

Table 1: The prediction performance compared to RLinear, RMLP, PatchTST, Crossformer and Stationary. **The input length is 96.**

Models	Metric	CrossGNN		RLinear		RMLP		PatchTST		Crossformer		Stationary	
		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
ETTh2	96	0.309	0.359	0.321	0.364	0.333	0.371	0.343	0.376	0.347	0.391	0.476	0.458
	192	0.390	0.406	<u>0.393</u>	<u>0.412</u>	0.403	0.413	0.405	0.417	0.419	0.427	0.512	0.493
	336	0.426	0.444	<u>0.431</u>	<u>0.449</u>	0.441	0.450	0.448	0.453	0.449	0.465	0.552	0.551
	720	0.445	0.464	<u>0.450</u>	<u>0.465</u>	0.457	0.471	0.464	0.483	0.479	0.505	0.562	0.560
ETTm2	96	0.176	0.266	<u>0.181</u>	<u>0.266</u>	0.186	0.271	0.192	0.273	0.208	0.292	0.192	0.274
	192	0.240	0.307	<u>0.243</u>	<u>0.305</u>	0.251	0.312	0.252	0.314	0.263	0.332	0.280	0.339
	336	0.304	0.345	<u>0.309</u>	<u>0.350</u>	0.315	0.354	0.318	0.357	0.337	0.369	0.334	0.361
	720	0.406	0.400	<u>0.402</u>	<u>0.398</u>	0.411	0.412	0.413	0.416	0.429	0.430	0.417	0.413
Weather	96	0.159	0.218	0.171	0.230	<u>0.164</u>	<u>0.221</u>	0.171	0.230	0.191	0.251	0.173	0.223
	192	0.211	0.266	0.220	0.274	<u>0.214</u>	<u>0.269</u>	0.219	0.271	0.219	0.259	0.245	0.285
	336	0.267	0.310	0.278	0.319	<u>0.274</u>	<u>0.315</u>	0.277	0.321	0.287	0.332	0.321	0.338
	720	0.352	0.362	0.368	0.369	<u>0.361</u>	<u>0.364</u>	0.365	0.367	0.368	0.378	0.414	0.410
Traffic	96	0.570	0.310	0.590	0.321	0.587	<u>0.318</u>	<u>0.583</u>	0.319	0.591	0.329	0.612	0.338
	192	0.577	0.321	0.599	0.333	0.594	<u>0.329</u>	<u>0.591</u>	0.331	0.607	0.345	0.613	0.340
	336	0.588	0.324	0.604	0.329	<u>0.598</u>	<u>0.330</u>	0.599	0.332	0.613	0.339	0.618	0.328
	720	0.597	0.337	0.607	0.348	0.609	0.346	<u>0.601</u>	<u>0.341</u>	0.620	0.348	0.653	0.355

Table 2: The prediction performance compared to RLinear, RMLP, PatchTST, Crossformer and Stationary. **The input length is 336 and RevIN is incorporated in all models.**

Models	Metric	CrossGNN		RLinear		RMLP		PatchTST		Crossformer		Stationary	
		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
ETTh2	96	0.259	0.329	<u>0.262</u>	<u>0.331</u>	0.288	0.352	0.276	0.337	0.284	0.348	0.314	0.349
	192	0.319	0.371	<u>0.319</u>	<u>0.374</u>	0.343	0.387	0.339	0.379	0.353	0.395	0.380	0.428
	336	0.322	0.380	<u>0.325</u>	<u>0.386</u>	0.353	0.402	0.331	0.380	0.346	0.402	0.365	0.437
	720	0.371	0.417	<u>0.372</u>	<u>0.421</u>	0.410	0.440	0.379	0.422	0.397	0.428	0.409	0.454
ETTm2	96	0.159	0.253	0.164	0.253	0.174	0.259	0.165	0.256	0.172	0.253	0.206	0.270
	192	0.215	0.293	0.219	0.290	0.236	0.303	0.238	0.305	0.256	0.317	0.271	0.324
	336	0.276	0.323	0.273	0.326	0.291	0.338	0.276	0.332	0.291	0.345	0.317	0.358
	720	0.361	0.378	0.366	0.385	0.371	0.391	0.369	0.391	0.382	0.410	0.413	0.448
Weather	96	0.148	0.200	0.175	0.225	<u>0.149</u>	<u>0.202</u>	0.155	0.205	0.186	0.222	0.216	0.259
	192	0.195	0.240	0.218	0.260	0.194	<u>0.242</u>	0.199	0.245	0.213	0.247	0.232	0.249
	336	0.240	0.281	0.265	0.294	<u>0.243</u>	<u>0.282</u>	0.249	0.284	0.268	0.306	0.294	0.317
	720	0.311	0.329	0.329	0.339	<u>0.316</u>	<u>0.333</u>	0.319	0.335	0.340	0.360	0.349	0.396
Traffic	96	0.365	0.251	0.396	0.280	0.374	<u>0.264</u>	<u>0.367</u>	0.251	0.399	0.293	0.419	0.316
	192	0.385	0.260	0.409	0.283	0.395	0.263	0.385	0.259	0.412	0.296	0.436	0.328
	336	0.396	0.266	0.424	0.293	0.410	0.275	<u>0.398</u>	0.265	0.425	0.299	0.453	0.329
	720	0.430	0.286	0.461	0.315	0.443	0.296	<u>0.434</u>	<u>0.289</u>	0.477	0.323	0.496	0.348

Table 3: The comparison of whether removing outliers. Input length is 96 and output length is set as 336. † indicates the outliers are removed before training.

Dataset	Method	ETTh1		ETTm1		ETTh2		ETTm2	
		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
CrossGNN		0.465	0.445	0.403	0.411	0.426	0.444	0.304	0.345
†CrossGNN		0.472	0.459	0.416	0.425	0.439	0.457	0.317	0.358
TimesNet		0.491	0.469	0.410	0.411	0.452	0.452	0.321	0.351
†TimesNet		0.495	0.472	0.416	0.417	0.455	0.459	0.325	0.357
ETSformer		0.574	0.521	0.435	0.428	0.485	0.479	0.314	0.357
†ETSformer		0.588	0.526	0.440	0.429	0.492	0.496	0.317	0.372
Autoformer		0.521	0.496	0.621	0.537	0.482	0.486	0.339	0.372
†Autoformer		0.525	0.503	0.628	0.542	0.490	0.492	0.342	0.375

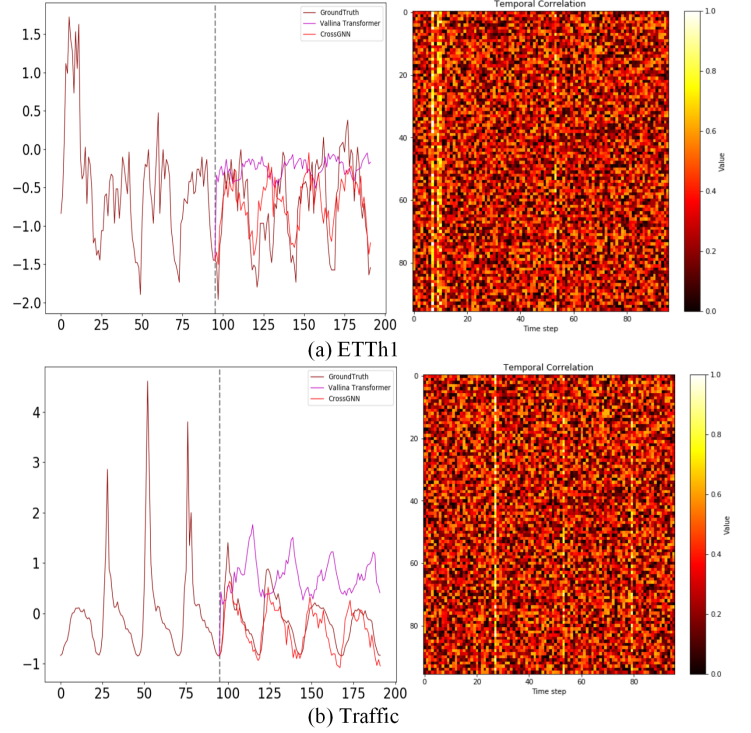


Figure 1: The prediction results of Vallina Transformer with 96 input length and 96 output length on ETTh1 and Traffic. **The temporal correlation of Vallina Transformer is on the right, which is affected by unexpected noise.**

Table 4: Performance comparisons on ablative variants. **C-CV is added to verify the effectiveness of Cross-Variable GNN.**

Dataset	Predict Length	Weather				Traffic				ETTm2			
		96	192	336	720	96	192	336	720	96	192	336	720
C-AMSI	MSE	0.167	0.220	0.276	0.358	0.585	0.590	0.596	0.610	0.192	0.249	0.313	0.420
	MAE	0.229	0.284	0.318	0.382	0.330	0.336	0.341	0.354	0.279	0.318	0.358	0.417
C-CS	MSE	0.175	0.231	0.290	0.371	0.588	0.599	0.603	0.614	0.200	0.259	0.328	0.422
	MAE	0.241	0.286	0.325	0.385	0.331	0.343	0.342	0.358	0.281	0.325	0.364	0.421
C-Hete	MSE	0.172	0.224	0.277	0.364	0.589	0.588	0.603	0.616	0.19	0.255	0.320	0.417
	MAE	0.231	0.280	0.327	0.381	0.329	0.332	0.335	0.354	0.280	0.320	0.358	0.417
C-CV	MSE	0.174	0.227	0.279	0.367	0.588	0.591	0.604	0.616	0.193	0.257	0.322	0.419
	MAE	0.235	0.281	0.328	0.382	0.330	0.335	0.338	0.358	0.278	0.323	0.359	0.418
CrossGNN	MSE	0.159	0.211	0.267	0.352	0.570	0.577	0.588	0.597	0.176	0.240	0.304	0.406
	MAE	0.218	0.266	0.307	0.362	0.310	0.321	0.324	0.337	0.265	0.307	0.345	0.400

Table 5: Comparisons of **per-batch running time**.

Models	DLinear	CrossGNN	Pyraformer	Autoformer	TimesNet
ETTh2	7.0ms	<u>15.6ms</u>	37.9ms	167.2ms	205.4ms
Traffic	47.3ms	<u>84.3ms</u>	134.3ms	195.4ms	1586.4ms
Weather	10.1ms	<u>20.4ms</u>	49.3ms	181.8ms	309.3ms

Table 6: Comparisons of **two strategies of dealing with amplitude** in terms of efficiency and performance.

Dataset Metric	ETTh2		ETTm2		Weather		Traffic	
	MSE	Time	MSE	Time	MSE	Time	MSE	Time
Average Amplitude	0.309	15.6ms	0.176	15.6ms	0.159	20.4ms	0.570	84.3ms
No average Amplitude	0.311	16.5ms	0.175	16.5ms	0.158	22.7ms	0.568	117.3ms