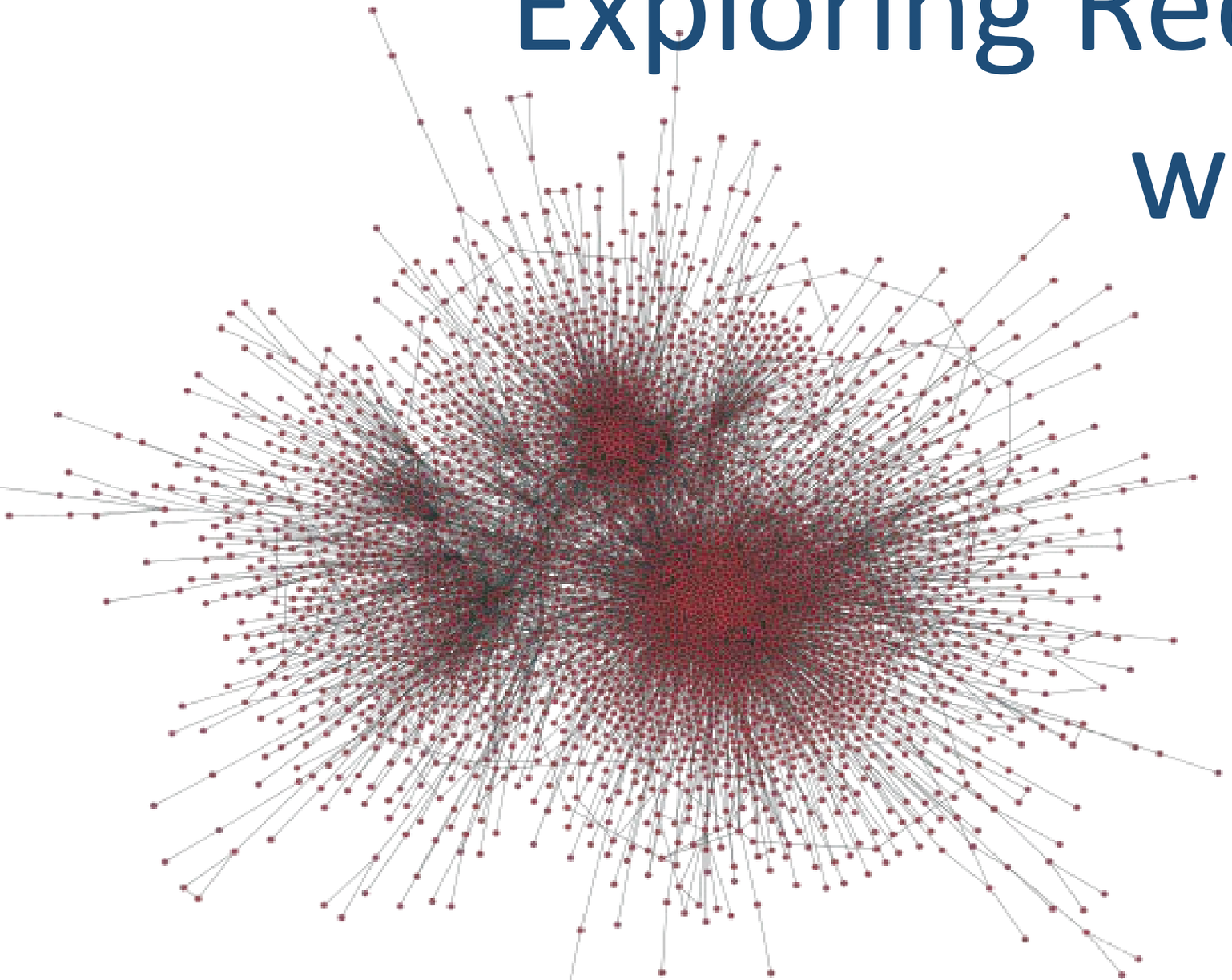
Exploring Recommenders with Networks



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Can social networks help machine-learning algorithms?

With friend relationships between users, can it improve recommendation systems?

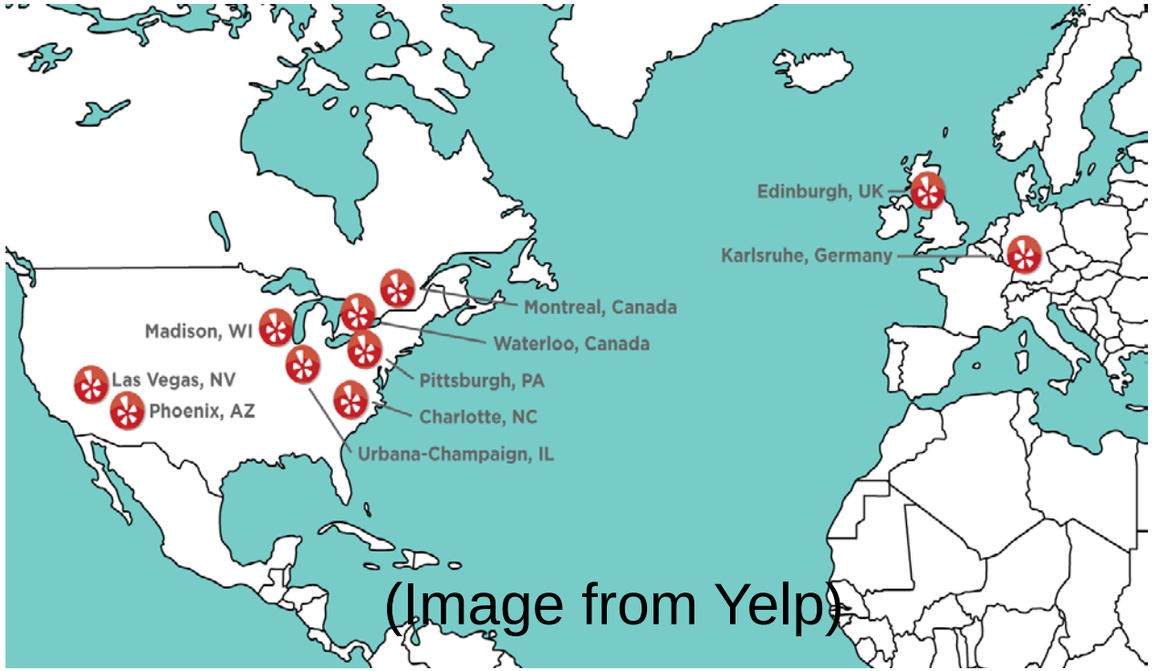
Maybe Yes, but how?

Data: Yelp Dataset Challenge

Ratings (+reviews): 1.6 M (10/12/2004 ~ 01/08/2015)
Businesses: 61K (on 10 cities)
Users: 366K with social network (2.9M edges)

10 cities

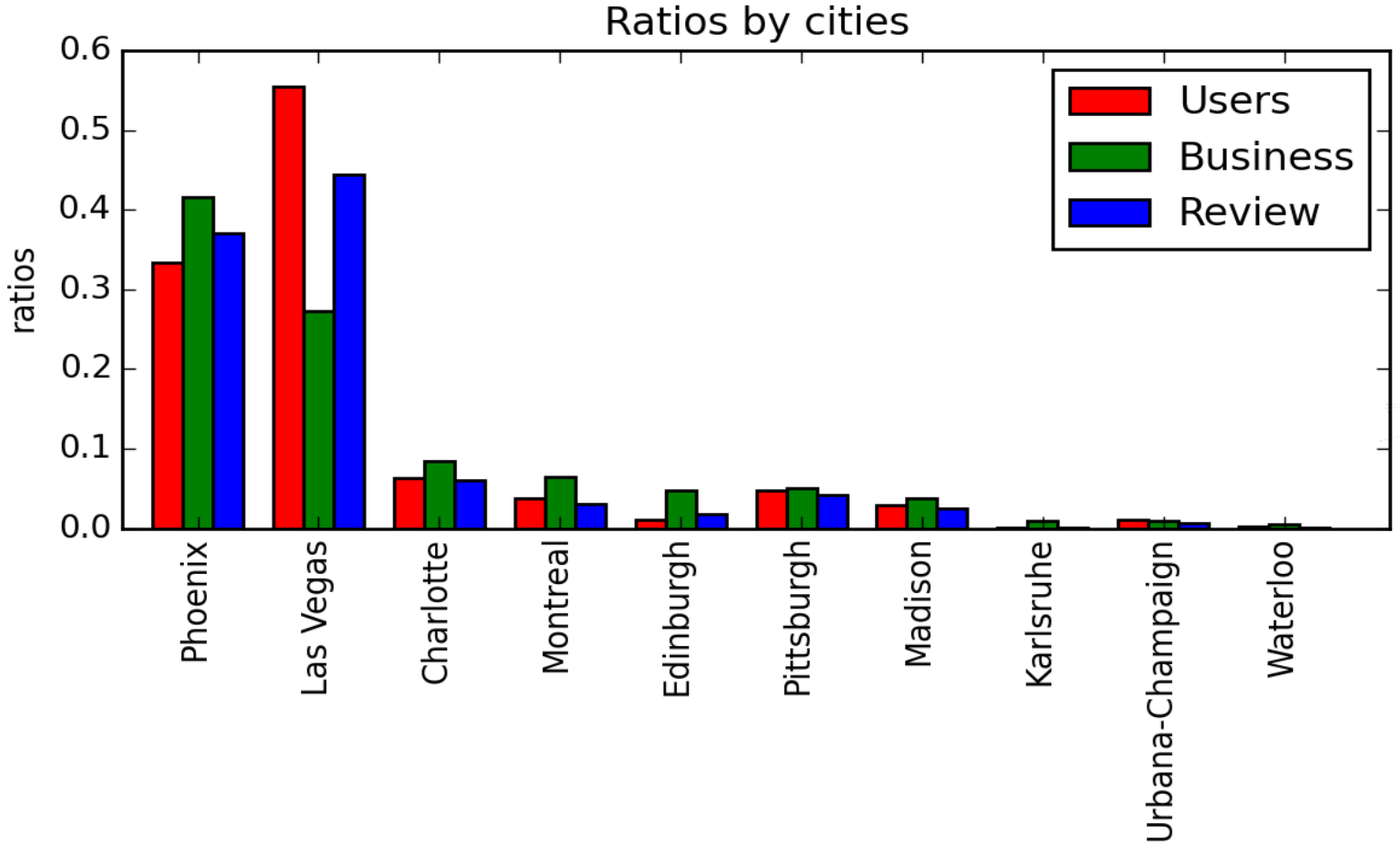
Edinburgh, Karlsruhe,
Montreal, Waterloo, Pittsburgh,
Charlotte, Urbana-Champaign,
Phoenix, Las Vegas, Madison

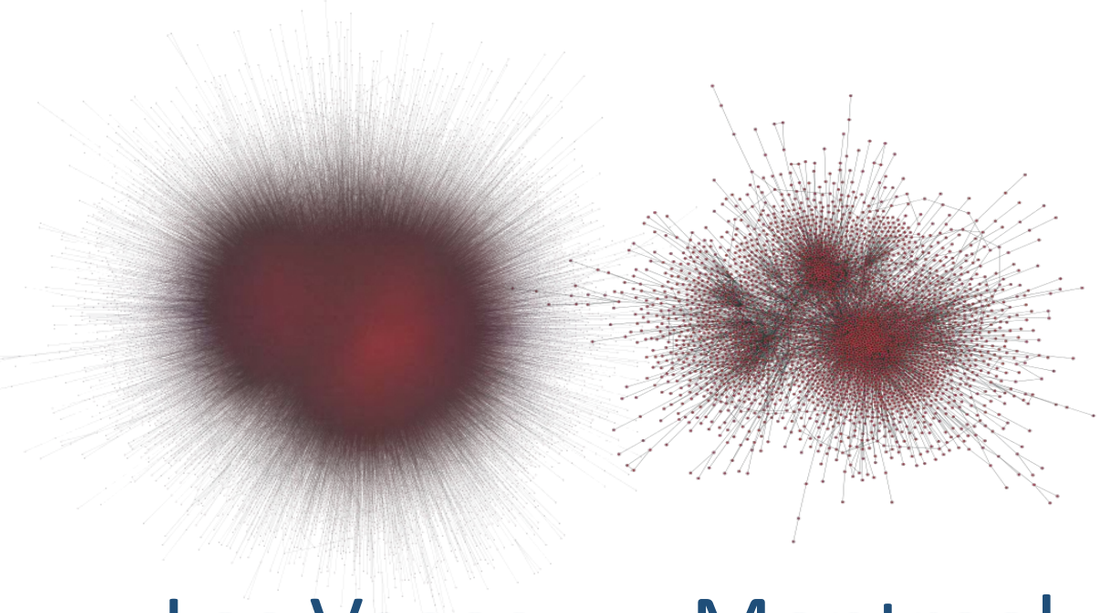


(Image from Yelp)

Data: Preprocessing

10 subsets of data, one for each city, are prepared.





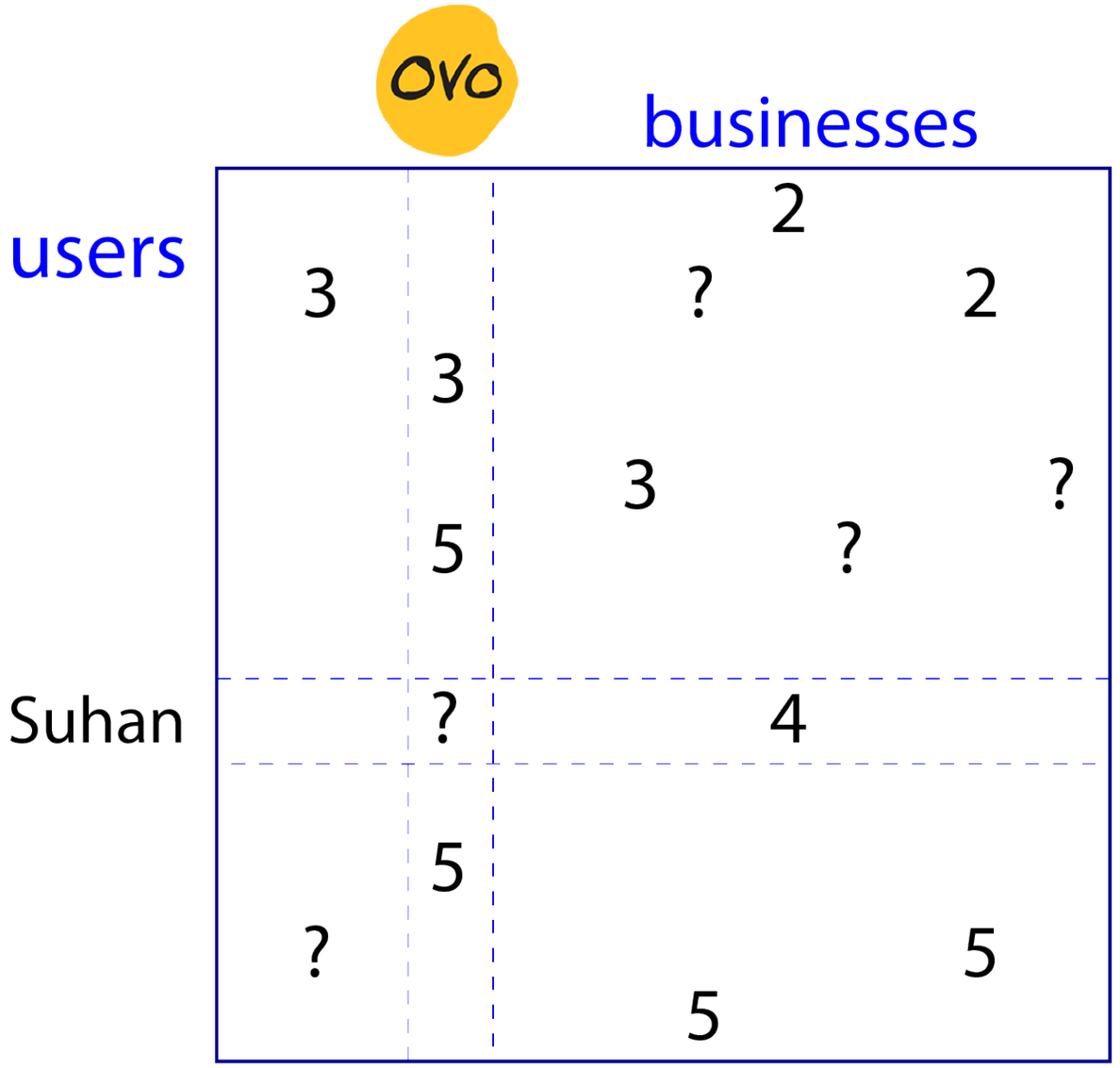
Las Vegas Montreal

Only **ratings** + **networks** will be used here.

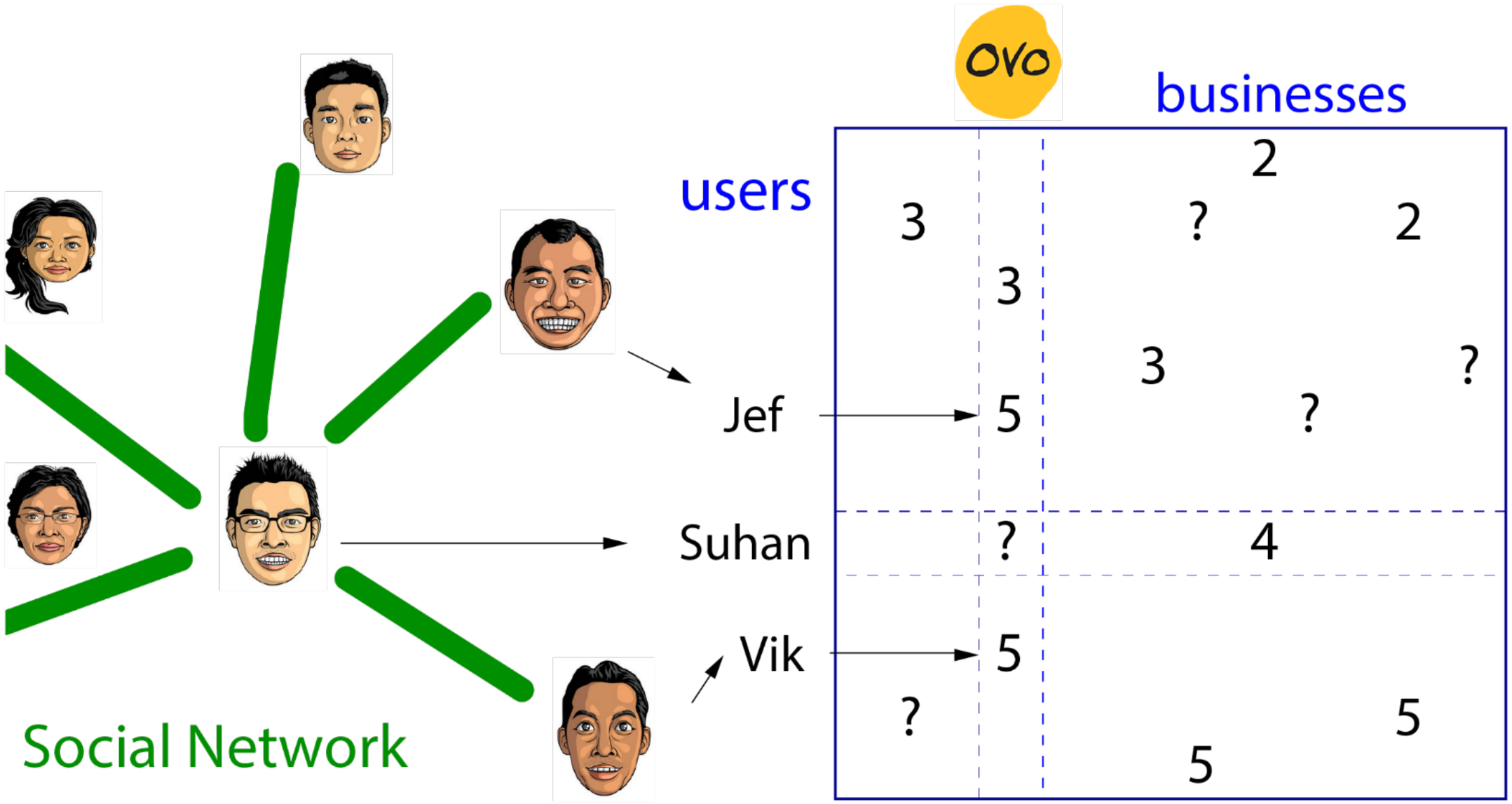
Typical Recommender Systems

Models

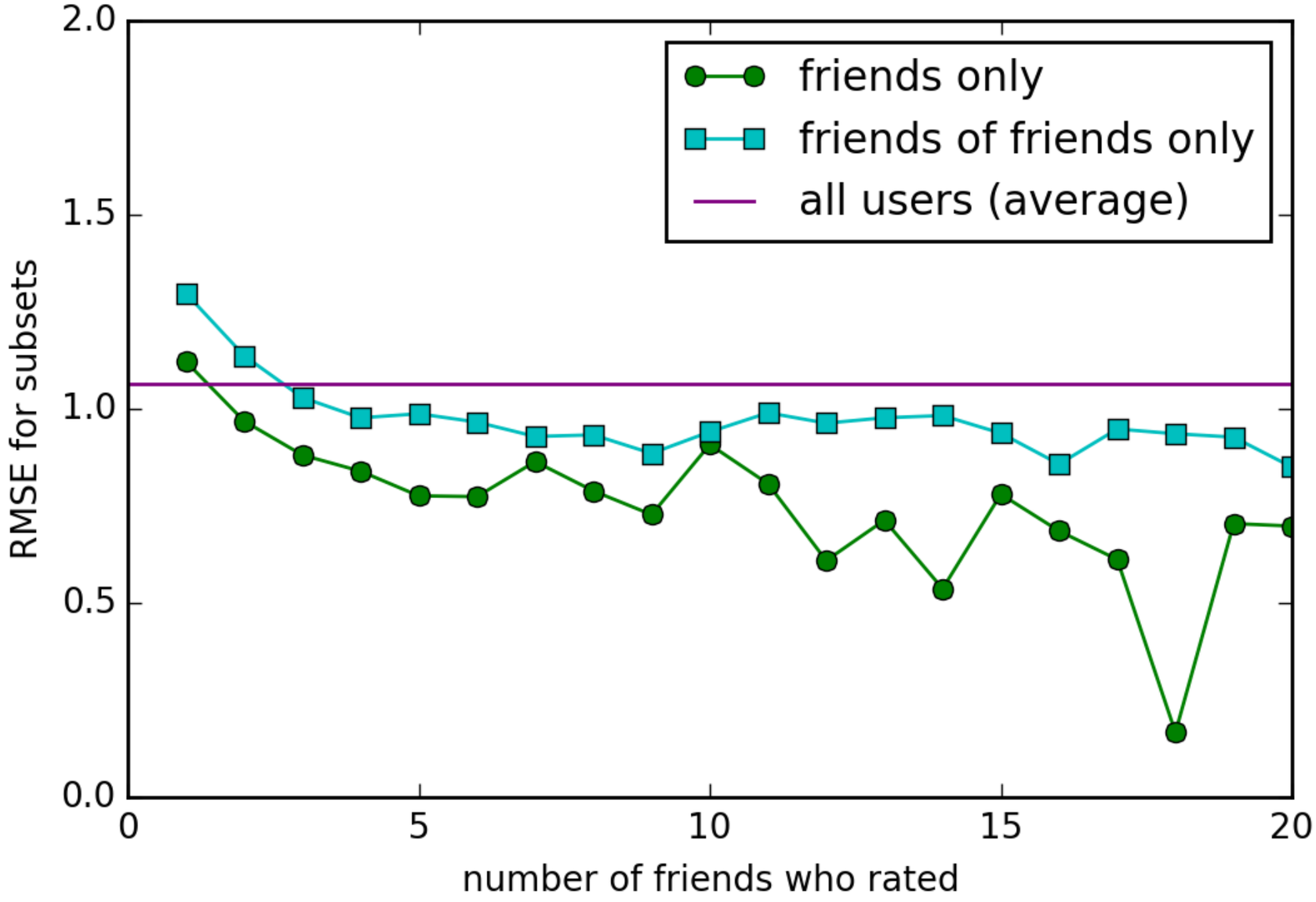
- Average rating (baseline)
- Content-based
- Demographic Filtering
- Collaborative Filtering (CF)
  - User-based
  - Business-based
  - Latent factors (SVD)
- And so on…



A Network-Based Model

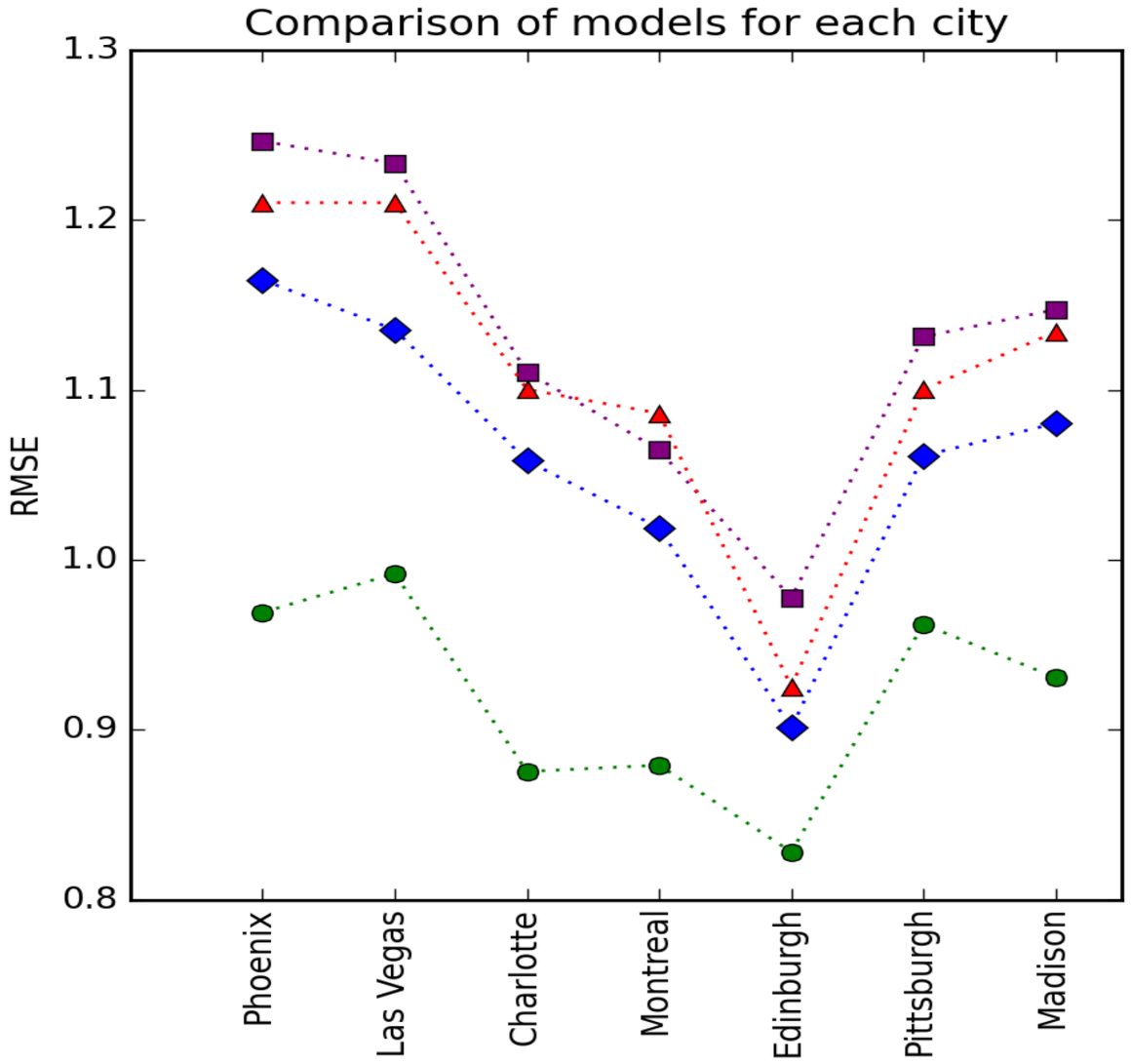


Network-based Model: will it work?



for the city of Montreal

Comparing models: it works!



Computed average RMSE using K-fold cross validation at k=10 for each city.

*: it was computed for the cases when (ratings by friends) ≥ 2.

Conclusion

Social networks can be useful for recommender systems!

Thank you!