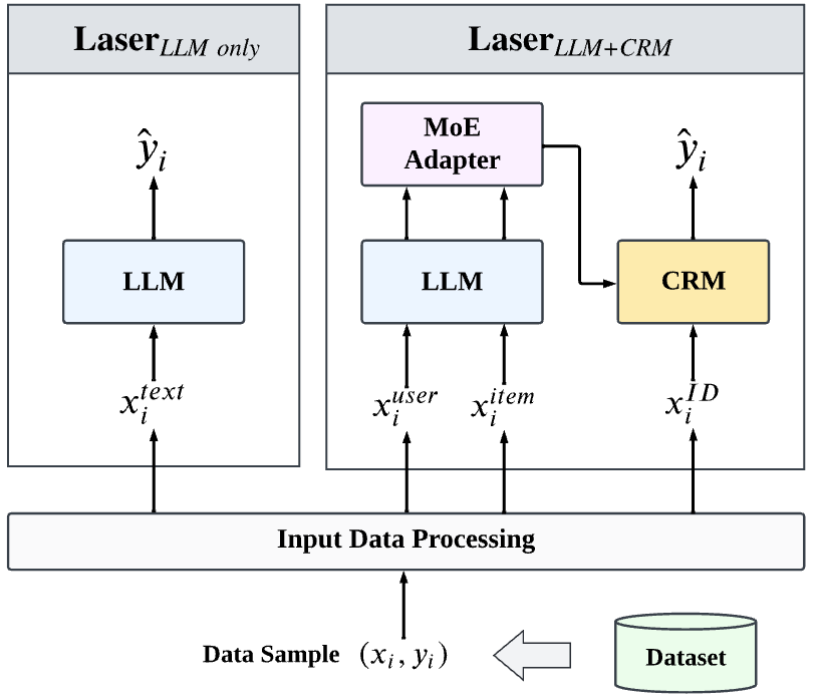
Large Language Models Make Sample-Efficient Recommender Systems

Jianghao LIN, Xinyi DAI, Rong SHAN, Bo CHEN, Ruiming TANG, Yong YU, Weinan ZHANG

Frontiers of Computer Science, DOI: 10.1007/s11704-024-40039-z

Problems & Ideas

- We propose and verify our core viewpoint: Large Language Models Make Sample-Efficient Recommender Systems.
- We propose a simple yet effective framework (i.e., Laser) to validate the viewpoint from two aspects:
  1. LLMs themselves are sample-efficient recommenders;
  2. LLMs, as feature generators and encoders, make CRMs more sample-efficient.



Main Contributions

Overall Performance

Model	BookCrossing			MovieLens-1M		
	AUC ↑	Log Loss ↓	Rel.Impr	AUC ↑	Log Loss ↓	Rel.Impr
DeepFM	0.7496	0.5953	1.05%	0.7915	0.5484	1.49%
AutoInt	0.7481	0.6840	1.26%	0.7929	0.5453	1.31%
DCNv2	0.7472	0.6816	1.38%	0.7931	0.5464	1.29%
GRU4Rec	0.7479	0.5930	1.28%	0.7926	0.5453	1.35%
Caser	0.7478	0.5990	1.30%	0.7918	0.5464	1.45%
SASRec	0.7482	0.5934	1.24%	0.7934	0.5460	1.25%
DIN	0.7477	0.6811	1.31%	0.7962	0.5425	0.89%
SIM	0.7541	0.5893	0.45%	0.7992	0.5387	0.51%
CTR-BERT	0.7448	0.5938	1.71%	0.7931	0.5457	1.29%
PTab	0.7429	0.6154	1.97%	0.7955	0.5428	0.98%
P5	0.7438	0.6128	1.84%	0.7937	0.5478	1.21%
Laser$_{LLM\ only}$	**0.7575***	0.5919	-	**0.8033***	**0.5362***	-
Laser$_{LLM+CRM}$	0.7508	**0.5848***	-	0.7996	0.5375	-

Inference Time

Dataset	DCNv2	SIM	PTab	Laser$_{LLM\ only}$	Laser$_{LLM+CRM}$
BookCrossing	2.34×10^{-4}	2.45×10^{-4}	5.23×10^{-3}	7.89×10^{-1}	2.77×10^{-4}
MovieLens-1M	1.65×10^{-4}	2.07×10^{-4}	3.95×10^{-3}	7.42×10^{-1}	2.34×10^{-4}

Model Compatibility Study

Metric	SIM	Mistral-7B		Vicuna-7B		Vicuna-13B	
		LLM only	LLM+CRM	LLM only	LLM+CRM	LLM only	LLM+CRM
AUC	0.7992	0.8005	0.7990	0.8016	0.7997	0.8033	0.7996
LogLoss	0.5387	0.5388	0.5385	0.5365	0.5372	0.5362	0.5375