Table 4: (APPENDIX) The opitmal hyper-parameter settings found by Bayesian HyperOpt for all methods.

	Parameter	CAL	PHO	SIN	NY	Searching space	Description
BPRMF	-embedding_size	60	60	60	60	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0093	0.0084	0.0091	0.0089	[0.0001, 0.01]	learning rate
	-lambda	0.0050	0.0081	0.0093	0.0091	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	256	256	512	512	{256, 512, 1024}	batch size
ST-RNN	-embedding_size	90	90	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0091	0.0086	0.0097	0.0092	[0.0001, 0.01]	learning rate
	-lambda	0.0015	0.0026	0.0042	0.0013	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	256	512	512	512	{256, 512, 1024}	batch size
	-layers	1	1	1	1	{1, 2, 3}	the number of RNN layers
ATST-LSTM	-embedding_size	60	120	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0009	0.0010	0.0034	0.0012	[0.0001, 0.01]	learning rate
	-lambda	0.0004	0.0004	0.0003	0.0002	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	512	512	512	1024	{256, 512, 1024}	batch size
	-layers	1	1	1	1	{1, 2, 3}	the number of LSTM layers
MCARNN	-embedding_size	90	90	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0089	0.0091	0.0085	0.0085	[0.0001, 0.01]	learning rate
	-lambda	0.0091	0.0079	0.0083	0.0094	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	512	512	512	512	{256, 512, 1024}	batch size
	-layers	2	2	2	2	{1, 2, 3}	the number of RNN layers
iMTL	-embedding_size	120	120	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0001	0.0001	0.0001	0.0002	[0.0001, 0.01]	learning rate
	-lambda	0.0001	0.0001	0.0001	0.0001	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	256	512	512	512	{256, 512, 1024}	batch size
	-layers	2	2	2	2	{1, 2, 3}	the number of LSTM layers
SASRec	-embedding_size	60	90	90	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0005	0.0008	0.0013	0.0016	[0.0001, 0.01]	learning rate
	-lambda	0.0001	0.0002	0.0002	0.0002	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	256	512	512	512	{256, 512, 1024}	batch size
	-heads	1	1	1	1	{1, 2, 3}	the heads of self-attention
	-blocks	1	1	1	1	{1, 2, 3}	the blocks of self-attention
	-dropout	0.25	0.25	0.25	0.75	{0.25, 0.5, 0.75}	the dropout rate of self-attention
LightGCN	-embedding_size	90	90	90	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0018	0.0014	0.0012	0.0011	[0.0001, 0.01]	learning rate
	-lambda	0.0001	0.0004	0.0002	0.0002	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	512	512	512	512	{256, 512, 1024}	batch size
	-dropout	0.25	0.25	0.5	0.5	{0.25, 0.5, 0.75}	the dropout rate of GCN
	-layers	2	2	2	2	{1, 2, 3}	the number of GCN layers
SGRec	-embedding_size	120	120	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0051	0.0045	0.0091	0.0099	[0.0001, 0.01]	learning rate
	-lambda	0.0001	0.0002	0.0002	0.0004	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	512	512	512	1024	{256, 512, 1024}	batch size
	-dropout	0.25	0.25	0.25	0.25	{0.25, 0.5, 0.75}	the dropout rate of GAT
	-layers	1	1	1	1	{1, 2, 3}	the number of GAT layers
MCMG	-embedding_size	180	120	120	120	{60, 90, 120, 150, 180, 210}	the size of embeddings
	-epochs	50	50	50	50	-	the number of epochs
	-lr	0.0043	0.0024	0.0016	0.0015	[0.0001, 0.01]	learning rate
	-lambda	0.0001	0.0001	0.0001	0.0001	[0.0001, 0.01]	L2 regularization coefficient
	-batch_size	512	512	512	1024	{256, 512, 1024}	batch size
	-layers	1	1	1	1	{1, 2, 3}	the number of GCN layers
	-heads	1	1	1	1	{1, 2, 3}	the heads of self-attention
	-blocks	1	1	1	1	{1, 2, 3}	the blocks of self-attention
	-GCN_dropout	0.5	0.5	0.5	0.25	{0.25, 0.5, 0.75}	the dropout rate of GCN
	-SA_dropout	0.5	0.5	0.5	0.75	{0.25, 0.5, 0.75}	the dropout rate of self-attention