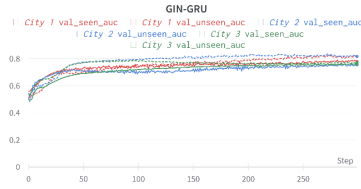


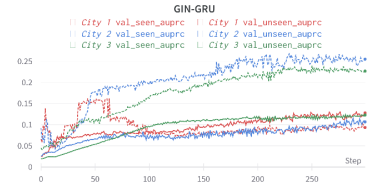
Appendix A Convergence plots



(a) City 1

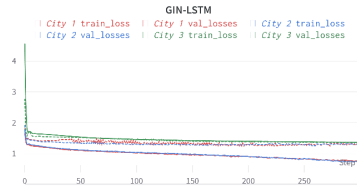


(b) City 2

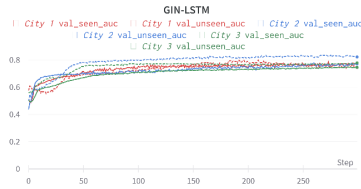


(c) City 3

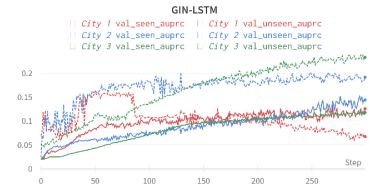
Fig. 1: GIN-GRU



(a) City 1

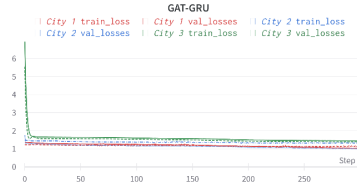


(b) City 2

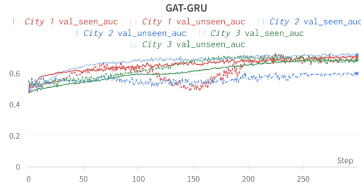


(c) City 3

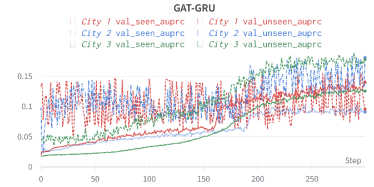
Fig. 2: GIN-LSTM



(a) City 1



(b) City 2



(c) City 3

Fig. 3: GAT-GRU

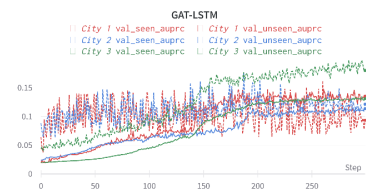
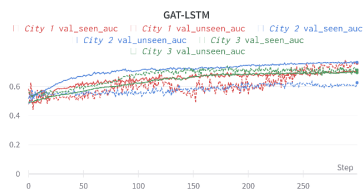


Fig. 4: GAT-LSTM

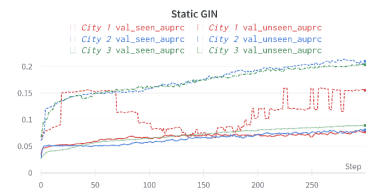
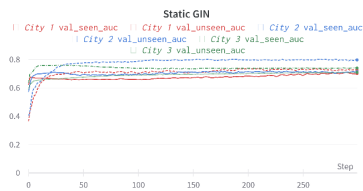
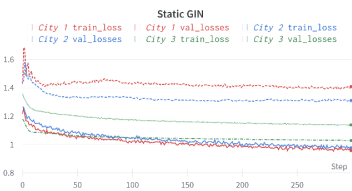


Fig. 5: Static GIN

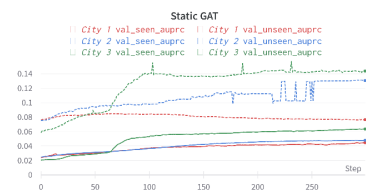
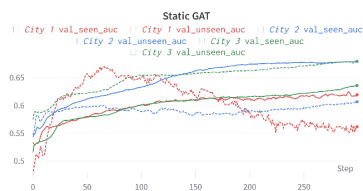
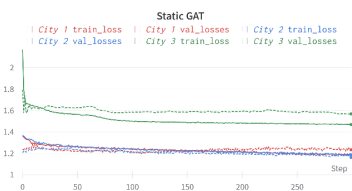


Fig. 6: Static GAT

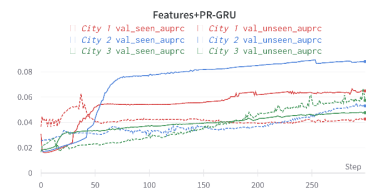
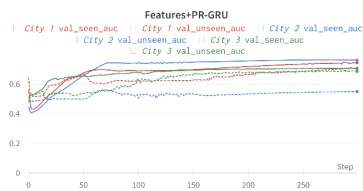
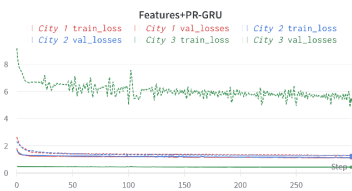


Fig. 7: Features+PR-GRU

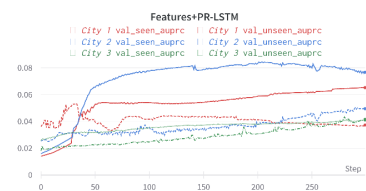
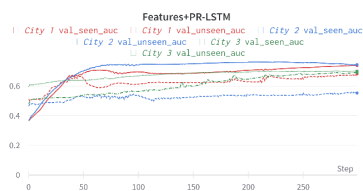
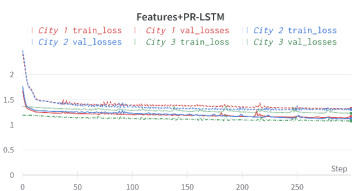
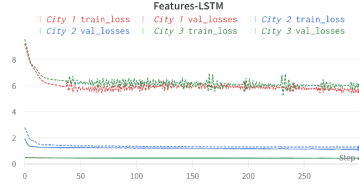
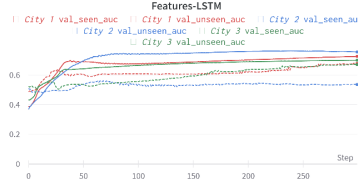


Fig. 8: Features+PR-LSTM



(a) City 1

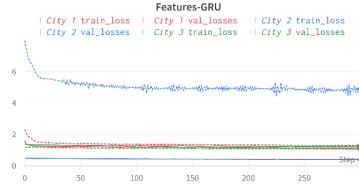


(b) City 2

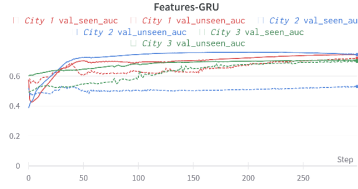


(c) City 3

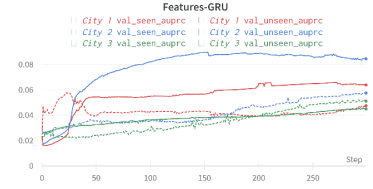
Fig. 9: Features-LSTM



(a) City 1



(b) City 2



(c) City 3

Fig. 10: Features-GRU

Appendix B Best model configurations

Table 1: Model configurations

Model	#layers GNN	#emb. GNN	#hid.dim. GNN	SMOTE rate	#layers RNN	#hid.dim. RNN	Loss
GIN-LSTM	2	512	512	0	1	256	Focal
GIN-GRU	2	512	512	0	1	512	Focal
GAT-LSTM	2	256	256	0	1	512	Focal
GAT-GRU	2	256	256	0	2	256	Focal
Features+PR-LSTM	/	/	/	0	1	512	BCE
Features+PR-GRU	/	/	/	0.5	1	512	Focal
Features-LSTM	/	/	/	0.5	1	256	Focal
Features-GRU	/	/	/	0	1	512	BCE
Static GAT	4	256	512	0.5	/	/	Focal
Static GIN	2	512	512	0.5	/	/	BCE

Appendix C Node features

Table 2: Node features description

Feature group description	Type	#features
# no payments from the contract creation date to the payment date	Numerical	1
Outstanding balance of a credit card at a cut-off date	Numerical	1
Payments between: 1) start date of the billing period and cut-off date (a final date of the billing period); 2) cut-off date to payment date (the date when a customer is supposed to pay)	Numerical	2
Credit card consumption in delivery app (total, average and standard deviation) between: 1) start date to cut-off date; 2) cut-off date to payment date	Numerical	6
Credit card consumption in other commercials (total, average and standard deviation) between: 1) start date to cut-off date; 2) cut-off date to payment date	Numerical	6
Number of transactions between: 1) start date to cut-off date; 2) cut-off date to payment date	Numerical	2
Credit limit	Numerical	1
Number of no payments between the contract creation date and the payment date	Numerical	1
Bureau score of the user at an application date	Numerical	1
Estimated income at an application date	Numerical	1
Amount of increase in the credit limit	Numerical	1
User's operative state at the payment date	Categorical	1
Credit limit increase indicator	Categorical	1
Counter of past referrals	Numerical	1