RELISON: A Framework for Link Recommendation in Social Networks

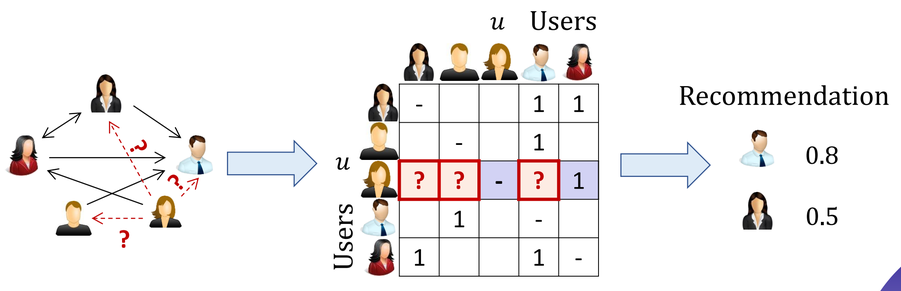
Javier Sanz-Cruzado
Terrier Team
University of Glasgow

Pablo Castells
Information Retrieval Group
Universidad Autónoma de Madrid

RELISON is an **extensible** Java framework for running **link recommendation** experiments. It includes algorithms and metrics that consider the **potential effect of recommendations** on the properties of social networks: **network structure** and **information diffusion**

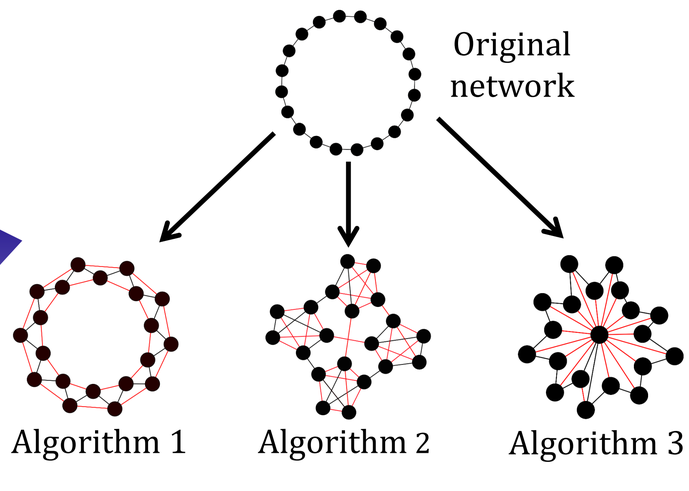
Why is it necessary?

The contact/link recommendation task



- Particularities w.r.t. classic recommendation
  - Items ⊂ Users
  - Users are connected to each other (social network)
  - Recommendations affect the network structure

Effects on network structure

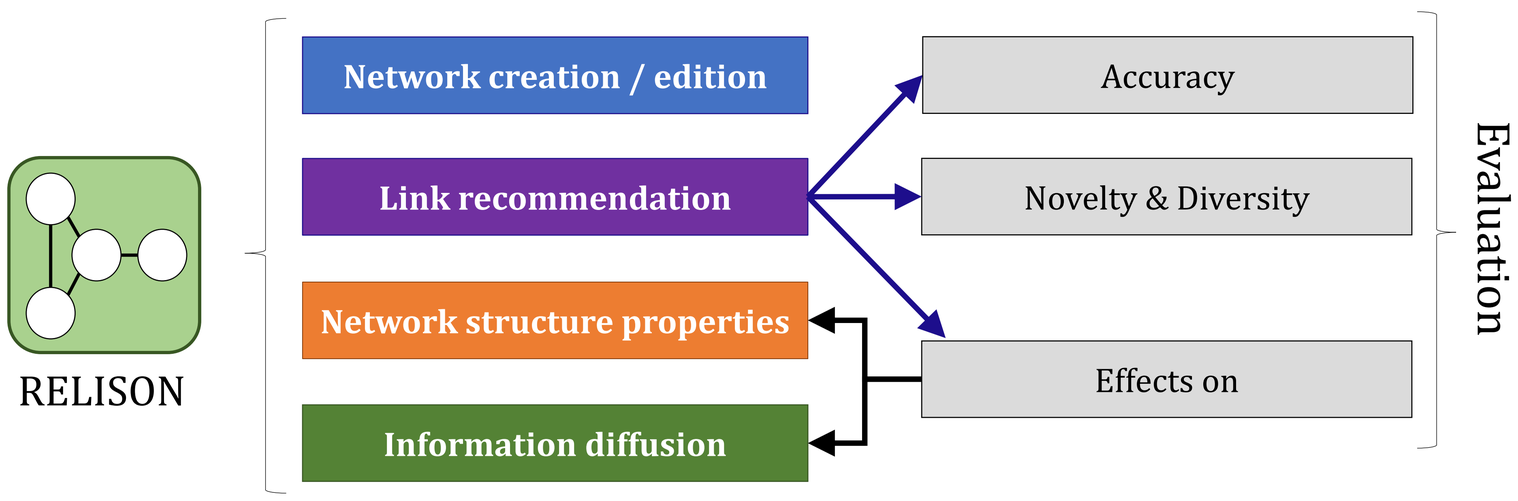


Reproducibility in recommender systems

- Challenges:
  - Different domains / data sources
  - Different evaluation metrics / tasks
- Open-source frameworks
  - Elliot, Lenskit, LibRec, MyMediaLite, Ranksys, Beta-Recsys, RecBole, DaisyRec…
  - General purpose recommendation

There is NOT a framework for contact recommendation!

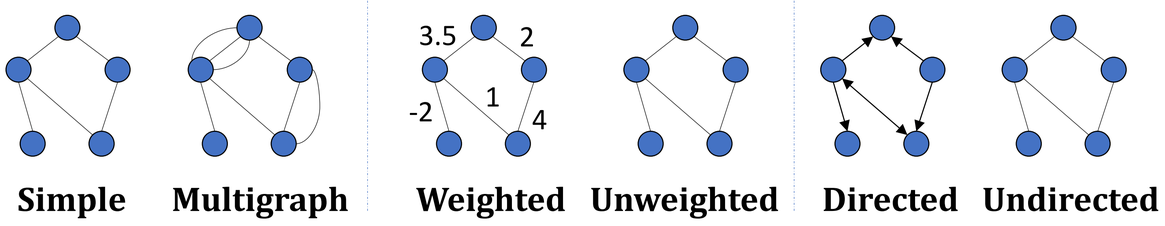
RELISON: REcommending LInks in SOcial Networks



Download now!

Top features

Supported networks



Social network analysis

- Understanding structural properties of social networks
- **50+ structural metrics**, including

Node	Edge/pair	Graph	Community (individual)	Community (global)
Betweenness	Betweenness	Assortativity	Degree	Edge Gini
Closeness	Distance	Clustering	Size	Modularity
Degree	Neighbor overlap	Density	Volume	
PageRank		Diameter		

- Community detection and network partitions
  - Automatic detection of clusters of tightly connected users
  - Measuring partition quality: modularity
  - **8 algorithms**

Connectedness	Modularity	Other
Strongly connected components	Louvain	Girvan-Newman
Weakly connected components	FastGreedy	Spectral clustering
	Infomap	Label propagation

Link recommendation

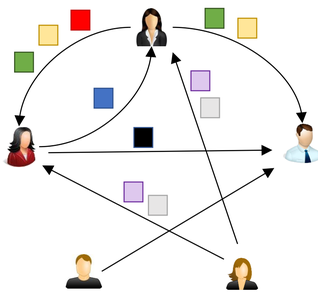
- Contact recommendation functionalities
- Built on top of RankSys
- **50+ algorithms** for people / contact / link recommendation, including

Collaborative filtering	Common neighbors	Path-based algorithms	Random walks	Other algorithms
User kNN	Adamic-Adar	Distance	PageRank	Twittomender
Item kNN	Cosine	Katz	HITS	Supervised classifiers
Implicit MF	Jaccard	Local path index	Money	LambdaMART
	IR models		Hitting time	

- **Global reranking** (targeting structural properties)
  - Basic implementations (metric agnostic)
  - Optimized reranking (clustering coefficient, Gini-based community metrics)
- Also used for **link prediction**

Information diffusion

- Simulation of the exchange of information in social networks
- Concurrent propagation of **multiple user-generated contents**
- **Highly configurable**
  - Which contents do users propagate?
  - Which users receive those contents?
  - Which contents draw users' attention?
  - Can users re-propagate information?
  - How do they decide to re-propagate?



- Pre-configured simulation models provided
- Metrics for measuring diffusion
  - Speed
  - Information novelty and diversity

European Commission
HORIZON 2020
Infinitech