

- Result 1
 - LSTM and GRU have lower test loss than RNN, DNN, and RF.
 - The lowest test loss of NH_3N forecasting approach has higher validation loss than several approaches.

Table 1: Evaluation of each baseline model forecasting approach.

Rank	Model-Dataset	Test loss*	valid loss
1	GRU-sg7	0.0383	1.2508
2	GRU-sg5	0.0385	1.2644
3	LSTM-ew3	0.0388	1.0796
4	LSTM-sg7	0.0388	1.1804
5	LSTM-sg5	0.0388	1.2346
6	GRU-ew2	0.0389	1.1891
7	GRU-ew4	0.0391	1.2390
8	LSTM-ew2	0.0392	1.0969
9	GRU-ew3	0.0392	1.2199
10	LSTM-ew4	0.0395	1.1219
11	GRU-sg9	0.0396	1.3097
12	LSTM-or	0.0398	1.2612
13	LSTM-obs	0.0405	1.2366
14	GRU-or	0.0405	1.3993
15	LSTM-sg9	0.0410	1.3076
16	GRU-obs	0.0414	1.3638
17	RNN-sg5	0.0415	1.5088
18	RNN-ew2	0.0421	1.5425
19	RNN-sg7	0.0423	1.6267
20	RNN-ew4	0.0432	1.5992

- Result 2
 - Test dataset from 1/16 to 1/22 performed differently on the same forecasting approach compared to validation loss.

Table 2: Comparison of NH_3N val/test loss from 1/16 to 1/22.

GRU	Test loss*	Val loss	LSTM	Test loss*	Val loss
sg7	0.0383	1.2508	ew3	0.0388	1.0796 (1)
sg5	0.0385	1.2644	sg7	0.0388	1.1804
ew2	0.0389	1.1891 (1)	sg5	0.0388	1.2346
ew4	0.0391	1.2390 (3)	ew2	0.0392	1.0969 (2)
ew3	0.0392	1.2199 (2)	ew4	0.0395	1.1219 (3)
sg9	0.0396	1.3097	or	0.0398	1.2612
or	0.0405	1.3993	obs	0.0405	1.2366
obs	0.0414	1.3638	sg9	0.0410	1.3076

- Result 3
 - The influence of each pre-processing method on model training is different.

Table 3: Evaluation of pre-processing methods on LSTM and GRU models from 1/16 to 1/22.

Rank	GRU	LSTM
1	sg7	ew3
2	sg5	sg7
3	ew2	sg5
4	ew4	ew2
5	ew3	ew4
6	sg9	or
7	or	obs
8	obs	sg9

- Result 4
 - Test dataset from 10/10 to 10/16 performed similar on the same forecasting approach compared to validation loss.

Table 4: Comparison of NH_3N val/test loss from 10/10 to 10/16.

GRU	Test loss*	Val loss	LSTM	Test loss*	Val loss
ew3	0.0167	1.2199 (2)	ew3	0.0158	1.0796 (1)
ew4	0.0169	1.239 (3)	ew2	0.0161	1.0969 (2)
ew2	0.017	1.1891 (1)	ew4	0.0163	1.1219 (3)
sg9	0.0174	1.3097	sg5	0.0166	1.2346
sg5	0.0178	1.2644	obs	0.0175	1.2366
sg7	0.018	1.2508	or	0.0177	1.2612
or	0.0187	1.3993	sg7	0.018	1.1804
obs	0.0189	1.3638	sg9	0.0188	1.3076

- Result 5
 - EWMA pre-processing method can improve model forecasting performance in general.

Table 5: Evaluation of pre-processing methods on LSTM and GRU from 10/10 to 10/16.

Rank	GRU	LSTM
1	ew3	ew3
2	ew4	ew2
3	ew2	ew4
4	sg9	sg5
5	sg5	obs
6	sg7	or
7	or	sg7
8	obs	sg9