

Multi-step ahead predictive model for Blood Glucose Concentrations of Type-1 Diabetic Patients

Supplementary Information

1 Tables

Patient ID	Data type	# CGM Samples	Mean CGM	# Hypovalues	# Hypervalues	# Normovalues	# Meals taken	Mean basal	Mean bolus
1	Train	36435	98.82	1130	85	35220	696	0.063	0.046
	Test	7713	96.25	272	2	7439	126	0.057	0.038
2	Train	25636	109.91	952	644	24040	469	0.100	0.058
	Test	7331	116.10	146	236	6949	117	0.093	0.058
3	Train	191861	96.84	15067	756	176038	5309	0.065	0.035
	Test	8615	97.32	232	2	8381	183	0.060	0.037
4	Train	92282	119.85	2344	5911	84027	2288	0.067	0.045
	Test	8577	108.84	268	174	8135	248	0.057	0.028
5	Train	25818	101.18	2680	303	22835	437	0.055	0.027
	Test	7970	98.45	945	96	6929	168	0.063	0.033
6	Train	30940	125.10	773	2797	27370	896	0.088	0.065
	Test	6956	131.78	110	856	5990	181	0.087	0.052
7	Train	61836	99.32	6040	1221	54575	755	0.083	0.019
	Test	7674	95.78	988	11	6675	158	0.067	0.020
8	Train	44224	128.04	1048	4638	38538	517	0.260	0.195
	Test	8117	131.62	127	1038	6952	114	0.321	0.206
9	Train	77354	129.29	1582	8579	67193	2041	0.084	0.027
	Test	3132	110.68	105	39	2988	63	0.076	0.025
10	Train	38206	129.41	956	4199	33051	560	0.101	0.048
	Test	8017	142.30	100	1428	6489	106	0.115	0.031
11	Train	25926	127.88	651	2935	22340	755	0.034	0.054
	Test	8120	129.16	184	955	6981	212	0.040	0.056
12	Train	39857	111.54	3497	2090	34270	39	0.054	0.052
	Test	7214	105.90	825	228	6161	0	0.060	0.048
13	Train	31272	123.63	1602	3022	26648	1198	0.104	0.094
	Test	8519	126.50	324	957	7238	285	0.100	0.073
14	Train	47206	127.76	1697	5404	40105	1285	0.086	0.053
	Test	8267	132.54	249	1343	6675	221	0.067	0.042
15	Train	41081	116.92	2494	3613	34974	882	0.056	0.073
	Test	8529	129.90	324	1318	6887	254	0.035	0.066
16	Train	32520	113.25	3092	1641	27787	498	0.082	0.031
	Test	7557	117.40	603	538	6416	96	0.085	0.028
17	Train	19211	127.86	342	1962	16907	292	0.103	0.064
	Test	1791	132.52	114	288	1389	29	0.105	0.080
18	Train	26460	131.96	540	3446	22474	710	0.063	0.020
	Test	4495	130.84	70	547	3878	93	0.055	0.020
19	Train	45299	133.87	1227	5792	38280	654	0.032	0.017
	Test	7625	149.47	210	1809	5606	109	0.028	0.019
20	Train	76955	125.76	3107	9039	64809	1495	0.083	0.076
	Test	8326	123.62	385	979	6962	148	0.083	0.092
21	Train	35070	125.99	1955	3692	29423	764	0.082	0.068
	Test	7523	129.26	365	941	6217	160	0.076	0.066
22	Train	26225	130.93	845	3619	21761	308	0.074	0.047
	Test	8023	127.14	252	813	6958	84	0.072	0.040
23	Train	28005	131.05	576	4226	23203	897	0.093	0.080
	Test	8549	134.50	116	1313	7120	302	0.094	0.104
24	Train	24989	132.41	735	3587	20667	463	0.067	0.055
	Test	6616	113.46	403	333	5880	107	0.058	0.046
25	Train	41086	132.42	1836	5632	33618	941	0.072	0.039
	Test	6387	127.84	397	900	5090	152	0.073	0.028
26	Train	40037	135.64	757	6643	32637	880	0.097	0.105
	Test	8007	133.42	154	1272	6581	171	0.119	0.131

27	Train	21224	121.83	1660	2129	17435	627	0.031	0.049
	Test	6712	122.71	426	712	5574	194	0.031	0.050
28	Train	25963	121.36	2093	2866	21004	670	0.111	0.083
	Test	8598	139.36	255	1585	6758	235	0.118	0.114
29	Train	20504	128.98	1048	2678	16778	432	0.046	0.036
	Test	3399	135.07	154	564	2681	62	0.045	0.036
30	Train	39075	137.74	929	6698	31448	1041	0.059	0.080
	Test	8550	139.15	367	1620	6563	205	0.075	0.080
31	Train	32815	126.45	2088	4255	26472	708	0.007	0.011
	Test	8291	121.67	593	972	6726	225	0.007	0.013
32	Train	27505	139.35	550	5139	21816	748	0.059	0.067
	Test	7446	140.46	150	1381	5915	162	0.064	0.068
33	Train	21551	124.71	1682	2665	17204	713	0.032	0.030
	Test	7069	126.29	336	742	5991	224	0.027	0.028
34	Train	32425	137.01	1437	5504	25484	466	0.134	0.064
	Test	6574	123.14	325	677	5572	143	0.126	0.063
35	Train	24811	140.23	581	4927	19303	741	0.060	0.032
	Test	7903	128.34	131	772	7000	210	0.059	0.020
36	Train	24410	127.68	1704	3706	19000	762	0.056	0.051
	Test	7664	124.70	281	891	6492	206	0.059	0.036
37	Train	39747	136.27	1905	7091	30751	965	0.025	0.037
	Test	7239	129.63	356	886	5997	148	0.020	0.041
38	Train	39623	116.18	4597	3831	31195	1882	0.047	0.071
	Test	6466	116.48	646	461	5359	270	0.045	0.055
39	Train	56837	137.89	2252	10536	44049	1678	0.152	0.085
	Test	7709	145.31	70	1616	6023	161	0.160	0.061
40	Train	68900	146.21	780	14933	53187	917	0.368	0.097
	Test	6342	155.59	27	1658	4657	92	0.298	0.081
41	Train	37730	132.93	1708	6972	29050	412	0.087	0.068
	Test	7220	132.05	484	1056	5680	62	0.076	0.048
42	Train	62894	146.80	843	14114	47937	1514	0.028	0.025
	Test	4244	132.31	85	679	3480	98	0.028	0.032
43	Train	21768	136.68	1108	4381	16279	289	0.102	0.063
	Test	6443	143.51	308	1527	4608	76	0.112	0.056
44	Train	96267	136.68	4082	18812	73373	2154	0.038	0.037
	Test	8219	144.57	449	2371	5399	211	0.045	0.056
45	Train	24360	119.68	2997	3035	18328	808	0.028	0.037
	Test	6609	122.87	778	793	5038	226	0.026	0.032
46	Train	29484	148.71	693	7230	21561	357	0.079	0.040
	Test	5757	146.23	35	1161	4561	78	0.082	0.039
47	Train	35359	140.50	1462	7824	26073	352	0.169	0.074
	Test	7500	135.34	152	1321	6027	78	0.157	0.083
48	Train	29832	136.75	1714	6051	22067	748	0.130	0.108
	Test	8152	145.34	570	2069	5513	202	0.176	0.113
49	Train	31651	135.77	2567	5758	23326	609	0.045	0.043
	Test	5270	164.03	263	1950	3057	93	0.044	0.039
50	Train	30812	140.04	1774	6942	22096	1177	0.041	0.022
	Test	7232	141.44	425	1645	5162	247	0.034	0.016
51	Train	25247	139.74	1598	5596	18053	551	0.046	0.035
	Test	8484	121.73	760	925	6799	180	0.040	0.030
52	Train	64705	151.96	1226	18351	45128	730	0.115	0.043
	Test	4886	145.20	136	1086	3664	65	0.109	0.040
53	Train	22678	147.88	629	6009	16040	313	0.033	0.021
	Test	5211	155.27	125	1595	3491	67	0.032	0.022
54	Train	37199	152.23	929	10442	25828	810	0.124	0.114
	Test	8117	140.80	450	1759	5908	176	0.126	0.108
55	Train	28518	158.64	244	8729	19545	720	0.056	0.062
	Test	7999	158.78	94	2222	5683	191	0.061	0.055
56	Train	28252	160.81	201	8789	19262	701	0.142	0.071
	Test	7595	155.71	54	2215	5326	211	0.144	0.067
57	Train	33359	160.57	436	10421	22502	236	0.122	0.044
	Test	7381	157.94	143	2324	4914	66	0.140	0.045
58	Train	23188	152.55	976	6739	15473	576	0.044	0.030
	Test	7361	150.69	214	2042	5105	147	0.035	0.026
59	Train	28504	164.97	341	9984	18179	364	0.116	0.075
	Test	8072	161.09	128	2509	5435	80	0.127	0.054

60	Train	27251	155.07	1463	8310	17478	632	0.035	0.060
	Test	8245	152.64	526	2451	5268	142	0.030	0.060
61	Train	46559	162.07	894	15949	29716	857	0.073	0.051
	Test	6259	161.20	99	1885	4275	123	0.073	0.054
62	Train	50593	163.86	933	18022	31638	514	0.211	0.083
	Test	7262	169.39	109	2987	4166	62	0.257	0.071
63	Train	87269	167.12	1063	32478	53728	1209	0.155	0.084
	Test	7549	167.53	215	2799	4535	114	0.163	0.083
64	Train	23231	175.69	403	9209	13619	504	0.119	0.113
	Test	8174	165.38	92	2790	5292	145	0.133	0.091
65	Train	26516	168.69	897	9786	15833	523	0.133	0.092
	Test	8147	153.91	408	2359	5380	123	0.139	0.089
66	Train	39462	177.60	94	17249	22119	355	0.107	0.024
	Test	6567	159.32	106	2134	4327	55	0.101	0.022
67	Train	36992	184.90	324	15889	20779	444	0.125	0.050
	Test	7910	178.95	154	3376	4380	75	0.137	0.043
68	Train	24196	180.03	396	10347	13453	606	0.229	0.082
	Test	3801	166.67	119	1337	2345	59	0.264	0.062
69	Train	45438	181.90	193	20086	25159	377	0.253	0.106
	Test	7356	185.68	36	3533	3787	6	0.255	0.087
70	Train	26230	179.25	85	11474	14671	241	0.123	0.077
	Test	7306	191.55	50	3683	3573	56	0.124	0.090
71	Train	23344	174.35	709	10156	12479	446	0.072	0.219
	Test	7029	178.09	215	3107	3707	111	0.079	0.202
72	Train	40391	200.98	12	21369	19010	812	0.059	0.057
	Test	8513	190.89	20	3896	4597	160	0.063	0.056
73	Train	100573	220.92	0	79233	21340	1667	0.102	0.006
	Test	8585	215.42	0	6441	2144	137	0.103	0.005
74	Train	30853	123.94	131	1384	29338	422	0.092	0.085
	Test	8221	122.39	26	288	7907	85	0.116	0.070
75	Train	23722	121.47	175	1214	22333	684	0.068	0.056
	Test	6964	126.90	48	515	6401	190	0.076	0.068
76	Train	26941	125.04	134	1818	24989	563	0.013	0.011
	Test	7780	124.30	18	545	7217	171	0.016	0.015
77	Train	39227	131.40	110	3740	35377	995	0.102	0.086
	Test	8551	132.49	29	1070	7452	198	0.112	0.087
78	Train	113935	126.15	1507	9450	102978	2138	0.060	0.015
	Test	7271	130.01	82	763	6426	138	0.066	0.012
79	Train	37338	130.58	158	3550	33630	787	0.086	0.064
	Test	8570	128.97	108	898	7564	174	0.085	0.066
80	Train	45400	138.62	99	5841	39460	859	0.026	0.025
	Test	8124	140.20	17	996	7111	186	0.028	0.027
81	Train	35787	138.67	37	4723	31027	795	0.081	0.097
	Test	8179	136.50	3	963	7213	202	0.084	0.086
82	Train	22219	132.59	365	2917	18937	404	0.054	0.085
	Test	2400	134.55	22	283	2095	46	0.061	0.088
83	Train	20595	143.26	56	3078	17461	324	0.080	0.036
	Test	6777	139.72	26	789	5962	120	0.080	0.035
84	Train	121153	142.20	605	16957	103591	1360	0.095	0.024
	Test	8357	139.47	20	953	7384	136	0.091	0.030
85	Train	27070	134.36	392	3413	23265	714	0.060	0.039
	Test	7861	146.43	82	1725	6054	194	0.062	0.038
86	Train	61391	134.86	867	8291	52233	1198	0.068	0.052
	Test	8459	129.80	158	919	7382	158	0.078	0.050
87	Train	38491	136.02	417	5798	32276	866	0.091	0.071
	Test	8234	141.33	42	1282	6910	178	0.098	0.083
88	Train	30025	136.73	333	4805	24887	654	0.102	0.078
	Test	8334	132.55	93	1111	7130	190	0.091	0.079
89	Train	28744	137.86	290	4626	23828	508	0.155	0.089
	Test	8484	121.44	92	543	7849	115	0.132	0.059
90	Train	34318	141.73	385	5998	27935	445	0.072	0.041
	Test	8519	135.43	115	1034	7370	131	0.079	0.047
91	Train	38140	145.79	259	6881	31000	844	0.089	0.062
	Test	8534	142.98	74	1458	7002	188	0.096	0.071
92	Train	28418	153.43	27	5510	22881	383	0.126	0.124
	Test	8555	151.77	0	1598	6957	132	0.148	0.130

93	Train	14186	146.86	221	3015	10950	234	0.121	0.070
	Test	4246	151.98	16	1094	3136	81	0.125	0.083
94	Train	73299	149.73	602	17256	55441	1379	0.062	0.065
	Test	7846	159.24	30	2217	5599	173	0.074	0.061
95	Train	36945	154.89	171	9400	27374	575	0.092	0.040
	Test	8298	146.70	73	1626	6599	143	0.091	0.033
96	Train	30845	154.12	291	8150	22404	677	0.111	0.094
	Test	7910	156.81	65	2186	5659	180	0.101	0.084
97	Train	78904	157.63	88	22920	55896	1464	0.101	0.091
	Test	8533	159.80	6	2672	5855	173	0.095	0.103

Supplementary Table S1. Patient data characteristics

Patient ID	Measures	Overall	Hypoglycemia	Hyperglycemia	Normoglycemia
1	RMSE	13.33	20.80	No test samples	12.99
	MAE	10.10	17.40	No test samples	9.85
	MAPE	10.94	28.40	No test samples	10.33
	NRMSE	0.10	0.16	No test samples	0.10
	TP/P	–	61/257	No test samples	7191/7292
	FP/N	–	95/7292	6/7549	196/257
2	RMSE	16.10	25.47	20.68	15.70
	MAE	11.87	21.29	15.82	11.56
	MAPE	10.59	34.78	8.11	10.23
	NRMSE	0.08	0.13	0.11	0.08
	TP/P	–	16/126	143/236	6712/6846
	FP/N	–	50/7082	84/6972	203/362
3	RMSE	10.68	18.87	48.93	10.34
	MAE	7.69	15.11	48.93	7.48
	MAPE	8.03	24.13	27.01	7.59
	NRMSE	0.08	0.14	0.36	0.07
	TP/P	–	40/224	0/2	8233/8307
	FP/N	–	74/8309	0/8531	186/226
4	RMSE	13.00	16.62	18.94	12.72
	MAE	9.33	11.97	14.83	9.13
	MAPE	8.88	18.99	7.49	8.60
	NRMSE	0.06	0.08	0.09	0.06
	TP/P	–	77/248	114/174	7863/8032
	FP/N	–	129/8206	40/8280	231/422
5	RMSE	13.83	10.03	44.88	13.32
	MAE	9.72	6.75	37.09	9.72
	MAPE	9.62	11.59	18.81	9.23
	NRMSE	0.07	0.05	0.24	0.07
	TP/P	–	667/875	26/96	6496/6794
	FP/N	–	296/6890	2/7669	278/971
6	RMSE	18.46	15.76	24.62	17.46
	MAE	13.56	10.66	18.95	12.85
	MAPE	10.65	16.40	8.91	10.80
	NRMSE	0.06	0.05	0.08	0.06
	TP/P	–	45/88	590/818	5396/5845
	FP/N	–	287/6663	162/5933	271/906
7	RMSE	12.44	11.37	19.67	12.58
	MAE	9.31	8.41	18.07	9.42
	MAPE	10.06	13.56	9.72	9.54
	NRMSE	0.08	0.07	0.13	0.08
	TP/P	–	643/967	2/11	6060/6573
	FP/N	–	510/6584	3/7540	333/978
8	RMSE	15.24	14.22	22.82	13.83
	MAE	10.78	10.80	17.69	9.78
	MAPE	8.22	16.56	8.38	8.05
	NRMSE	0.04	0.04	0.07	0.04
	TP/P	–	35/127	729/989	6643/6837
	FP/N	–	37/7826	157/6964	352/1116

9	RMSE	14.86	16.89	23.56	14.63
	MAE	11.10	12.67	19.02	10.93
	MAPE	10.57	20.85	9.81	10.21
	NRMSE	0.08	0.10	0.14	0.08
	TP/P	–	23/105	18/39	2749/2865
	FP/N	–	78/2904	38/2970	103/144
10	RMSE	16.28	16.05	19.79	15.45
	MAE	12.18	10.73	15.80	11.44
	MAPE	8.88	18.87	7.64	9.02
	NRMSE	0.05	0.05	0.06	0.04
	TP/P	–	44/83	1054/1356	6095/6455
	FP/N	–	46/7811	314/6538	341/1439
11	RMSE	19.91	28.72	34.53	20.12
	MAE	14.35	22.72	27.26	14.74
	MAPE	14.44	36.40	12.23	12.88
	NRMSE	0.05	0.08	0.09	0.05
	TP/P	–	25/180	666/995	6590/6862
	FP/N	–	69/7817	203/7082	444/1135
12	RMSE	19.05	14.42	24.67	19.36
	MAE	14.14	10.19	19.09	14.49
	MAPE	14.13	17.85	9.31	13.81
	NRMSE	0.08	0.06	0.10	0.08
	TP/P	–	606/820	150/223	5027/6048
	FP/N	–	926/6271	95/6868	287/1043
13	RMSE	18.57	25.04	22.23	17.68
	MAE	13.00	16.27	16.34	12.41
	MAPE	11.22	26.25	7.57	11.04
	NRMSE	0.06	0.08	0.07	0.05
	TP/P	–	110/312	754/935	6708/7026
	FP/N	–	111/7961	211/7338	379/1247
14	RMSE	17.56	20.21	20.94	16.71
	MAE	13.00	15.33	16.13	12.30
	MAPE	10.68	25.37	7.34	10.83
	NRMSE	0.05	0.05	0.06	0.04
	TP/P	–	78/229	1074/1295	6253/6579
	FP/N	–	119/7874	207/6808	372/1524
15	RMSE	23.34	20.67	31.19	21.64
	MAE	16.88	14.99	24.76	15.45
	MAPE	13.48	24.24	11.62	13.33
	NRMSE	0.08	0.07	0.11	0.07
	TP/P	–	130/320	958/1294	6283/6751
	FP/N	–	121/8045	347/7071	526/1614
16	RMSE	19.14	25.78	30.32	17.11
	MAE	13.44	18.92	22.81	12.15
	MAPE	12.62	33.03	9.88	11.04
	NRMSE	0.05	0.07	0.08	0.04
	TP/P	–	222/558	390/538	5963/6927
	FP/N	–	218/6835	117/6855	483/1096
17	RMSE	25.77	33.82	35.64	22.22
	MAE	19.18	28.31	28.65	16.38
	MAPE	16.59	50.15	12.73	14.57
	NRMSE	0.09	0.12	0.13	0.08
	TP/P	–	25/114	202/288	1292/1348
	FP/N	–	14/1636	42/1462	175/402
18	RMSE	27.41	40.27	44.86	23.57
	MAE	20.71	34.23	37.26	18.10
	MAPE	16.44	55.40	17.96	15.50
	NRMSE	0.12	0.18	0.20	0.10
	TP/P	–	5/70	204/536	3634/3766
	FP/N	–	31/4302	101/3836	397/606
19	RMSE	29.22	38.58	40.96	24.03
	MAE	21.17	29.18	31.13	17.82
	MAPE	15.46	47.08	13.90	14.74
	NRMSE	0.08	0.10	0.11	0.06
	TP/P	–	38/210	1187/1688	5098/5522
	FP/N	–	150/7210	276/5732	671/1898

20	RMSE	23.38	28.04	44.48	18.35
	MAE	16.11	19.67	36.67	13.08
	MAPE	13.17	33.73	15.85	11.64
	NRMSE	0.07	0.09	0.15	0.06
	TP/P	–	86/380	559/930	6524/6770
	FP/N	–	151/7700	97/7150	663/1310
21	RMSE	20.64	20.09	26.81	19.56
	MAE	15.31	15.74	19.75	14.61
	MAPE	12.92	26.51	9.10	12.72
	NRMSE	0.06	0.06	0.08	0.05
	TP/P	–	128/347	739/914	5610/6016
	FP/N	–	175/6930	231/6363	394/1261
22	RMSE	14.55	20.50	16.72	14.02
	MAE	10.74	15.00	12.60	10.37
	MAPE	9.17	26.37	6.00	8.95
	NRMSE	0.05	0.07	0.06	0.05
	TP/P	–	104/237	708/813	6557/6850
	FP/N	–	116/7663	177/7087	238/1050
23	RMSE	24.18	34.65	29.09	22.95
	MAE	17.14	26.27	21.82	16.13
	MAPE	13.97	41.77	9.71	14.29
	NRMSE	0.07	0.11	0.09	0.07
	TP/P	–	28/116	1051/1276	6501/6952
	FP/N	–	127/8228	324/7068	313/1392
24	RMSE	27.34	36.14	38.41	25.90
	MAE	18.27	27.06	29.56	17.08
	MAPE	17.31	45.60	14.40	15.62
	NRMSE	0.12	0.16	0.17	0.11
	TP/P	–	98/380	216/318	5394/5795
	FP/N	–	122/6113	283/6175	380/698
25	RMSE	18.59	13.11	24.89	17.62
	MAE	13.61	9.16	18.56	13.09
	MAPE	11.18	14.84	8.95	11.29
	NRMSE	0.07	0.05	0.09	0.06
	TP/P	–	235/386	666/874	4592/5004
	FP/N	–	225/5878	187/5390	359/1260
26	RMSE	20.65	24.82	28.45	18.81
	MAE	14.65	18.81	22.37	13.17
	MAPE	11.55	30.58	10.64	11.29
	NRMSE	0.07	0.09	0.10	0.07
	TP/P	–	44/147	866/1160	6130/6495
	FP/N	–	112/7655	253/6642	397/1307
27	RMSE	27.55	30.33	42.93	24.84
	MAE	20.31	23.42	33.49	18.50
	MAPE	17.94	39.87	15.07	16.63
	NRMSE	0.08	0.09	0.13	0.08
	TP/P	–	121/413	473/658	5094/5477
	FP/N	–	151/6135	232/5890	477/1071
28	RMSE	21.20	30.66	24.32	19.96
	MAE	15.08	22.79	18.39	14.04
	MAPE	11.96	39.42	8.39	11.72
	NRMSE	0.07	0.10	0.08	0.06
	TP/P	–	75/255	1293/1510	6245/6710
	FP/N	–	77/8220	389/6965	396/1765
29	RMSE	23.91	34.65	27.10	22.49
	MAE	17.43	22.32	20.74	16.51
	MAPE	14.42	41.23	9.93	13.90
	NRMSE	0.10	0.15	0.11	0.09
	TP/P	–	53/139	422/523	2364/2614
	FP/N	–	102/3137	150/2753	185/662
30	RMSE	15.99	17.92	18.34	15.22
	MAE	12.33	13.61	14.39	11.73
	MAPE	9.80	22.34	6.82	9.87
	NRMSE	0.05	0.06	0.06	0.05
	TP/P	–	128/348	1294/1617	6035/6380
	FP/N	–	95/7997	250/6728	543/1965

31	RMSE	19.83	18.64	24.89	19.12
	MAE	14.33	11.84	18.53	13.96
	MAPE	12.62	18.93	8.81	12.59
	NRMSE	0.07	0.07	0.09	0.07
	TP/P	–	293/579	712/915	5887/6510
	FP/N	–	428/7425	195/7089	489/1494
32	RMSE	18.92	28.99	21.26	18.02
	MAE	13.43	24.09	15.71	12.64
	MAPE	10.73	40.98	7.15	10.86
	NRMSE	0.06	0.09	0.06	0.05
	TP/P	–	33/137	1181/1361	5498/5784
	FP/N	–	70/7145	217/5921	283/1498
33	RMSE	29.28	37.11	51.31	24.92
	MAE	21.31	28.74	41.97	18.48
	MAPE	18.08	50.12	19.24	16.13
	NRMSE	0.09	0.12	0.17	0.08
	TP/P	–	54/330	325/678	5478/5815
	FP/N	–	184/6493	155/6145	627/1008
34	RMSE	17.52	23.65	25.16	15.99
	MAE	11.67	15.13	18.35	10.72
	MAPE	10.21	25.82	8.66	9.52
	NRMSE	0.06	0.08	0.08	0.05
	TP/P	–	134/301	490/617	5176/5410
	FP/N	–	98/6027	137/5711	293/918
35	RMSE	22.70	30.27	30.45	21.53
	MAE	16.41	24.72	23.56	15.48
	MAPE	13.26	39.09	11.59	12.94
	NRMSE	0.09	0.12	0.12	0.08
	TP/P	–	16/131	461/733	6477/6875
	FP/N	–	86/7608	312/7006	387/864
36	RMSE	19.91	17.76	25.68	19.06
	MAE	14.92	12.28	19.82	14.36
	MAPE	12.54	19.91	9.44	12.66
	NRMSE	0.06	0.06	0.09	0.06
	TP/P	–	134/272	654/885	5938/6384
	FP/N	–	289/7269	157/6656	369/1157
37	RMSE	23.66	23.80	36.27	21.33
	MAE	16.95	18.85	24.89	15.74
	MAPE	14.20	31.96	11.31	13.54
	NRMSE	0.07	0.07	0.12	0.07
	TP/P	–	93/349	573/809	5403/5876
	FP/N	–	266/6685	207/6225	492/1158
38	RMSE	24.03	18.81	33.88	23.55
	MAE	18.08	12.31	24.50	18.22
	MAPE	16.35	21.34	11.81	16.15
	NRMSE	0.10	0.07	0.14	0.09
	TP/P	–	374/627	310/456	4159/5219
	FP/N	–	893/5675	168/5846	398/1083
39	RMSE	30.04	43.73	44.07	24.98
	MAE	21.69	34.96	35.17	18.09
	MAPE	15.27	59.23	16.20	14.52
	NRMSE	0.10	0.15	0.15	0.08
	TP/P	–	11/69	900/1517	5587/5918
	FP/N	–	43/7435	288/5987	675/1586
40	RMSE	20.29	14.31	29.66	15.73
	MAE	14.20	12.25	22.95	11.12
	MAPE	9.03	18.38	10.05	8.62
	NRMSE	0.06	0.04	0.08	0.04
	TP/P	–	2/27	1265/1605	4316/4546
	FP/N	–	15/6151	215/4573	365/1632
41	RMSE	21.45	23.07	25.53	20.46
	MAE	15.20	16.86	19.87	14.20
	MAPE	13.02	27.72	8.51	12.66
	NRMSE	0.05	0.06	0.07	0.05
	TP/P	–	164/457	877/1034	5152/5565
	FP/N	–	215/6599	198/6022	450/1491

42	RMSE	20.72	27.59	28.18	18.65
	MAE	14.88	21.04	21.09	13.48
	MAPE	11.80	34.15	10.22	11.55
	NRMSE	0.08	0.11	0.12	0.08
	TP/P	–	21/85	483/673	3196/3363
	FP/N	–	57/4036	110/3448	254/758
43	RMSE	22.86	20.08	30.53	19.91
	MAE	16.75	14.39	23.51	14.70
	MAPE	12.60	24.27	10.04	12.65
	NRMSE	0.06	0.05	0.08	0.05
	TP/P	–	164/303	1186/1475	4092/4501
	FP/N	–	236/5976	173/4804	428/1778
44	RMSE	20.41	14.83	25.36	18.22
	MAE	14.99	8.96	19.47	13.51
	MAPE	11.31	15.84	8.46	12.20
	NRMSE	0.05	0.04	0.07	0.05
	TP/P	–	364/437	1974/2341	4308/5277
	FP/N	–	845/7618	124/5714	440/2778
45	RMSE	23.86	22.53	35.52	21.66
	MAE	17.19	16.86	23.63	16.22
	MAPE	15.67	30.07	10.94	14.21
	NRMSE	0.07	0.06	0.10	0.06
	TP/P	–	367/755	525/777	4378/4913
	FP/N	–	374/5690	164/5668	637/1532
46	RMSE	18.76	28.28	25.32	16.61
	MAE	12.92	24.04	18.74	11.37
	MAPE	9.16	38.67	8.71	9.04
	NRMSE	0.06	0.10	0.09	0.06
	TP/P	–	4/35	927/1116	4205/4442
	FP/N	–	21/5558	216/4477	220/1151
47	RMSE	16.86	17.72	20.81	15.84
	MAE	12.03	11.90	16.19	11.13
	MAPE	9.40	19.42	7.38	9.61
	NRMSE	0.05	0.06	0.07	0.05
	TP/P	–	60/137	1099/1289	5663/5910
	FP/N	–	77/7199	170/6047	267/1426
48	RMSE	28.17	30.11	33.85	25.54
	MAE	20.73	22.54	25.79	18.68
	MAPE	16.39	42.67	11.32	15.71
	NRMSE	0.07	0.08	0.09	0.07
	TP/P	–	224/526	1603/2004	4781/5417
	FP/N	–	293/7421	345/5943	701/2530
49	RMSE	33.68	23.78	39.35	30.35
	MAE	24.82	18.19	30.07	22.07
	MAPE	16.96	34.84	12.14	18.50
	NRMSE	0.09	0.06	0.10	0.08
	TP/P	–	124/243	1513/1845	2267/2936
	FP/N	–	461/4781	212/3179	447/2088
50	RMSE	32.05	28.25	38.30	30.15
	MAE	23.09	19.07	29.21	21.51
	MAPE	17.81	32.35	13.43	17.95
	NRMSE	0.10	0.08	0.12	0.09
	TP/P	–	202/425	1153/1581	4396/5062
	FP/N	–	226/6643	441/5487	650/2006
51	RMSE	20.45	17.32	26.22	19.85
	MAE	14.75	12.38	19.92	14.31
	MAPE	13.07	21.52	9.02	12.69
	NRMSE	0.06	0.05	0.07	0.05
	TP/P	–	439/751	732/925	6021/6685
	FP/N	–	487/7610	177/7436	505/1676
52	RMSE	20.74	24.67	29.81	17.27
	MAE	15.31	21.59	23.25	12.47
	MAPE	11.74	36.79	10.09	10.28
	NRMSE	0.07	0.08	0.10	0.05
	TP/P	–	5/127	830/1045	3455/3550
	FP/N	–	6/4595	89/3677	337/1172

53	RMSE	28.82	18.92	36.79	24.98
	MAE	20.09	12.84	26.34	17.68
	MAPE	13.78	20.71	11.41	14.54
	NRMSE	0.08	0.05	0.10	0.07
	TP/P	–	66/125	1185/1487	3040/3476
	FP/N	–	212/4963	226/3601	359/1612
54	RMSE	17.85	14.77	22.57	16.48
	MAE	12.35	10.49	16.37	11.34
	MAPE	9.65	18.00	7.04	9.75
	NRMSE	0.04	0.04	0.06	0.04
	TP/P	–	212/450	1464/1663	5428/5799
	FP/N	–	175/7462	196/6249	437/2113
55	RMSE	22.28	46.54	26.87	19.60
	MAE	15.72	35.35	20.13	13.71
	MAPE	10.81	61.37	8.74	10.95
	NRMSE	0.06	0.12	0.07	0.05
	TP/P	–	15/76	1795/2209	5304/5591
	FP/N	–	41/7800	246/5667	475/2285
56	RMSE	23.03	30.51	25.08	22.05
	MAE	16.99	22.48	19.45	15.93
	MAPE	11.79	37.30	8.77	12.79
	NRMSE	0.06	0.09	0.07	0.06
	TP/P	–	11/49	1851/2166	4789/5257
	FP/N	–	59/7423	409/5306	353/2215
57	RMSE	19.86	27.02	22.67	18.22
	MAE	13.86	21.49	16.45	12.49
	MAPE	9.81	35.10	7.41	10.17
	NRMSE	0.06	0.08	0.06	0.05
	TP/P	–	36/136	1853/2171	4541/4869
	FP/N	–	38/7040	290/5005	418/2307
58	RMSE	30.09	37.92	36.31	26.83
	MAE	21.58	28.81	27.95	18.75
	MAPE	15.78	47.09	12.40	15.86
	NRMSE	0.09	0.11	0.11	0.08
	TP/P	–	54/200	1582/1971	4338/4944
	FP/N	–	139/6915	469/5144	533/2171
59	RMSE	19.41	13.52	22.45	18.00
	MAE	13.88	10.41	17.05	12.54
	MAPE	9.31	17.26	7.35	10.00
	NRMSE	0.05	0.03	0.06	0.05
	TP/P	–	69/128	2086/2417	5008/5363
	FP/N	–	98/7780	257/5491	390/2545
60	RMSE	30.40	27.06	38.60	26.00
	MAE	22.34	19.10	29.75	19.16
	MAPE	16.08	31.90	12.56	16.16
	NRMSE	0.08	0.07	0.10	0.07
	TP/P	–	226/515	1926/2428	4505/5138
	FP/N	–	355/7566	278/5653	791/2943
61	RMSE	19.88	33.99	21.88	18.43
	MAE	15.05	28.27	17.10	13.82
	MAPE	10.42	51.56	7.93	10.54
	NRMSE	0.07	0.12	0.07	0.06
	TP/P	–	20/99	1512/1849	3804/4147
	FP/N	–	23/5996	320/4246	416/1948
62	RMSE	26.71	36.07	30.18	23.65
	MAE	20.08	27.74	23.42	17.54
	MAPE	13.12	43.97	10.32	14.27
	NRMSE	0.08	0.10	0.09	0.07
	TP/P	–	15/109	2426/2880	3721/4109
	FP/N	–	81/6989	307/4218	548/2989
63	RMSE	28.33	30.38	31.82	25.83
	MAE	21.42	24.49	24.50	19.37
	MAPE	14.50	39.83	10.48	15.85
	NRMSE	0.07	0.08	0.08	0.07
	TP/P	–	29/198	2249/2708	3883/4356
	FP/N	–	71/7064	402/4554	628/2906

64	RMSE	26.82	29.64	30.63	24.65
	MAE	19.22	23.03	23.05	17.25
	MAPE	13.06	36.65	9.74	14.30
	NRMSE	0.07	0.08	0.08	0.06
	TP/P	–	22/92	2185/2605	4748/5231
	FP/N	–	49/7836	435/5323	489/2697
65	RMSE	24.25	19.17	28.83	22.36
	MAE	17.24	13.32	20.95	15.93
	MAPE	12.45	24.10	9.13	13.00
	NRMSE	0.06	0.05	0.07	0.06
	TP/P	–	243/408	2054/2312	4801/5345
	FP/N	–	187/7657	358/5753	422/2720
66	RMSE	20.08	26.87	24.31	18.87
	MAE	14.79	20.59	18.35	13.83
	MAPE	10.21	34.06	8.28	11.13
	NRMSE	0.05	0.07	0.06	0.05
	TP/P	–	24/104	1635/2023	3954/4235
	FP/N	–	26/6258	255/4339	468/2127
67	RMSE	22.93	39.25	25.50	19.87
	MAE	15.94	33.25	18.89	13.07
	MAPE	10.38	63.21	7.86	10.51
	NRMSE	0.06	0.10	0.07	0.05
	TP/P	–	27/148	2932/3311	3994/4287
	FP/N	–	22/7598	271/4435	500/3459
68	RMSE	29.74	39.31	36.02	24.96
	MAE	22.21	33.46	27.99	18.45
	MAPE	15.52	59.48	11.28	15.54
	NRMSE	0.08	0.10	0.09	0.06
	TP/P	–	16/119	1089/1247	2048/2271
	FP/N	–	55/3518	168/2390	261/1366
69	RMSE	30.39	55.81	32.42	27.97
	MAE	22.64	44.19	25.31	19.94
	MAPE	13.37	71.84	10.74	15.26
	NRMSE	0.08	0.15	0.09	0.07
	TP/P	–	2/36	2832/3460	3176/3696
	FP/N	–	39/7156	483/3732	660/3496
70	RMSE	20.49	13.48	28.01	16.23
	MAE	14.77	9.47	21.97	11.74
	MAPE	8.80	14.44	8.97	8.63
	NRMSE	0.06	0.03	0.08	0.04
	TP/P	–	25/50	3135/3629	3326/3504
	FP/N	–	14/7133	164/3554	519/3679
71	RMSE	22.07	23.02	23.03	21.18
	MAE	16.48	18.62	17.35	15.64
	MAPE	10.85	29.90	7.38	12.56
	NRMSE	0.06	0.06	0.06	0.06
	TP/P	–	55/215	2651/2947	3154/3580
	FP/N	–	76/6527	350/3795	456/3162
72	RMSE	24.60	23.95	27.34	22.03
	MAE	18.45	19.65	20.86	16.41
	MAPE	10.34	36.52	8.77	11.56
	NRMSE	0.06	0.06	0.07	0.06
	TP/P	–	11/20	3354/3848	4008/4563
	FP/N	–	4/8411	551/4583	503/3868
73	RMSE	13.52	No test samples	13.64	13.15
	MAE	9.83	No test samples	9.96	9.45
	MAPE	4.71	No test samples	4.21	6.19
	NRMSE	0.04	No test samples	0.05	0.04
	TP/P	–	No test samples	6163/6332	1801/2130
	FP/N	–	0/8462	329/2130	169/6332
74	RMSE	16.02	29.21	31.92	15.13
	MAE	11.10	24.48	26.20	10.55
	MAPE	9.02	36.83	13.08	8.81
	NRMSE	0.07	0.14	0.15	0.07
	TP/P	–	2/20	138/267	7639/7770
	FP/N	–	12/8037	119/7790	147/287

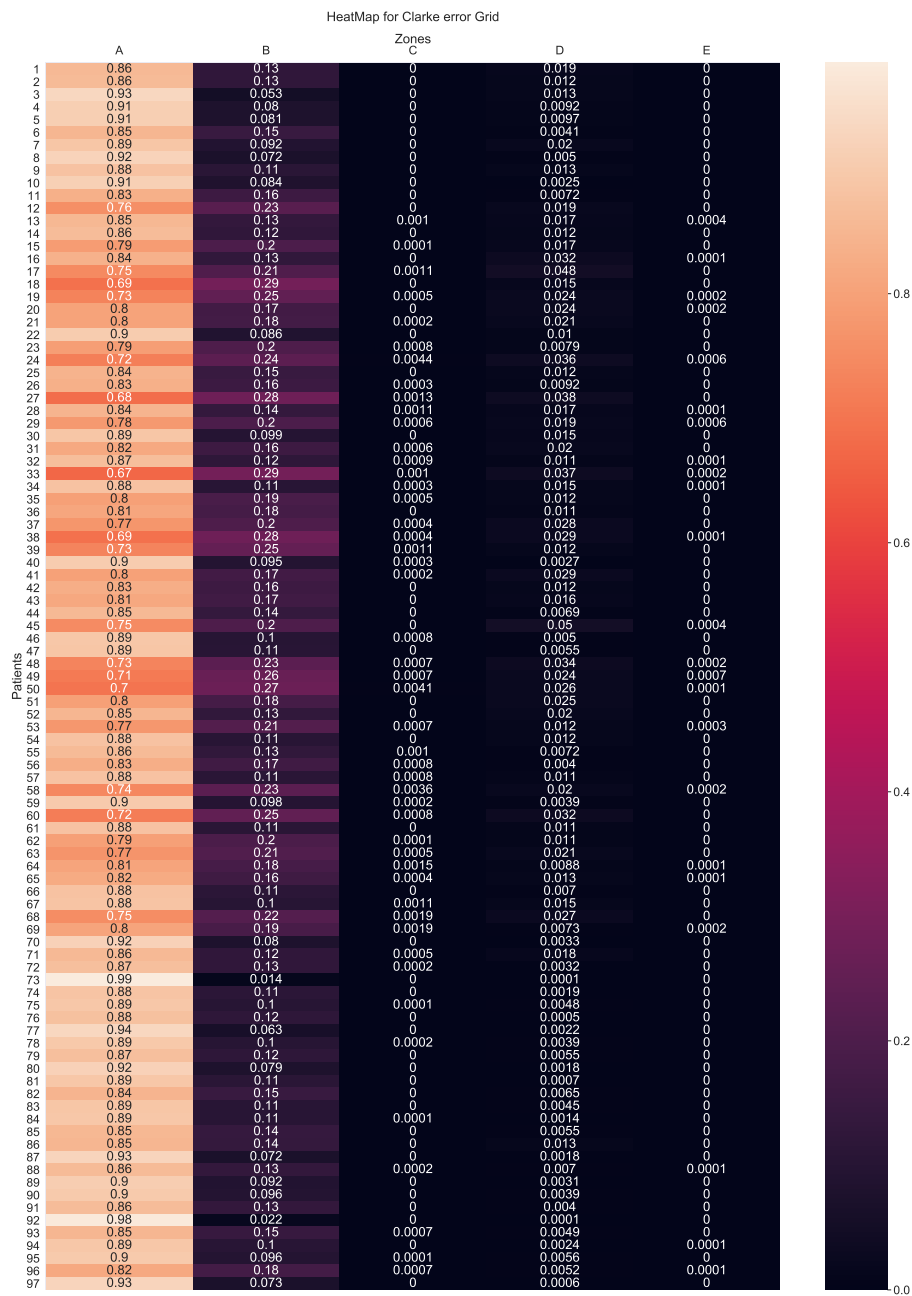
75	RMSE	16.64	26.36	25.09	15.66
	MAE	11.52	20.17	17.81	10.94
	MAPE	9.31	33.24	8.68	9.18
	NRMSE	0.06	0.10	0.10	0.06
	TP/P	–	13/48	330/508	6070/6244
	FP/N	–	20/6752	154/6292	213/556
76	RMSE	17.47	13.62	29.86	16.21
	MAE	12.44	10.13	22.65	11.71
	MAPE	9.93	15.16	11.31	9.81
	NRMSE	0.09	0.07	0.15	0.08
	TP/P	–	6/16	317/513	6862/7046
	FP/N	–	60/7559	124/7062	206/529
77	RMSE	13.94	22.16	19.82	12.86
	MAE	10.15	18.92	15.16	9.41
	MAPE	7.78	28.68	7.52	7.73
	NRMSE	0.06	0.10	0.09	0.06
	TP/P	–	2/29	806/1027	7040/7331
	FP/N	–	7/8358	284/7360	248/1056
78	RMSE	17.01	19.00	25.81	15.59
	MAE	12.21	14.05	19.67	11.29
	MAPE	9.60	23.26	9.24	9.50
	NRMSE	0.05	0.06	0.08	0.05
	TP/P	–	21/68	513/760	6094/6279
	FP/N	–	72/7039	113/6347	294/828
79	RMSE	18.28	22.60	28.08	16.66
	MAE	12.91	16.65	21.02	11.90
	MAPE	10.15	29.43	10.08	9.88
	NRMSE	0.06	0.08	0.10	0.06
	TP/P	–	34/108	606/883	7231/7456
	FP/N	–	38/8339	187/7564	351/991
80	RMSE	16.16	22.17	21.68	15.23
	MAE	12.00	20.76	16.60	11.35
	MAPE	8.77	31.82	8.19	8.79
	NRMSE	0.07	0.10	0.09	0.06
	TP/P	–	0/17	667/963	6742/7021
	FP/N	–	1/7984	278/7038	313/980
81	RMSE	17.85	40.05	28.44	16.04
	MAE	12.80	39.51	21.64	11.70
	MAPE	9.48	58.61	9.85	9.41
	NRMSE	0.05	0.13	0.09	0.05
	TP/P	–	0/3	686/885	6932/7127
	FP/N	–	4/8012	191/7130	202/888
82	RMSE	19.30	23.44	25.51	18.20
	MAE	14.64	20.60	20.11	13.80
	MAPE	11.36	30.59	9.81	11.36
	NRMSE	0.09	0.11	0.12	0.08
	TP/P	–	0/22	211/281	1884/1974
	FP/N	–	7/2255	83/1996	92/303
83	RMSE	17.97	51.23	28.41	15.89
	MAE	12.28	46.49	21.01	11.05
	MAPE	9.24	73.52	9.90	8.92
	NRMSE	0.07	0.20	0.11	0.06
	TP/P	–	0/21	515/737	5623/5773
	FP/N	–	0/6510	150/5794	243/758
84	RMSE	18.00	31.90	26.69	16.56
	MAE	13.33	23.92	20.84	12.37
	MAPE	9.78	39.18	9.99	9.68
	NRMSE	0.05	0.10	0.08	0.05
	TP/P	–	6/20	555/901	7076/7272
	FP/N	–	18/8173	178/7292	360/921
85	RMSE	21.48	18.92	29.36	18.74
	MAE	15.37	15.66	22.56	13.36
	MAPE	10.69	25.44	10.53	10.54
	NRMSE	0.07	0.06	0.10	0.06
	TP/P	–	16/79	1167/1660	5688/5958
	FP/N	–	112/7618	158/6037	556/1739

86	RMSE	18.78	24.80	26.21	17.57
	MAE	13.58	20.31	19.88	12.71
	MAPE	11.02	31.46	9.71	10.74
	NRMSE	0.08	0.11	0.12	0.08
	TP/P	–	23/154	572/844	7052/7297
	FP/N	–	48/8141	197/7451	403/998
87	RMSE	15.51	15.95	21.99	14.15
	MAE	10.61	11.68	15.80	9.74
	MAPE	7.82	18.06	7.23	7.85
	NRMSE	0.04	0.04	0.06	0.04
	TP/P	–	15/42	898/1140	6658/6888
	FP/N	–	50/8028	180/6930	269/1182
88	RMSE	18.29	28.40	24.03	17.04
	MAE	13.32	21.42	18.58	12.40
	MAPE	10.62	34.19	8.64	10.62
	NRMSE	0.07	0.10	0.09	0.06
	TP/P	–	22/93	834/1095	6811/7023
	FP/N	–	59/8118	154/7116	331/1188
89	RMSE	15.24	15.27	22.69	14.57
	MAE	10.67	11.18	17.37	10.19
	MAPE	8.90	16.95	8.51	8.84
	NRMSE	0.07	0.07	0.11	0.07
	TP/P	–	21/82	397/543	7476/7695
	FP/N	–	65/8238	154/7777	207/625
90	RMSE	16.90	16.90	21.91	16.09
	MAE	11.66	12.02	15.98	11.06
	MAPE	8.96	18.89	7.64	8.98
	NRMSE	0.07	0.07	0.09	0.06
	TP/P	–	48/110	767/997	6942/7248
	FP/N	–	133/8245	173/7358	292/1107
91	RMSE	20.53	23.46	28.51	18.46
	MAE	14.81	17.52	22.88	13.15
	MAPE	10.64	29.50	10.52	10.47
	NRMSE	0.06	0.07	0.09	0.06
	TP/P	–	15/70	983/1399	6581/6901
	FP/N	–	63/8300	257/6971	471/1469
92	RMSE	11.87	No test samples	16.67	10.50
	MAE	8.40	No test samples	12.37	7.51
	MAPE	5.52	No test samples	5.90	5.44
	NRMSE	0.05	No test samples	0.07	0.04
	TP/P	–	No test samples	1317/1531	6592/6860
	FP/N	–	0/8391	268/6860	214/1531
93	RMSE	22.88	39.51	27.71	20.79
	MAE	16.21	36.40	21.32	14.29
	MAPE	11.30	57.64	10.12	11.46
	NRMSE	0.08	0.14	0.10	0.07
	TP/P	–	0/16	748/1049	2791/2976
	FP/N	–	2/4025	183/2992	317/1065
94	RMSE	19.37	47.21	23.05	17.45
	MAE	13.67	34.88	16.90	12.31
	MAPE	9.07	60.70	7.97	9.21
	NRMSE	0.07	0.17	0.08	0.06
	TP/P	–	8/30	1771/2138	5083/5514
	FP/N	–	11/7652	421/5544	388/2168
95	RMSE	18.85	19.01	26.79	16.39
	MAE	12.72	15.76	19.11	11.15
	MAPE	9.04	24.70	8.72	8.94
	NRMSE	0.05	0.05	0.07	0.04
	TP/P	–	12/73	1259/1557	6169/6504
	FP/N	–	49/8061	286/6577	359/1630
96	RMSE	25.17	21.10	30.58	22.74
	MAE	18.17	15.70	22.60	16.46
	MAPE	12.12	26.67	10.14	12.73
	NRMSE	0.07	0.06	0.09	0.07
	TP/P	–	26/65	1794/2163	5030/5518
	FP/N	–	46/7681	443/5583	407/2228

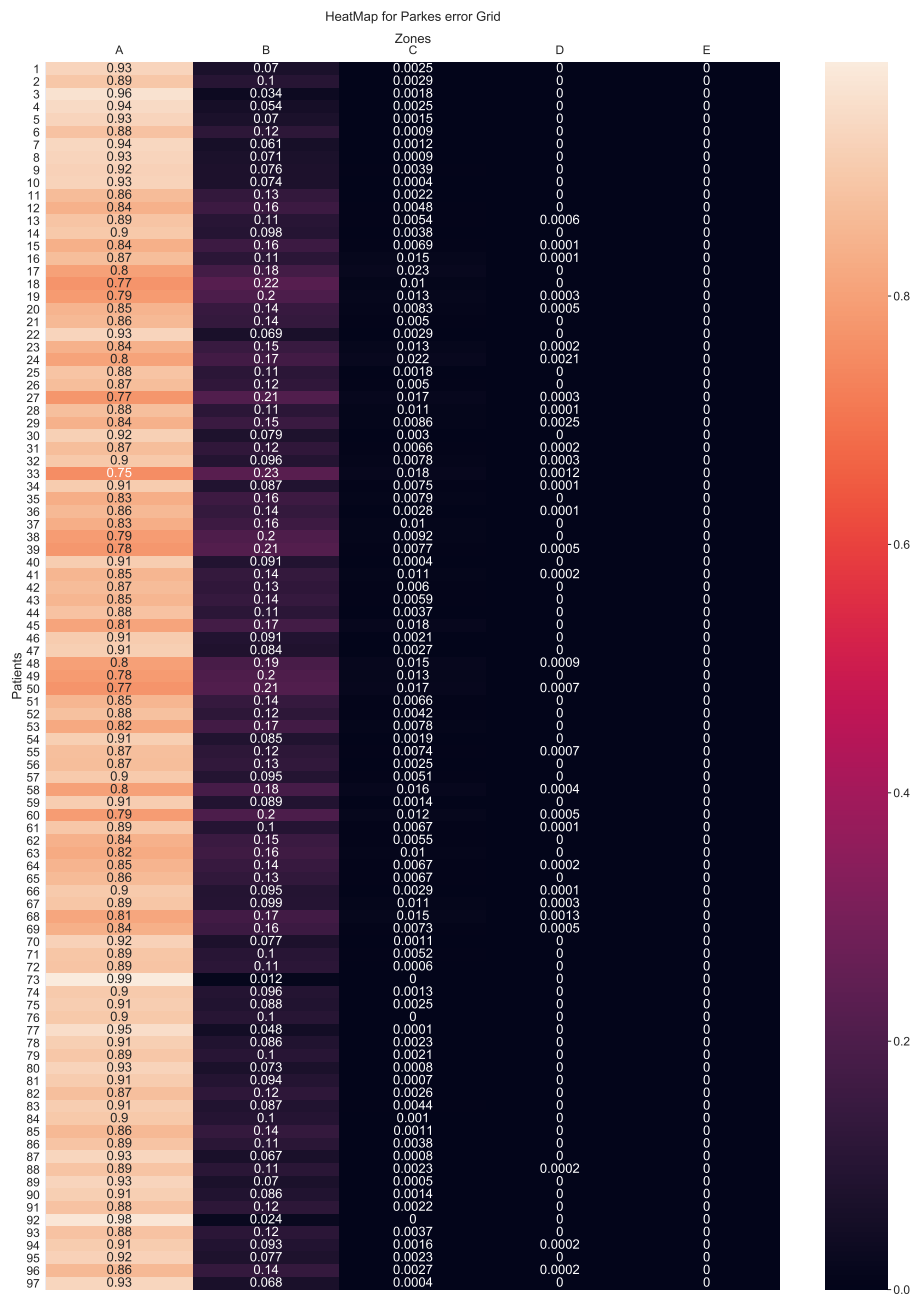
97	RMSE	16.85	35.27	19.62	15.41
	MAE	12.17	33.13	14.77	10.98
	MAPE	7.97	49.72	6.73	8.48
	NRMSE	0.06	0.14	0.07	0.06
	TP/P	–	0/6	2199/2577	5478/5745
	FP/N	–	12/8322	255/5751	384/2583

Supplementary Table S2. Results for 97 patients at 30 minutes ahead forecasting horizon; RMSE, MAE, MAPE, NRMSE are in mg/dL, TP/P stands for True Positives/Positives while TN/N stands for True Negatives/Negatives

2 Figures



Supplementary Figure S1. HeatMap of Clarke Error Grid



Supplementary Figure S2. HeatMap of Parkes Error Grid