Application:
Point-Of-Interest Recommendation

Marie Al-Ghossein

June 2, 2025

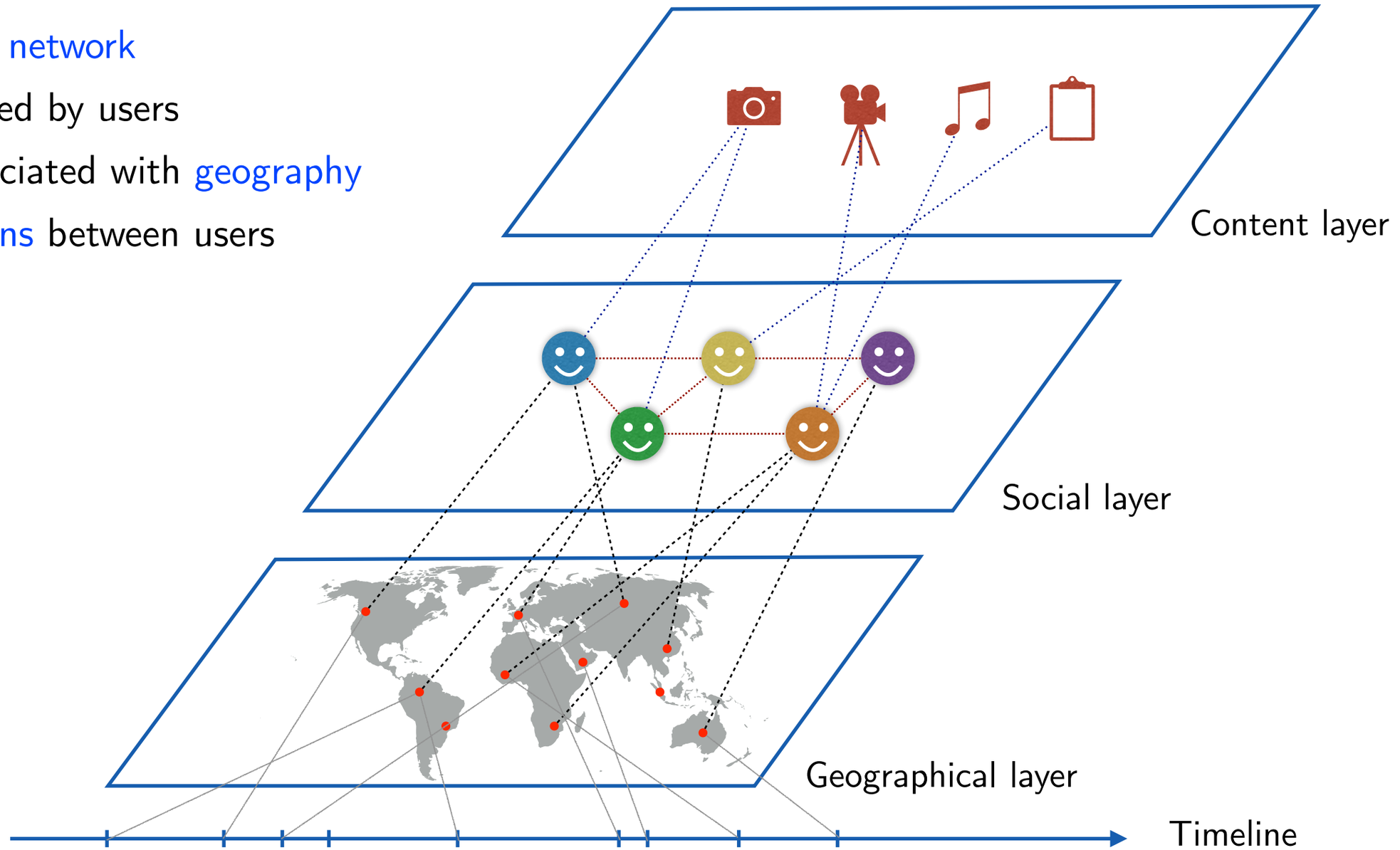
Location-Based Social Networks (LBSN)

- Online social network
- Content shared by users
- Content associated with geography
- Social relations between users

FOURSQUARE

facebook

Gowalla



Point-Of-Interest (POI) recommendation

- Recommend POIs, i.e., *locations* defined by $(latitude, longitude)$
- Available information:
  - Users' history, i.e., previous visits
  - Users' social relations
  - Users' shared content

- Different problems:
  - Next POI recommendation
  - POI itinerary recommendation
  - In-town/out-of-town POI recommendation

Point-Of-Interest (POI) recommendation

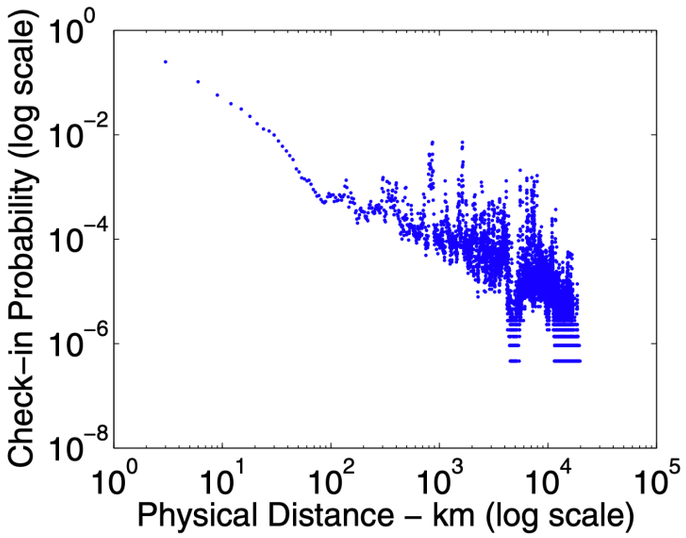
Challenges

- Sparsity
- Scalability
- Modeling:
  - Geographical influence
  - Social influence
  - Temporal influence

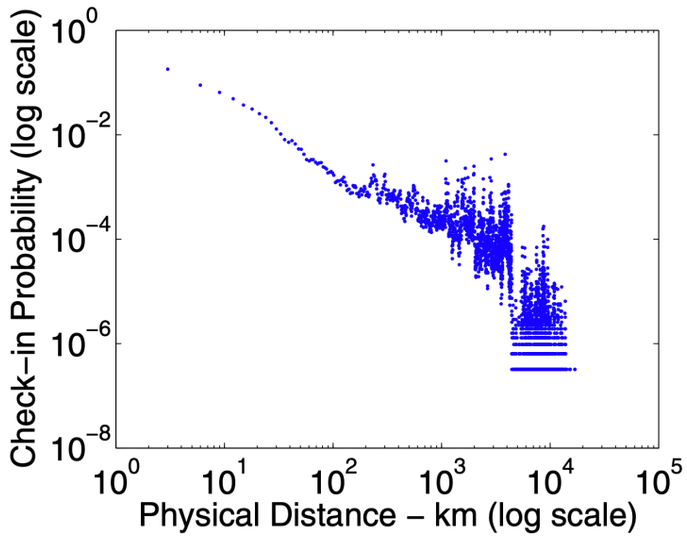
Geographical influence

Tobler's first law of geography.

"*Everything is related to everything else, but near things are more related than distant things.*"



(a) Foursquare

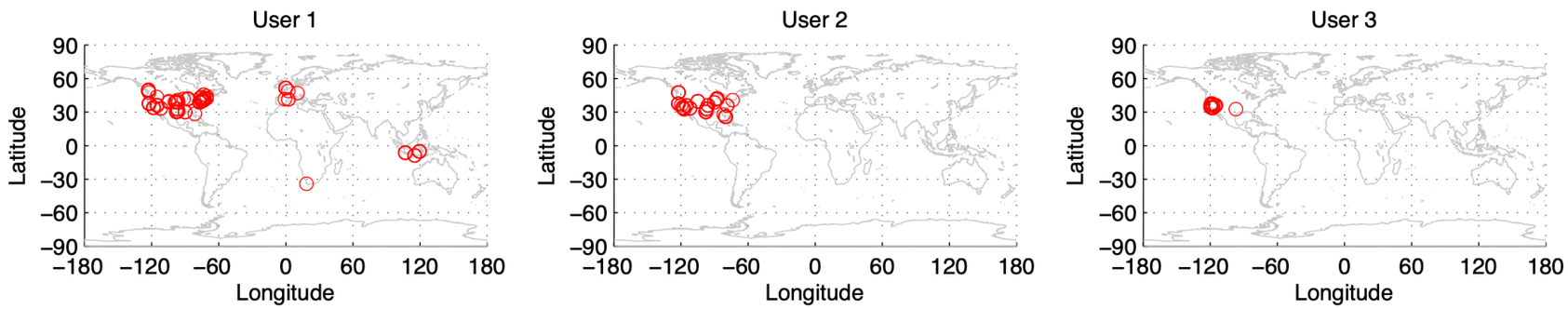


(b) Whrrl

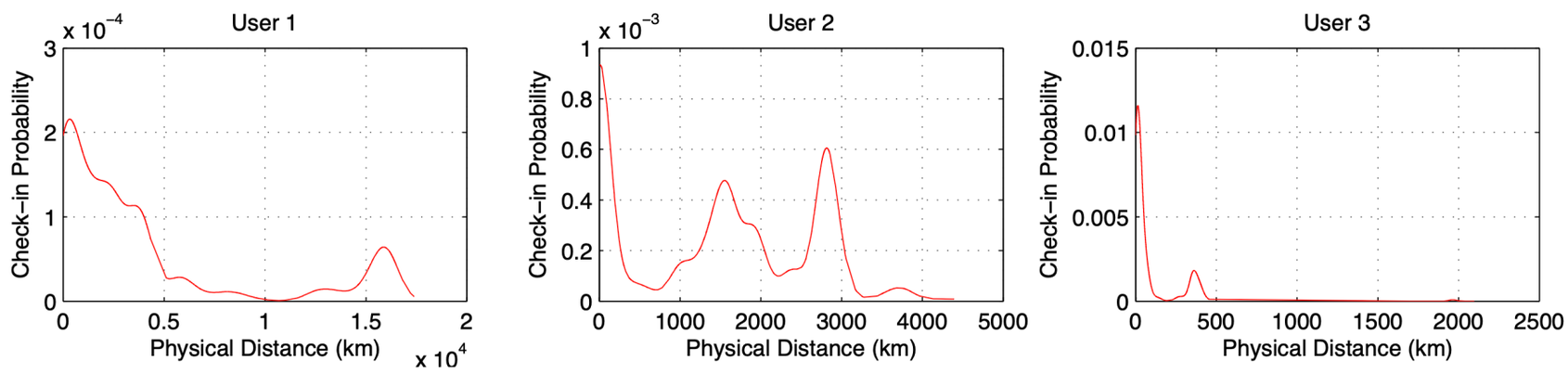
Geographical influence probability distribution

Extracted from "*Exploiting Geographical Influence for Collaborative Point-of-Interest Recommendation*", Ye et al., SIGIR'11.

Geographical influence



Distributions of personal check-in locations



Personal check-in probabilities over geographical distances

Extracted from "*iGSLR: Personalized Geo-Social Location Recommendation - A Kernel Density Estimation Approach*", Zhang and Chow, SIGSPATIAL'13.

Social influence

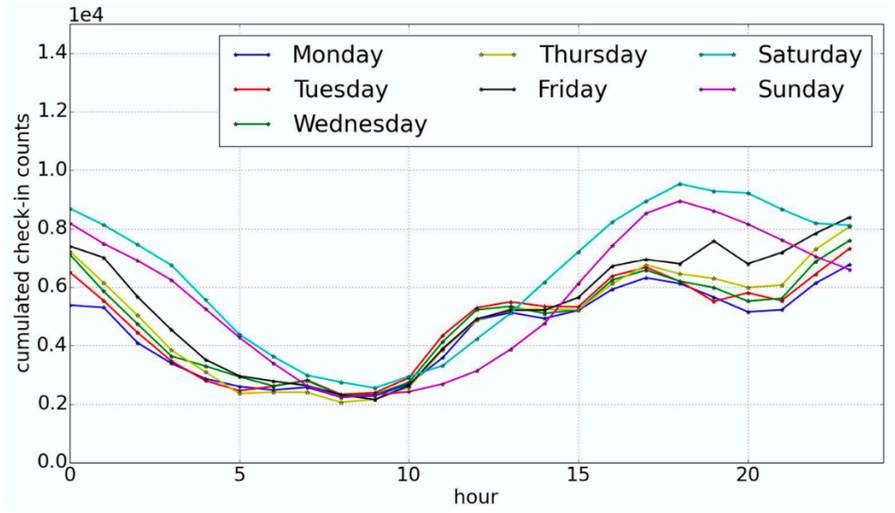
- Social friends are more likely to share common interests in POIs than strangers

- From the Gowalla dataset:
  - Average overlap of a user's check-ins with his friends' check-ins is 9.6%
  - Almost 38% of users visit POIs that are not visited by their friends
  - Almost 90% of users visit less than 20% of POIs visited by their friends

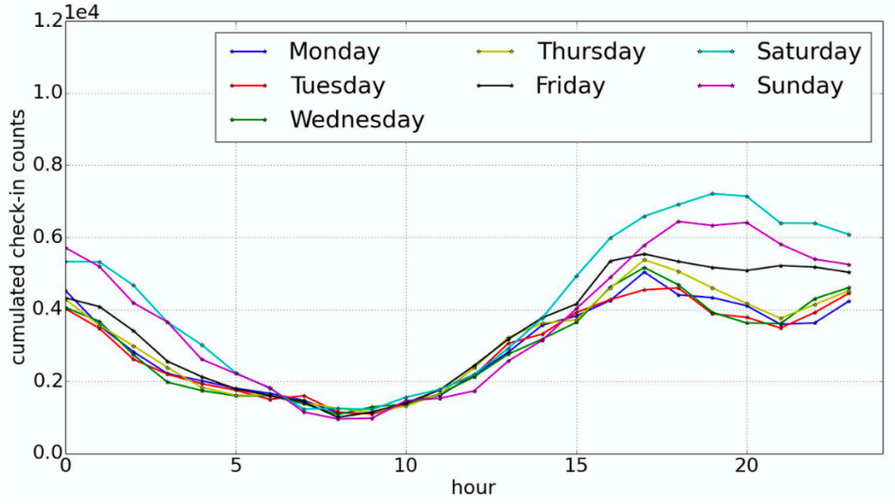
  ➡ Social relationships have limited effect on users, but cannot be ignored

Extracted from "*Fused Matrix Factorization with Geographical and Social Influence in Location-Based Social Networks*", Cheng et al., AAAI'12.

Temporal influence



(a) Foursquare



(b) Gowalla

Day of week check-in pattern at different hours

Extracted from "*Geo-Teaser: Geo-Temporal Sequential Embedding Rank for Point-of-Interest Recommendation*", Zhao et al., WWW'17.