogisticRegression	1:Log	OSS	SMOTE	0.6533	0.8216	0.9830	0.3237	0.9781	0.4029	0.9879	0.2705	E

* "–" = Not Applied