

Table 1: Comparison computational efficiency with other methods on the Sleep-EDF-20 dataset. Training time indicates the average time per iteration. Inference time indicates the average testing time per data epoch.

Sequence modeling	Methods	Parameters	FLOPs	Training time	Inference time
	FeatConcat	0.4M	37.6M	8.3s	0.3s
	MultitaskCNN	0.5M	41.8M	9.8s	0.4s
	SalientSleepNet	0.9M	57.4M	11.7s	0.6s
	MM-Net	1.5M	69.8M	13.0s	0.6s
✓	TransSleep	21.3M	161.3M	19.7s	1.1s
✓	XSleepNet	5.8M	88.7M	15.2s	0.7s
✓	CIMSleepNet	9.6M	125.6M	16.6s	0.9s

Table 2: Ablation study of CIMSleepNet on Sleep-EDF-20. “✓” indicates the use of this component. MCTA indicates the Transformer equipped with MCTA.

MAIM	SMCCL	MCTA	Acc	MF1	K	Parameters	FLOPs
			0.497	0.429	0.285	0.4M	37.6M
✓			0.771	0.704	0.672	1.1M	61.2M
	✓		0.786	0.726	0.699	0.6M	48.8M
		✓	0.694	0.629	0.536	8.7M	90.8M
✓	✓		0.810	0.756	0.759	1.3M	72.4M
✓		✓	0.829	0.778	0.777	9.4M	114.4M
	✓	✓	0.834	0.786	0.784	8.9M	102.0M
✓	✓	✓	0.853	0.801	0.805	9.6M	125.6M

Table 3: Performance comparison for complete modalities on the SHHS dataset.

Sequence modeling	Methods	Acc	MF1	K
	FeatConcat	0.840	0.752	0.781
	MultitaskCNN	0.848	0.755	0.786
	SalientSleepNet	0.864	0.783	0.812
	MM-Net	0.856	0.764	0.793
✓	TransSleep	0.891	0.822	0.850
✓	XSleepNet	0.888	0.820	0.843
✓	CIMSleepNet	0.903	0.828	0.862

Table 4: Performance comparison for complete and incomplete modalities with random partial missingness in other related tasks. Here "incomplete" means the maximum missing rate.

Datasets	Methods	Complete		Incomplete	
		Acc	MF1	Acc	MF1
UCI-HAR	FeatConcat	0.925	0.921	0.698	0.679
	MCNN-Bilstm	0.964	0.967	0.717	0.693
	HS-ResNet	0.974	0.974	0.728	0.696
	ELK-ResNet	0.995	0.995	0.711	0.685
	CIMSleepNet	0.989	0.989	0.957	0.958
WESAD	FeatConcat	0.903	0.907	0.667	0.613
	MCNN-Bilstm	0.931	0.935	0.713	0.712
	Attn-Bilstm-CNN	0.944	0.949	0.723	0.730
	BCSA	0.921	0.924	0.705	0.688
	CIMSleepNet	0.973	0.974	0.943	0.942

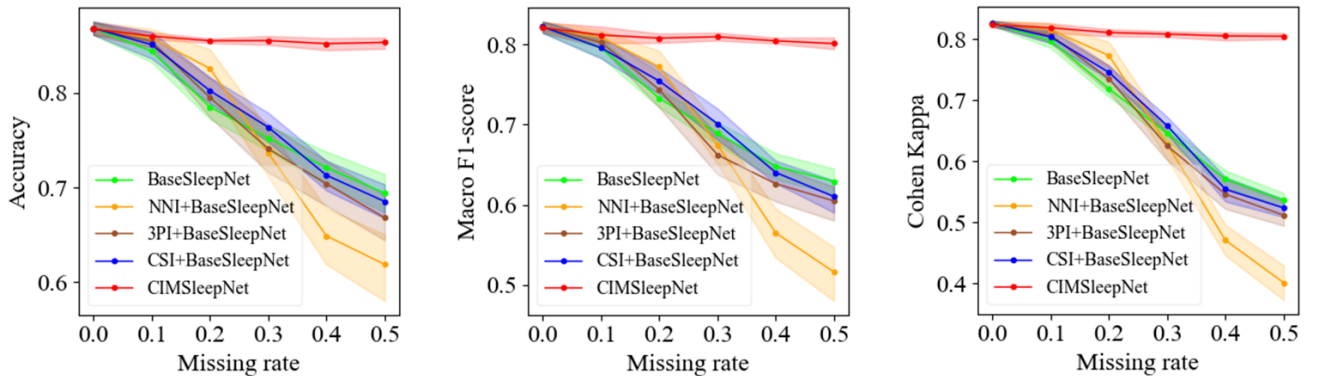


Figure 1: Impact of different statistical inference methods and CIMSleepNet on Sleep-EDF-20 dataset under various missing rates. The shaded area represents the range of upper and lower standard deviations.