
Exploiting Social and Mobility Patterns for Friendship Prediction in Location-Based Social Networks

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Supplementary material

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This document shows the figures and tables with the experimental results related to the work “Exploiting Social and Mobility Patterns for Friendship Prediction in Location-Based Social Networks”, which was accepted to be published in the proceedings of *The 23rd International Conference on Pattern Recognition (ICPR 2016)*.

The complete code of link prediction methods used in the paper is available here: <https://github.com/jvalverr/Geo-LPsource>.

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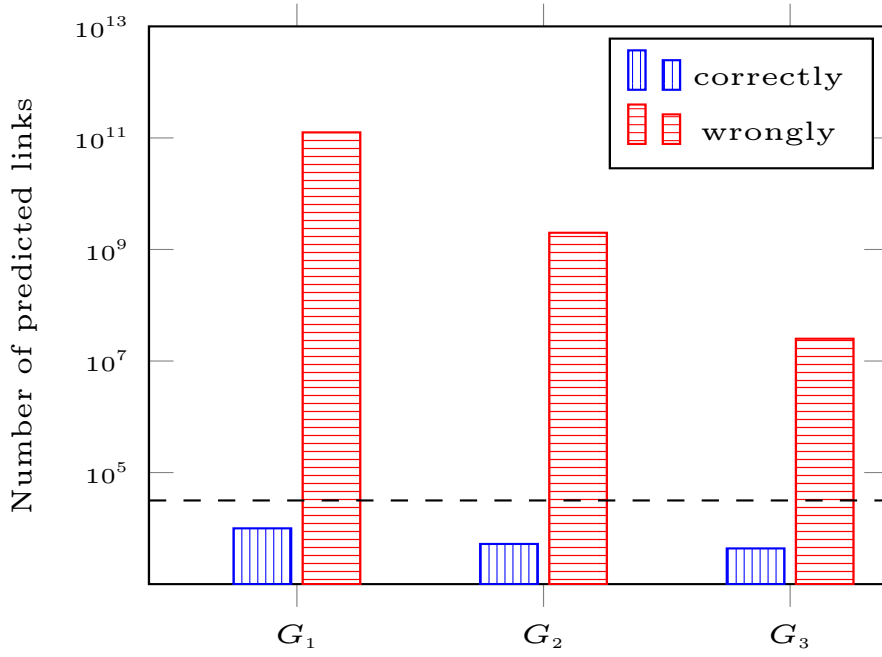
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Table 1 Performance comparison of different methods for inferring social links on unsupervised domain.

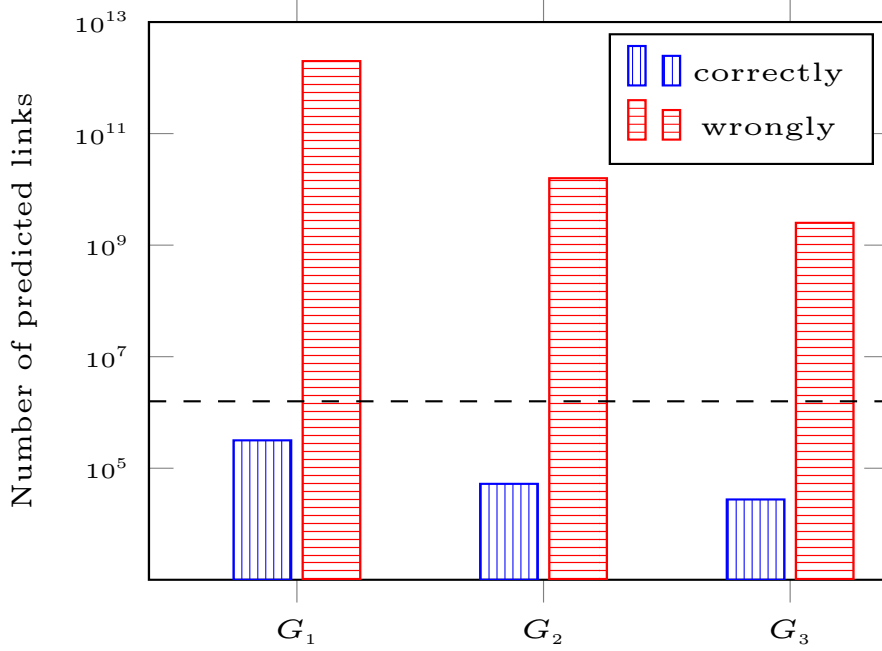
Method	Precision	Recall	F-measure	AUC	Precision	Recall	F-measure	AUC
Brightkite								
CN	0.143E-6	0.496	0.287E-6	0.814	0.128E-6	0.300	0.256E-6	0.732
Jac	0.138E-6	0.484	0.276E-6	0.706	0.128E-6	0.298	0.256E-6	0.354
AA	0.145E-6	0.498	0.290E-6	0.853	0.128E-6	0.299	0.256E-6	0.883
RA	0.145E-6	0.498	0.290E-6	0.842	0.128E-6	0.299	0.256E-6	0.881
PA	0.141E-6	0.493	0.282E-6	0.675	0.128E-6	0.298	0.256E-6	0.781
Gowalla								
Co	0.030	0.205	0.052	0.658	0.685E-6	0.143	0.137E-5	0.618
PAP	0.142E-6	0.494	0.285E-6	0.797	0.126E-6	0.292	0.251E-6	0.483
CL	0.039	0.286	0.069	0.715	0.682E-6	0.142	0.136E-5	0.609
JacP	0.033	0.293	0.060	0.486	0.684E-6	0.142	0.137E-5	0.681
AAE	0.142E-6	0.494	0.284E-6	0.363	0.125E-6	0.292	0.251E-6	0.351
TPOPOP								
WOCP	0.055	0.209	0.087	0.547	0.092	0.081	0.086	0.533
CNP	0.246E-6	0.427	0.492E-6	0.777	0.333E-6	0.215	0.667E-6	0.687
TPOP	0.040	0.291	0.070	0.651	0.062	0.128	0.084	0.585

Table 2 Classifier results measured by AUC.

	Dataset	J48	NB	SMO	MLP	Bag	RF
Brightkite	VSocial	0.846	0.828	0.708	0.860	0.882	0.856
	VLocations	0.768	0.700	0.536	0.749	0.802	0.773
	VProposals	0.720	0.791	0.647	0.799	0.801	0.788
	VSocial-Locations	0.854	0.843	0.715	0.904	0.914	0.901
	VSocial-Proposals	0.843	0.827	0.725	0.863	0.883	0.863
	VLocations-Proposals	0.820	0.801	0.674	0.845	0.870	0.844
	VTotals	0.841	0.843	0.738	0.903	0.915	0.901
Gowalla	VSocial	0.786	0.795	0.637	0.815	0.835	0.793
	VLocations	0.677	0.587	0.500	0.652	0.729	0.689
	VProposals	0.674	0.715	0.558	0.730	0.732	0.725
	VSocial-Locations	0.814	0.787	0.641	0.830	0.850	0.823
	VSocial-Proposals	0.789	0.790	0.642	0.831	0.836	0.796
	VLocations-Proposals	0.763	0.734	0.577	0.775	0.819	0.777
	VTotals	0.786	0.789	0.649	0.832	0.851	0.827



(a) Brightkite



(b) Gowalla

Figure 1 Number of correctly and wrongly predicted links for social (G_1), location (G_2), and proposed (G_3) methods for (a) Brightkite, and (b) Gowalla. The dashed horizontal line indicates the number of truly new links (links into the probe set). Results averaged over the 10 analyzed partitions.

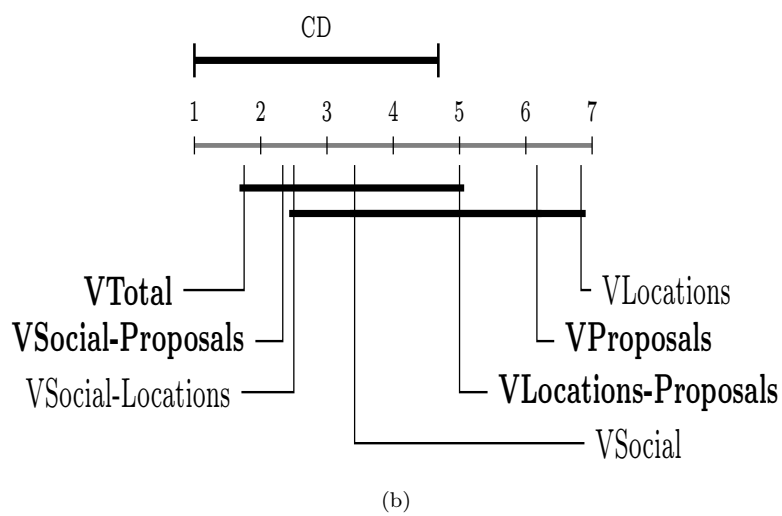
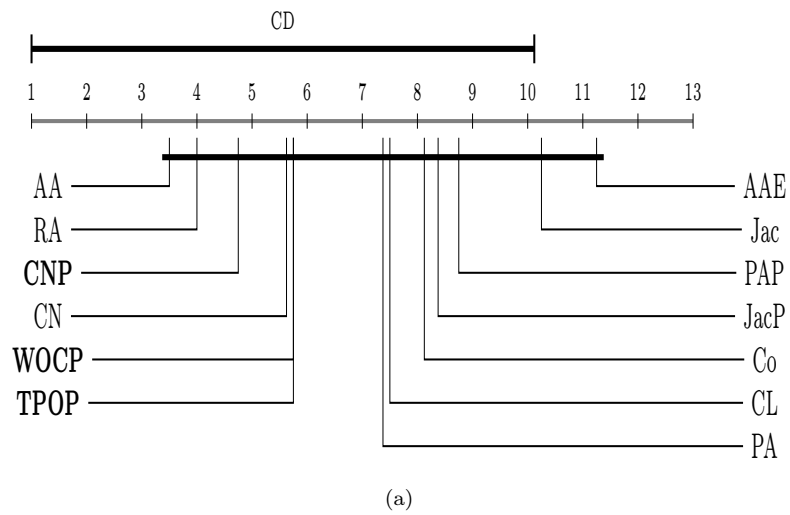
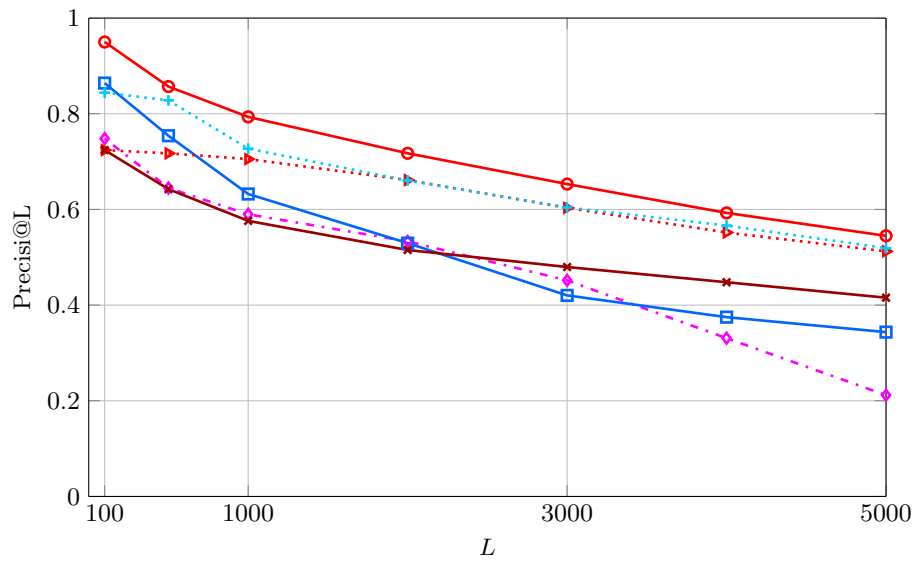
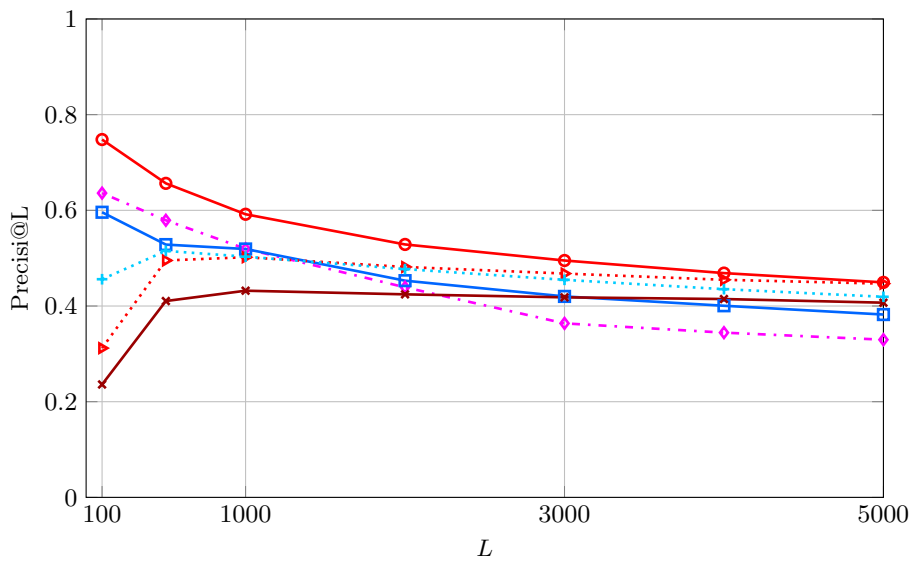


Figure 2 Nemenyi post-hoc test diagrams obtained from (a) unsupervised and (b) supervised experiment results showed in Tables 1 and 2, respectively.



(a) Brightkite



(b) Gowalla

-◇- WOCP
 -○- CNP
 -□- TPOP
 -▷- AA
 -×- RA
 -⊕- CN

Figure 3 Precisi@L performance of the top five methods considering different L values for (a) Brightkite, and (b) Gowalla.