

Visualization of Neural Network Predictions for Weather Forecasting – Additional Material

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Network Prediction Results

For completeness and reproducibility, we list the network prediction results for all tested forecasting models alongside with their hyperparameters. The prediction errors are shown for the temperature parameter. Mean absolute error (MAE), mean error (ME), standard deviation of absolute error (SDAE) and standard deviation of error (SDE) are all given in Kelvin. All network models were trained on the years 1990 – 1999 and were evaluated on data from 2000 – 2016.

Table 1: Results for the network model's temperature predictions for Zurich.

LSTM Neurons	LSTM Layers	Weather Attributes	Input Seasons	Forecast Distance	Steps Before	MAE	ME	SDAE	SDE
64	2	Temp, Spress	All	6 hours	20 steps	0.95	0.31	0.83	1.22
128	2	Temp, Spress	All	6 hours	20 steps	0.95	-0.29	0.79	1.20
64	2	Temp, Spress	All	6 hours	30 steps	1.00	0.60	0.85	1.17
64	4	Temp, Spress	All	6 hours	20 steps	1.00	-0.06	0.84	1.31
64	2	Temp, Wu, Wv	All	6 hours	20 steps	1.10	-0.62	0.88	1.27
64	2	Temp, Spress	All	6 hours	10 steps	1.10	0.72	0.89	1.22
64	2	Temp	All	6 hours	20 steps	1.24	-0.72	1.02	1.43
32	2	Temp, Spress	All	6 hours	20 steps	1.26	0.90	0.98	1.32
64	2	Temp, Fu, Fv	All	6 hours	20 steps	1.31	0.06	1.12	1.72
64	2	Temp, Spress	All	12 hours	20 steps	1.35	0.50	1.15	1.70
128	2	Temp, Av, Au	All	6 hours	20 steps	1.36	-0.04	1.16	1.79
128	2	Temp, Fu, Fv	All	6 hours	20 steps	1.37	0.18	1.17	1.79
64	2	Temp, Av, Au	All	6 hours	20 steps	1.49	-0.75	1.21	1.77
128	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	1.56	0.43	1.29	1.98
32	2	Temp, Av, Au	All	6 hours	20 steps	1.61	-0.80	1.25	1.87
32	2	Temp, Fu, Fv	All	6 hours	20 steps	1.63	-0.04	1.27	2.07
32	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	1.86	-0.69	1.39	2.22
64	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	2.01	-1.60	1.42	1.87
64	2	Temp, Spress, Cloud	All	6 hours	20 steps	2.61	-0.62	2.02	3.25
64	2	Temp, Spress	All	30 hours	20 steps	2.80	-1.92	2.15	2.97
64	2	Temp, Cloud	All	6 hours	20 steps	2.95	-0.59	2.24	3.66
64	2	Temp, Spress	Winter	6 hours	20 steps	3.09	-1.06	2.36	3.74
128	2	Temp, Spress, Cloud	All	6 hours	20 steps	3.41	-2.25	2.51	3.59
64	2	Temp, Spress	Summer	6 hours	20 steps	3.56	1.63	2.83	4.25
98	2	Temp, Spress, Cloud	All	6 hours	20 steps	4.55	4.13	2.72	3.32

Table 2: Results for the network model's temperature predictions for Paris.

LSTM Neurons	LSTM Layers	Weather Attributes	Input Seasons	Forecast Distance	Steps Before	MAE	ME	SDAE	SDE
64	2	Temp, Spress	All	6 hours	20 steps	0.95	0.31	0.83	1.22
128	2	Temp, Spress	All	6 hours	30 steps	0.95	-0.29	0.79	1.20
64	2	Temp, Spress	All	6 hours	20 steps	1.00	0.60	0.85	1.17
64	4	Temp, Spress	All	6 hours	20 steps	1.00	-0.06	0.84	1.31
64	2	Temp, Wu, Wv	All	6 hours	20 steps	1.10	-0.62	0.88	1.27
64	2	Temp, Spress	All	6 hours	10 steps	1.10	0.72	0.89	1.22
64	2	Temp	All	6 hours	20 steps	1.24	-0.72	1.02	1.43
32	2	Temp, Spress	All	6 hours	20 steps	1.26	0.90	0.98	1.32
64	2	Temp, Fu, Fv	All	6 hours	20 steps	1.31	0.06	1.12	1.72
64	2	Temp, Spress	All	12 hours	20 steps	1.35	0.50	1.15	1.70
128	2	Temp, Av, Au	All	6 hours	20 steps	1.36	-0.04	1.16	1.79
128	2	Temp, Fu, Fv	All	6 hours	20 steps	1.37	0.18	1.17	1.79
64	2	Temp, Av, Au	All	6 hours	20 steps	1.49	-0.75	1.21	1.77
128	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	1.56	0.43	1.29	1.98
32	2	Temp, Av, Au	All	6 hours	20 steps	1.61	-0.80	1.25	1.87
32	2	Temp, Fu, Fv	All	6 hours	20 steps	1.63	-0.04	1.27	2.07
32	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	1.86	-0.69	1.39	2.22
64	2	Temp, Fu, Fv, Av, Au	All	6 hours	20 steps	2.01	-1.60	1.42	1.87
64	2	Temp, Spress, Cloud	All	6 hours	20 steps	2.61	-0.62	2.02	3.25
64	2	Temp, Spress	All	30 hours	20 steps	2.80	-1.92	2.15	2.97
64	2	Temp, Cloud	All	6 hours	20 steps	2.95	-0.59	2.24	3.66
64	2	Temp, Spress	Winter	6 hours	20 steps	3.09	-1.06	2.36	3.74
128	2	Temp, Spress, Cloud	All	6 hours	20 steps	3.41	-2.25	2.51	3.59
64	2	Temp, Spress	Summer	6 hours	20 steps	3.56	1.63	2.83	4.25
98	2	Temp, Spress, Cloud	All	6 hours	20 steps	4.55	4.13	2.72	3.32

Table 3: Results for the network model's temperature predictions for Los Angeles.

LSTM Neurons	LSTM Layers	Weather Attributes	Input Seasons	Forecast Distance	Steps Before	MAE	ME	SDAE	SDE
64	2	Temp, Spress	All	6 hours	30 steps	1.00	0.11	0.80	1.28
64	2	Temp, Spress	All	6 hours	20 steps	1.21	0.82	0.88	1.25
128	2	Temp, Spress	All	6 hours	20 steps	1.47	1.19	1.01	1.33

Table 4: Adding a last layer helps to reduce the ME and thus balances the model. The MAE decreases as well.

LSTM Neurons	LSTM Layers	Weather Attributes	Last Layer	Forecast Distance	Steps Before	MAE	ME	SDAE	SDE
64	2	Temp, Spress	Yes	6 hours	20 steps	0.88	-0.07	0.76	1.17
64	2	Temp, Spress	No	6 hours	20 steps	0.95	0.31	0.83	1.22