

Table S1. Missing value imputation of sub-station rainfall data using DL methods.

Sub-station	Missing Gap	Model	Error Rate	
			RMSE	MAE
St1_Bal - Balangoda	I	MLP	12.675	5.813
	I	CNN-LSTM	17.330	7.682
St5_Ker – Keragala	II	CNN-LSTM	15.023	6.711
	III	MLP	18.566	9.658
	IV	RF	26.682	15.419
St6_Mor – Moraliyoya	I	MLP	17.996	9.140
	II	MLP	16.289	6.807
	III	MLP	19.591	9.468
	IV	MLP	17.750	9.893
	I	MLP	15.550	6.790
St3_Els - Elston	II	MLP	20.882	9.420
	III	MLP	19.674	8.609
	IV	MLP	7.921	3.886
	V	MLP	8.812	4.151
	I	NARX	17.962	14.242
St4_Ill – Illumbuluwa	II	MLP	22.855	14.276
	III	RF	18.851	11.344
	IV	CNN-LSTM	15.832	7.991
	V	CNN	18.301	8.755

Table S2. Final optimal weights.

Sample NO	Optimal Weights		Average RMSE	Sample NO	Optimal Weights		Average RMSE	Sample NO	Optimal Weights		Average RMSE
	Wk	Wm			Wk	Wm			Wk	Wm	
1	0.50788	0.49212	12.832273	34	0.55234	0.44766	12.845423	67	0.05307	0.94693	13.87802
2	0.33345	0.66655	12.982911	35	0.58817	0.41183	12.871107	68	0.75277	0.24723	13.157194
3	0.32658	0.67342	12.995429	36	0.48689	0.51311	12.833319	69	0.80781	0.19219	13.311894
4	0.71415	0.28585	13.065896	37	0.47719	0.52281	12.83538	70	0.77552	0.22448	13.217703
5	0.67599	0.32401	12.989999	38	0.69604	0.30396	13.02808	71	0.18409	0.81591	13.36421
6	0.57279	0.42721	12.858441	39	0.62977	0.37023	12.917619	72	0.34669	0.65331	12.960203
7	0.18405	0.81595	13.364349	40	0.35810	0.64190	12.9421	73	0.11629	0.88371	13.610176
8	0.23123	0.76877	13.219478	41	0.60756	0.39244	12.890563	74	0.16099	0.83901	13.443097
9	0.54428	0.45572	12.841495	42	0.34632	0.65368	12.960802	75	0.89278	0.10722	13.605064
10	0.68708	0.31292	13.010561	43	0.76440	0.23560	13.187522	76	0.95929	0.04071	13.878051
11	0.50013	0.49987	12.83212	44	0.31649	0.68351	13.014698	77	0.26563	0.73437	13.127905
12	0.21979	0.78021	13.252579	45	0.82688	0.17312	13.372086	78	0.64279	0.35721	12.935818
13	0.72526	0.27474	13.09068	46	0.61184	0.38816	12.895381	79	0.44006	0.55994	12.852501
14	0.97799	0.02201	13.96137	47	0.22687	0.77313	13.23193	80	0.45437	0.54563	12.844165
15	0.22519	0.77481	13.236794	48	0.41338	0.58662	12.873848	81	0.99840	0.00160	14.055455
16	0.38771	0.61229	12.901522	49	0.54312	0.45688	12.840988	82	0.51505	0.48495	12.832984
17	0.89821	0.10179	13.625953	50	1.10415	-0.10415	14.59333	83	1.25008	-0.25008	15.461517
18	0.11357	0.88643	13.620956	51	0.25923	0.74077	13.144031	84	0.47620	0.52380	12.835647
19	0.53964	0.46036	12.839543	52	0.78015	0.21985	13.230606	85	0.39254	0.60746	12.895775
20	1.01585	-0.01585	14.138467	53	0.24151	0.75849	13.981992	86	0.21632	0.78368	13.262878
21	0.54877	0.45123	12.843599	54	0.98253	0.01747	13.981992	87	0.38796	0.61204	12.901208
22	0.59137	0.40863	12.874048	55	0.34307	0.65693	12.96622	88	0.54684	0.45316	12.84267
23	0.32085	0.67915	13.006251	56	0.65496	0.34504	12.954394	89	0.25764	0.74236	13.148104
24	0.50866	0.49134	12.832324	57	0.99122	0.00878	14.021954	90	1.05862	-0.05862	14.351699
25	0.64018	0.35982	12.932026	58	0.72911	0.27089	13.099546	91	0.87861	0.12139	13.551755
26	0.76150	0.23850	13.179836	59	0.53280	0.46720	12.837081	92	0.33005	0.66995	12.989049
27	0.59842	0.40158	12.88091	60	0.45727	0.54273	12.842742	93	0.16036	0.83964	13.445294
28	0.47760	0.52240	12.835272	61	0.80610	0.19390	13.306681	94	0.99213	0.00787	14.026185
29	0.20301	0.79699	13.303465	62	0.37530	0.62470	12.917395	95	0.35677	0.64323	12.944133
30	0.79214	0.20786	13.264985	63	0.49135	0.50865	12.832706	96	0.78583	0.21417	13.246724
31	0.85698	0.14302	13.473722	64	0.86342	0.13658	13.496535	97	0.92601	0.07399	13.73685
32	1.24059	-0.24059	15.401001	65	0.69715	0.30285	13.030306	98	1.11667	-0.11667	14.662352
33	0.84093	0.15907	13.418505	66	0.88585	0.11415	13.57879	99	0.23537	0.76463	13.207837
								100	0.93884	0.06116	13.790228

Table S3. Comparison of prediction error of all models in validation under Subsection 3.4.2.

Method		Kriging			MLP			Hybrid			SPTK			
Number of Stations with Missing Values	Station	RMSE	MAE	R ² (%)	RMSE	MAE	R ² (%)	RMSE	MAE	R ² (%)	RMSE	MAE	R ² (%)	
	01	St1_Bal	6.6	3.5	4	3.0	1.7	37	3.9	2.4	14	25.1	17.8	2
		St2_Det	8.7	5.2	6	3.7	1.7	49	5.9	3.4	19	26.0	19.3	2
		St3_Els	6.9	3.6	42	7.4	2.9	39	6.9	3.2	45	25.3	18.3	0
		St4_Ill	14.3	9.9	13	14.9	10.3	8	14.5	10.1	11	24.7	16.4	7
		St5_Ker	13.8	8.5	8	11.7	5.9	21	11.5	6.6	16	25.9	17.9	1

02	St6_Mor	4.5	3.0	55	3.7	2.2	51	3.5	2.1	59	23.8	19.0	3
	St1_Bal	8.1	4.2	12	4.0	2.2	29	4.9	2.7	26	26.0	19.8	32
	St2_Det	9.4	5.9	5	5.7	2.6	41	7.2	4.2	18	28.6	21.1	1
	St1_Bal	6.9	3.8	1	4.1	2.3	0	4.6	2.9	1	19.7	16.3	26
	St3_Els	7.1	3.6	37	9.6	4.6	1	7.7	3.9	33	25.5	18.0	13
	St1_Bal	5.7	2.6	3	3.3	1.7	25	3.6	1.9	15	27.8	19.8	29
	St4_Ill	11.9	7.6	29	15.2	10.2	4	13.1	8.5	25	23.6	18.5	10
	St1_Bal	3.8	2.3	45	3.1	1.7	31	2.9	1.7	43	26.1	19.8	32
	St5_Ker	9.8	4.9	44	13.2	6.6	4	11.3	5.5	25	25.4	19.4	7
	St1_Bal	7.3	4.1	8	2.9	1.6	55	4.0	2.5	18	23.3	19.7	13
	St6_Mor	5.9	3.7	52	6.3	3.4	0	4.1	2.5	43	24.1	20.1	2
	St2_Det	9.2	5.3	1	2.4	1.5	24	5.2	3.3	6	29.5	21.1	2
	St3_Els	7.0	3.5	40	8.1	4.2	20	7.2	3.7	36	26.0	17.3	11
	St2_Det	6.3	3.4	19	4.7	2.0	55	4.7	2.7	47	24.3	17.3	4
	St4_Ill	11.9	7.6	28	14.1	9.6	18	12.9	8.4	25	21.7	17.1	9
	St2_Det	4.4	2.6	64	5.1	2.7	6	3.9	2.5	42	30.2	21.0	3
	St5_Ker	12.8	8.1	18	12.1	5.6	31	10.9	5.8	24	26.5	18.8	10
	St2_Det	9.8	5.9	7	3.6	2.0	7	6.0	3.8	9	25.3	21.3	0
	St6_Mor	5.5	3.8	53	4.8	2.9	32	3.6	2.0	54	24.0	20.1	2
	St3_Els	7.0	3.4	76	9.6	4.5	24	8.2	3.9	53	25.4	17.0	1
	St4_Ill	14.2	9.8	14	14.8	10.1	17	13.8	9.5	15	21.8	17.7	11
	St3_Els	6.8	3.6	44	9.9	5.0	0	8.0	4.2	22	25.7	17.1	11
	St5_Ker	12.4	7.3	16	12.6	5.4	45	11.0	5.6	25	25.6	19.1	8
	St3_Els	7.7	4.4	27	9.2	4.6	6	8.0	4.2	24	23.0	18.5	1
	St6_Mor	5.1	3.1	37	6.0	3.1	0	4.6	3.1	25	23.8	20.0	2
	St4_Ill	13.7	9.0	17	13.9	9.3	25	13.8	9.1	22	22.4	18.1	11
	St5_Ker	11.9	5.6	19	9.4	5.1	67	10.5	5.4	51	25.7	19.0	9
	St4_Ill	14.4	9.8	14	14.6	9.8	11	13.9	9.5	13	18.6	16.7	1
	St6_Mor	5.9	3.1	63	5.9	2.9	3	3.2	1.6	64	22.5	19.5	0
	St5_Ker	13.4	8.3	11	12.7	5.6	58	11.6	6.3	16	29.1	25.5	0
	St6_Mor	6.7	4.2	44	5.9	3.4	0	4.4	2.7	37	29.9	24.9	1
	St1_Bal	9.1	4.9	7	8.3	4.4	4	7.5	3.8	0	33.8	21.2	4.4
	St2_Det	10.3	6.5	0	2.4	1.2	7	5.8	3.8	2	34.4	22.2	2.4
	St3_Els	8.3	5.0	33	8.7	4.4	15	7.9	4.2	27	34.0	21.5	1.9
03	St1_Bal	7.9	3.2	9	3.9	2.0	8	4.4	2.0	10	33.8	21.2	4.4
	St2_Det	8.9	4.5	4	2.3	1.3	1	5.4	2.8	3	34.4	22.3	2.4
	St4_Ill	12.0	7.9	25	14.7	10.0	13	13.0	8.4	22	27.9	16.4	7.3
	St1_Bal	8.7	5.6	31	4.2	2.4	6	4.9	2.8	29	33.9	21.2	4.1
	St2_Det	10.6	7.5	17	3.5	1.9	3	6.4	4.4	8	34.5	22.3	1.9
	St5_Ker	10.7	6.4	30	13.1	5.4	10	10.8	5.2	29	34.4	22.1	1.2
	St1_Bal	9.6	5.2	14	7.6	3.8	2	7.7	3.4	3	29.1	22.6	0.9
	St2_Det	11.1	7.0	7	1.4	0.8	3	5.6	3.6	6	30.2	24.1	3.0
	St6_Mor	7.4	5.3	54	4.9	2.8	19	4.5	2.9	49	28.1	21.9	0.1
	St2_Det	6.2	3.3	3	1.6	1.0	3	3.5	1.9	1	34.4	22.2	2.4
	St3_Els	6.9	3.3	41	8.6	3.8	14	7.5	3.4	33	34.0	21.5	1.9

St4_Ill	13.0	8.7	19	14.3	9.4	16	13.6	8.9	19	27.9	16.4	7.3
St2_Det	6.7	4.7	16	2.9	1.5	0	4.3	3.0	8	34.4	22.3	2.3
St3_Els	7.5	4.7	32	9.7	4.7	1	8.1	4.4	20	34.0	21.5	1.9
St5_Ker	10.5	5.2	32	12.1	5.5	13	11.0	5.0	27	34.4	22.2	1.4
St2_Det	10.6	6.4	1	1.4	0.7	14	5.5	3.4	3	30.1	24.1	2.6
St3_Els	8.5	5.0	28	9.0	3.6	16	7.4	3.9	32	28.0	21.1	0.3
St6_Mor	6.6	4.4	41	3.4	2.2	66	4.3	2.6	58	28.4	22.0	0.2
St1_Bal	5.4	2.4	4	4.3	2.5	0	4.6	2.3	2	33.7	21.2	4.4
St3_Els	6.9	3.0	42	9.7	4.4	0	7.9	3.6	31	34.0	21.5	1.9
St4_Ill	13.7	9.3	14	14.6	10.1	25	14.0	9.5	18	27.9	16.4	7.3
St3_Els	6.6	3.1	50	9.0	3.9	90	7.5	3.5	62	34.0	21.5	1.9
St4_Ill	14.0	9.5	15	15.1	10.2	10	14.5	9.8	14	27.9	16.4	7.3
St5_Ker	10.2	4.6	69	13.6	6.1	3	11.8	5.4	62	34.4	22.2	1.4
St3_Els	7.5	3.9	36	9.6	4.0	1	7.6	3.4	35	28.1	21.2	0.2
St4_Ill	14.1	9.6	15	14.3	9.5	16	13.6	9.4	16	21.7	14.8	14.4
St6_Mor	5.3	3.0	63	3.7	1.8	60	3.7	2.2	63	28.4	22.1	0.2
St1_Bal	3.1	1.6	42	3.6	2.0	14	2.8	1.4	47	30.3	20.4	5.7
St4_Ill	14.2	9.2	11	15.6	10.8	10	14.7	10.0	13	27.3	16.2	8.0
St5_Ker	11.0	5.6	36	13.3	6.4	2	12.1	6.0	19	34.1	22.1	1.3
St2_Det	4.7	2.6	62	2.6	1.3	46	3.5	1.8	61	31.1	21.5	3.4
St4_Ill	13.9	9.2	12	14.8	9.8	6	14.3	9.5	9	27.4	16.2	8.0
St5_Ker	11.8	5.6	17	13.8	6.1	1	12.6	5.8	16	34.3	22.2	1.4
St4_Ill	13.6	8.7	16	15.1	10.1	9	14.2	9.2	15	30.8	19.4	6.2
St5_Ker	10.7	5.5	34	13.7	6.2	0	12.0	5.8	22	37.9	25.7	2.1
St6_Mor	4.9	2.4	56	5.3	2.7	28	4.7	2.3	45	37.7	24.5	5.9
St1_Bal	5.0	2.8	30	3.1	2.0	34	3.5	2.3	36	33.2	28.0	0.3
St5_Ker	11.1	5.9	21	11.6	5.7	59	10.9	5.4	35	32.0	26.7	1.8
St6_Mor	5.7	3.9	30	5.4	3.2	7	4.6	2.8	27	33.5	27.8	0.1
St2_Det	7.4	5.1	26	2.6	1.5	0	4.5	3.1	18	35.0	29.8	2.8
St5_Ker	11.3	6.0	19	12.4	5.3	14	11.3	5.4	23	32.0	26.7	1.8
St6_Mor	7.7	5.0	25	4.2	2.1	53	4.6	2.9	36	33.6	27.8	0.1
St3_Els	9.2	5.8	13	7.7	3.9	42	7.6	4.3	28	32.6	26.2	0.7
St5_Ker	12.9	8.0	17	13.8	6.1	1	11.6	5.9	14	31.9	26.6	1.8
St6_Mor	7.6	5.1	8	5.7	3.8	3	5.9	3.8	7	33.3	27.7	0.1
St1_Bal	7.6	4.2	1	4.0	2.1	6	5.3	3.0	2	28.9	22.6	0.8
St3_Els	7.9	4.3	29	8.4	3.8	28	7.5	3.7	33	28.0	21.0	0.3
St6_Mor	5.8	3.8	42	4.4	2.4	37	4.2	2.6	43	28.5	22.0	0.2
St1_Bal	5.6	2.3	12	3.9	2.2	2	3.9	2.1	11	28.9	22.5	0.8
St4_Ill	13.3	8.7	18	15.3	10.5	20	14.0	9.4	20	28.0	21.1	14.5
St6_Mor	4.8	2.5	62	5.5	2.7	26	3.2	1.7	64	28.4	22.0	0.2
St1_Bal	5.0	2.9	17	4.3	2.5	0	3.8	2.5	10	28.3	22.2	4.3
St3_Els	7.7	4.5	28	9.8	5.1	2	8.3	4.5	16	21.6	14.7	1.8
St5_Ker	10.5	5.2	35	11.2	4.9	56	10.6	4.7	52	29.0	22.3	1.3
St2_Det	6.9	3.7	14	1.5	0.9	2	3.6	2.0	11	33.5	21.2	2.4
St4_Ill	12.6	8.1	22	14.8	9.9	6	13.3	8.7	20	34.2	21.4	14.5

04	St6_Mor	3.8	2.2	70	3.8	1.9	57	2.9	1.3	71	34.6	22.2	0.2
	St2_Det	3.9	2.4	21	0.8	0.3	45	1.9	1.1	23	13.8	10.7	3.1
	St3_Els	6.9	3.4	58	8.6	3.6	33	7.6	3.5	60	12.6	9.1	6.9
	St4_Ill	13.9	9.5	16	14.8	9.9	9	14.3	9.7	14	7.4	5.2	61.4
	St5_Ker	11.2	4.7	38	12.8	5.5	17	12.0	5.1	35	12.4	9.5	21.3
	St2_Det	7.6	3.9	1	1.6	0.8	2	4.3	2.2	2	21.9	17.4	4.8
	St3_Els	7.5	3.9	33	9.1	3.9	6	7.9	3.7	25	19.4	15.0	5.2
	St4_Ill	12.6	8.4	23	15.6	10.9	3	13.8	9.4	18	11.3	8.7	51.9
	St6_Mor	4.3	2.6	59	5.6	2.9	12	3.5	2.1	58	19.7	15.7	2.9
	St2_Det	9.2	6.5	13	1.6	0.8	39	5.1	3.6	20	27.0	22.4	4.9
	St3_Els	9.0	5.9	17	8.7	3.9	18	7.9	4.4	23	25.1	19.4	0.2
	St5_Ker	11.8	6.2	14	13.3	5.7	1	12.0	5.1	11	25.2	20.9	0.3
	St6_Mor	8.1	5.7	8	5.4	2.3	9	5.5	3.5	11	25.5	20.7	0.9
	St2_Det	5.4	2.9	51	2.2	1.0	1	3.4	1.8	34	16.7	12.8	5.2
	St4_Ill	13.5	8.9	16	15.3	10.5	22	14.2	9.4	20	8.4	5.9	56.9
	St5_Ker	11.7	5.6	17	13.7	6.2	0	12.5	5.9	10	15.8	12.4	10.9
	St6_Mor	4.6	2.2	41	5.7	2.7	7	4.7	2.4	29	16.8	12.2	0.9
	St3_Els	8.7	4.2	23	10.0	4.6	2	9.3	4.4	12	9.6	4.8	0.1
	St4_Ill	15.1	10.2	13	15.6	10.6	8	15.3	10.4	15	14.6	10.3	35.0
	St5_Ker	13.4	5.6	0	13.8	6.0	1	13.6	5.8	0	13.4	5.8	0.1
	St6_Mor	5.6	2.8	4	6.1	3.1	1	5.7	2.9	4	5.9	3.5	1.6
	St1_Bal	9.0	3.7	1	4.3	2.4	0	5.3	2.7	1	12.3	9.7	0.8
	St2_Det	9.5	4.3	0	1.2	0.5	24	4.9	2.4	0	13.6	10.7	2.6
	St3_Els	8.0	4.1	33	8.4	3.6	58	7.2	3.1	38	12.6	9.4	5.4
	St4_Ill	13.4	9.5	15	15.0	9.9	6	14.0	9.7	12	7.2	5.0	63.3
	St1_Bal	8.2	5.0	15	4.2	2.4	0	4.7	2.8	11	12.3	9.7	0.9
	St2_Det	9.8	6.9	4	5.0	1.8	0	6.5	4.2	1	13.6	10.7	2.6
	St3_Els	8.3	5.5	30	9.4	4.4	3	7.9	4.3	23	12.6	9.4	5.4
	St5_Ker	9.9	5.6	38	13.2	5.9	4	10.8	4.9	35	12.7	9.7	17.3
	St1_Bal	11.8	6.8	7	4.0	2.2	6	6.6	3.9	8	20.6	16.5	0.0
	St2_Det	13.2	8.4	0	1.7	0.7	20	7.2	4.5	1	22.0	17.5	5.1
	St3_Els	10.6	6.9	24	8.3	3.9	21	7.5	4.4	33	19.7	15.2	4.8
	St6_Mor	9.8	6.5	39	5.5	2.8	7	5.4	3.4	35	20.1	15.9	2.9
	St1_Bal	6.3	3.2	15	4.3	2.4	1	4.3	2.0	10	12.3	9.8	0.8
	St2_Det	7.1	3.7	17	2.1	1.0	0	4.4	2.2	11	13.6	10.7	2.9
	St4_Ill	13.7	8.8	11	14.9	10.0	13	14.1	9.1	13	7.3	5.3	62.2
	St5_Ker	10.1	5.3	39	12.9	5.9	28	11.2	5.5	38	12.8	9.7	16.8
	St1_Bal	9.5	3.6	7	5.5	3.1	3	6.7	2.6	2	22.0	16.9	1.0
	St2_Det	10.3	4.9	4	1.4	0.7	6	5.6	2.7	5	23.0	17.9	6.3
	St4_Ill	12.9	8.6	19	15.2	10.4	12	13.4	8.7	19	11.9	9.7	53.0
	St6_Mor	5.9	3.0	72	3.5	1.5	61	3.5	1.7	73	19.1	15.3	2.8
	St1_Bal	3.7	2.1	10	3.8	2.3	7	3.7	2.0	10	12.3	9.7	0.9
	St3_Els	7.5	3.4	60	9.1	4.1	49	8.3	3.7	58	12.9	9.6	3.6
	St4_Ill	14.8	10.3	9	15.5	10.8	4	15.2	10.5	7	7.3	5.3	61.9
	St5_Ker	11.5	5.2	52	13.5	5.8	13	12.5	5.5	49	12.9	9.8	15.7

St1_Bal	6.8	2.8	2	4.6	2.8	2	5.2	2.7	0	20.5	16.4	0.0
St3_Els	7.9	3.6	27	9.8	4.4	0	8.3	3.8	24	19.4	15.0	5.1
St4_Ill	13.5	9.2	17	15.0	10.3	17	14.1	9.5	18	11.3	8.7	52.2
St6_Mor	4.0	2.5	59	6.0	3.0	0	3.7	2.2	60	19.7	15.7	2.9
St1_Bal	4.2	2.4	24	4.1	2.2	0	3.4	2.0	20	15.4	12.0	0.1
St4_Ill	14.3	9.3	12	15.2	10.4	24	14.6	9.7	15	8.4	5.9	57.0
St5_Ker	11.8	6.1	20	11.5	5.3	70	11.5	5.7	41	15.7	12.3	11.3
St6_Mor	4.1	1.9	46	6.0	2.9	1	4.4	2.0	45	16.6	12.1	1.1
St1_Bal	9.3	5.9	24	5.4	3.0	1	5.6	3.4	18	26.0	21.5	4.5
St2_Det	11.1	7.5	18	1.5	0.8	2	5.7	3.9	15	27.0	22.4	4.9
St5_Ker	10.9	6.5	28	13.5	5.8	0	11.1	5.4	25	25.2	20.9	0.4
St6_Mor	8.5	6.0	31	4.8	2.4	55	4.6	3.0	38	25.5	20.6	0.9
St1_Bal	6.6	4.1	18	4.5	2.7	0	4.3	2.7	12	26.1	21.4	4.6
St3_Els	8.8	5.3	14	9.7	4.7	0	8.7	4.8	8	25.1	19.4	0.2
St5_Ker	11.6	6.1	15	13.6	5.8	0	12.1	5.2	12	25.2	20.8	0.5
St6_Mor	7.3	4.9	8	6.1	3.5	1	5.6	3.4	5	25.5	20.7	0.7