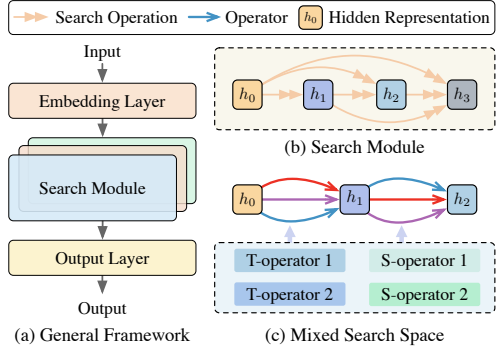


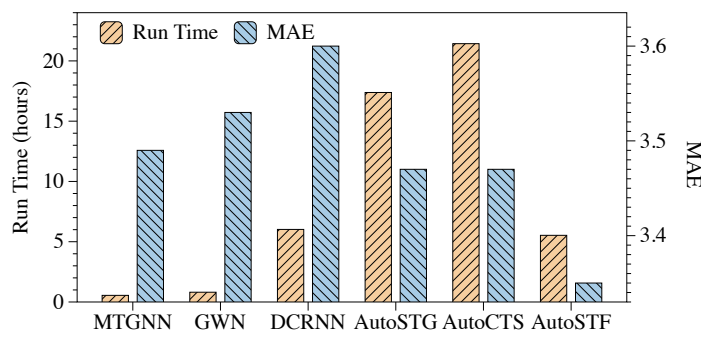
Introduction

Automated ST Forecasting

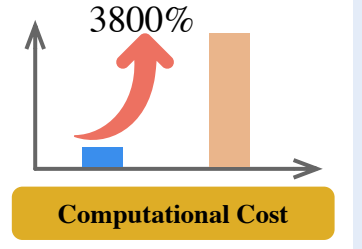


(a). **general framework**. (b) **search module**. (c) denotes **mixed search space**, encompassing both temporal and spatial operators.

Research Gap

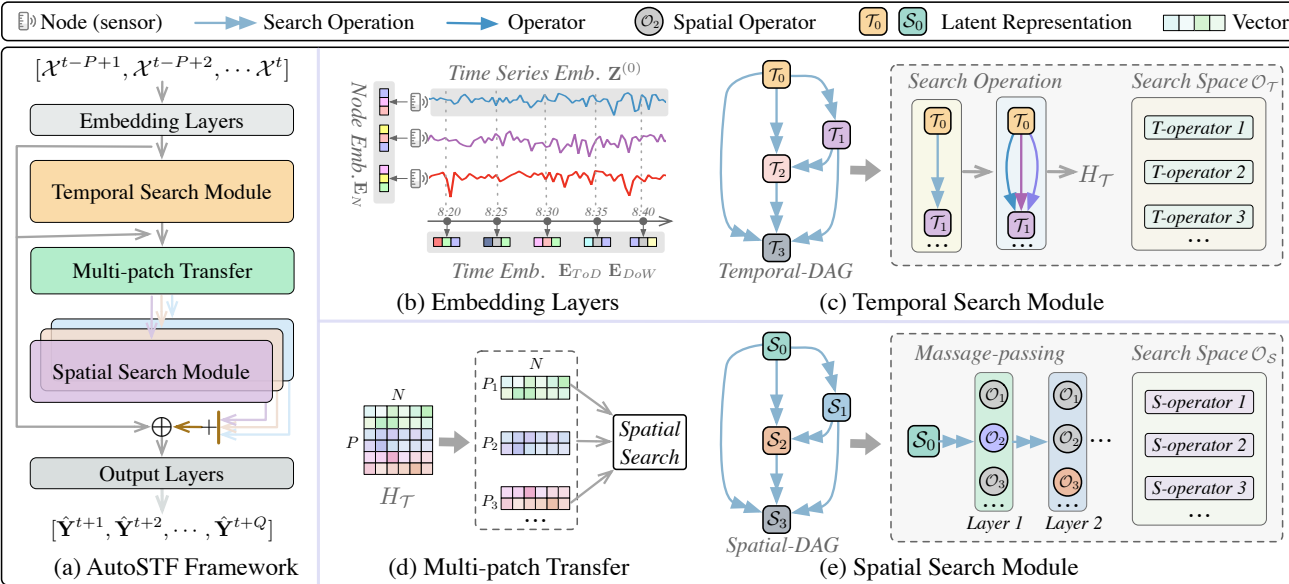


! The **training time** and **accuracy** comparison of manually-designed and automated models on the METR-LA dataset.



Existing automated spatio-temporal forecasting methods **take an order of magnitude longer** than manually-designed methods while yielding marginal prediction accuracy improvements.

AutoSTF Framework



Highlight

Temporal Search Module

Employed a directed acyclic graph (DAG) to facilitate the search for **various combinations** of temporal operators.

Multi-patch Transfer Module

Can explore **finer-grained** spatial and temporal dependencies in subsequent spatial search, and decrease **redundant computations** in the temporal feature dimension.

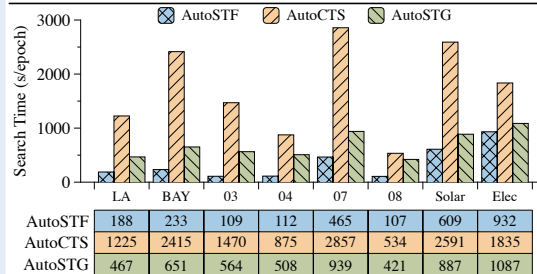
Spatial Search Module

Design a new spatial search space to cover a wide range of spatial modeling paradigms and automatically **optimize messages-passing across different layers**.

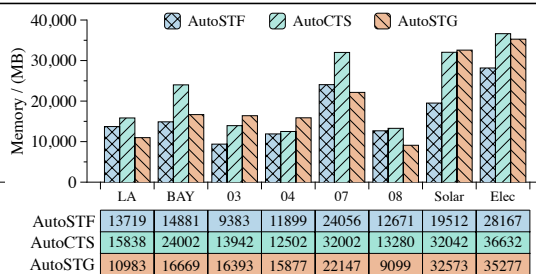
Experimental Results

Overall results of multi-step forecasting on traffic flow datasets

Data	Metric	DCRNN	STGCN	GWN	AGCRN	MTGNN	STID	STHODE	DeepSTUQ	STJGCN	STAEformer	LightCTS	AutoSTG	AutoCTS	AutoCTS+	AutoSTF
PEMS03	MAE	18.18	17.49	14.82	15.89	15.10	15.49	15.51	15.13	14.92	14.96	15.23	17.97	14.71	14.59	14.44
	RMSE	30.31	30.12	25.24	28.12	25.93	28.43	26.16	26.77	25.70	26.03	26.21	28.47	24.54	24.21	23.94
	MAPE	18.91%	17.15%	16.16%	15.38%	15.67%	16.03%	15.88%	14.03%	14.81%	15.06%	14.81%	18.08%	14.39%	14.02%	13.79%
PEMS04	MAE	24.70	22.70	19.16	19.83	19.32	19.25	19.61	19.11	18.81	18.41	18.79	20.46	19.13	18.95	18.38
	RMSE	38.12	35.55	30.46	32.26	31.57	30.91	30.97	31.68	30.35	30.01	30.14	32.18	30.44	30.31	29.86
	MAPE	17.12%	14.59%	13.26%	12.97%	13.52%	13.30	13.45%	12.71%	11.92%	13.36%	12.80%	13.77%	12.89%	12.75%	12.58%
PEMS07	MAE	25.30	25.38	21.54	21.31	22.07	20.69	21.71	20.36	19.95	20.64	23.24	26.77	20.93	20.77	19.50
	RMSE	38.58	38.78	34.23	35.06	35.80	33.93	34.63	33.71	33.01	33.53	36.86	41.63	33.69	33.49	32.66
	MAPE	11.66%	11.08%	9.22%	9.13%	9.21%	8.82%	9.82%	8.63%	8.31%	8.56%	9.87%	11.63%	8.90%	8.76%	8.14%
PEMS08	MAE	17.86	18.02	15.13	15.95	15.71	15.28	15.43	15.44	14.53	14.78	14.63	16.23	14.82	14.72	14.07
	RMSE	27.83	27.83	24.07	25.22	24.62	24.85	24.39	24.60	23.73	23.97	23.49	25.72	23.64	23.43	23.17
	MAPE	11.45%	11.40%	10.10%	10.09%	10.03%	9.92%	10.27%	10.06%	9.15%	9.71%	9.43%	10.25%	9.51%	9.45%	9.14%



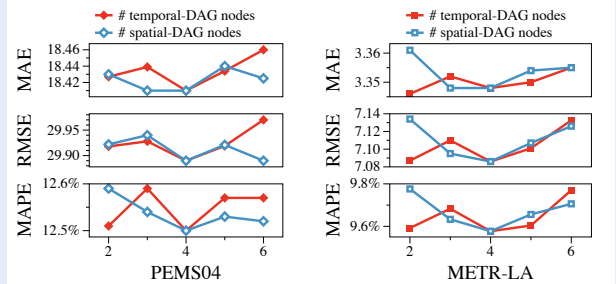
The search time on all datasets



The memory consumption

Ablation study

Dataset	Models	MAE	RMSE	MAPE	Search Time / (s)
METR-LA	w/o TS	3.39	7.19	9.65	58.40
	w/o MPT	3.38	7.19	9.85	152.12
	w/o SS	3.53	7.58	10.66	95.89
	AutoSTF	3.35	7.09	9.58	188
PEMS04	w/o TS	18.62	30.09	12.81	34.46
	w/o MPT	18.67	30.14	12.86	87.93
	w/o SS	18.58	30.06	12.71	58.96
	AutoSTF	18.38	29.86	12.58	112



Parameter sensitivity analysis