De-Layering Social Networks by Shared Tastes of Friendships

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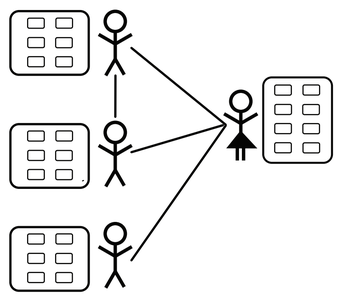
With the advent of big social networks, we observe social interactions as aggregates across different domains.

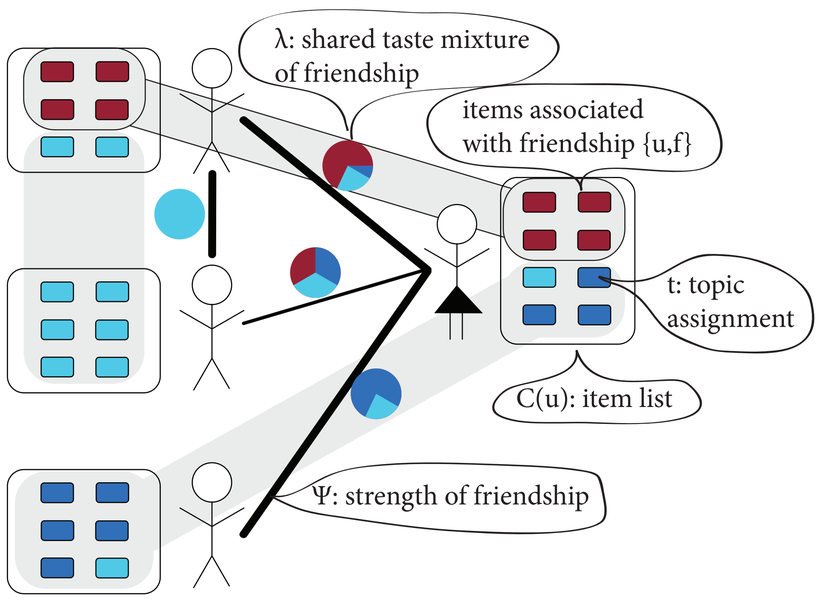
Issue: Community structure is dillute, needs to be recovered.
Goal: Partition edges into layers of shared taste.

Input Data:
- Aggregated social network (N, E).
- Aggregated vocabulary of items V.



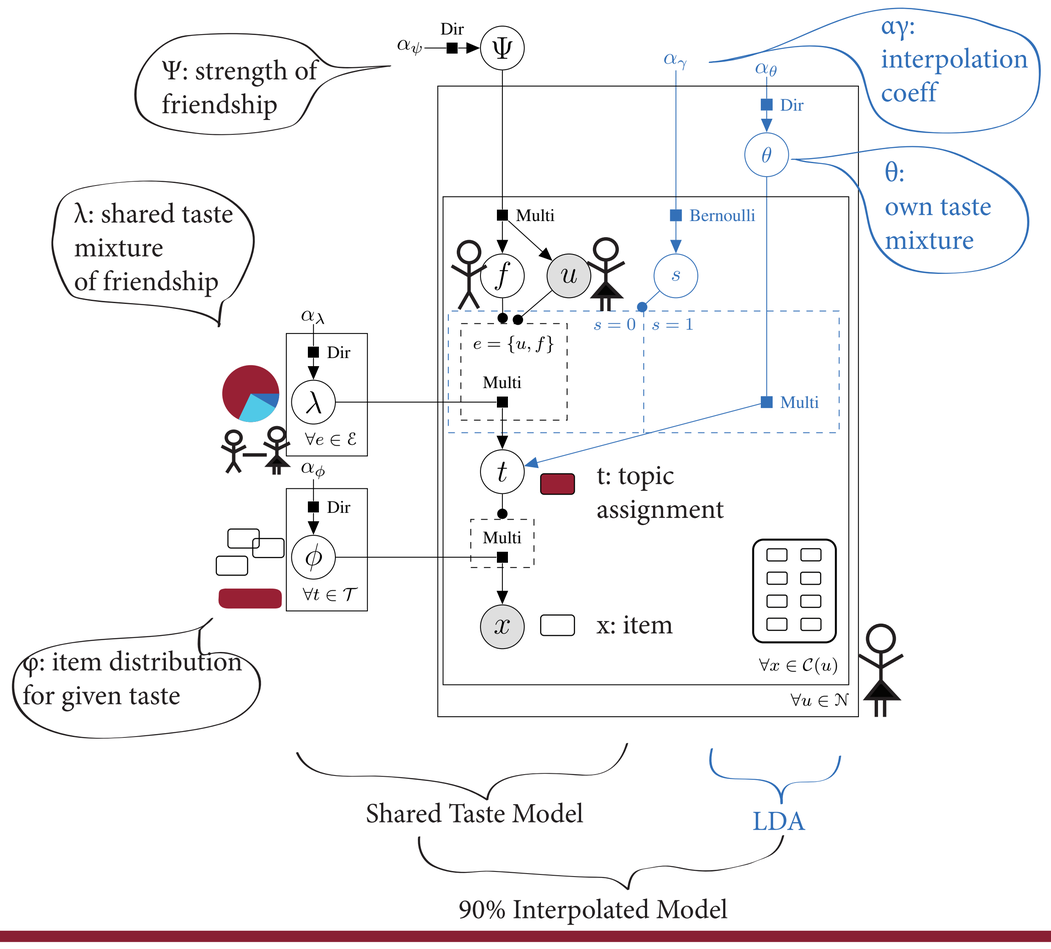
Shared Taste Model

download at http://cs.umass.edu/~dietz/delayer/



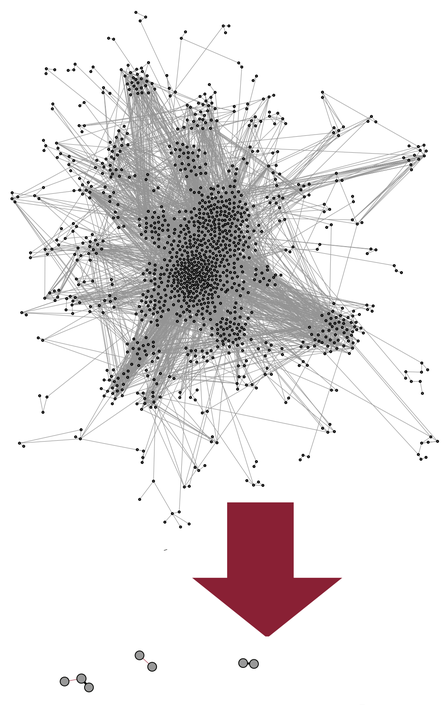
Jointly,
- Identify which items are of mutual interest.
- Learn topic model of shared tastes φ.
- Infer topic mixture λ for each friendship.

Result: Each taste represents one network layer.
λ induces soft assignment of edges to layers.



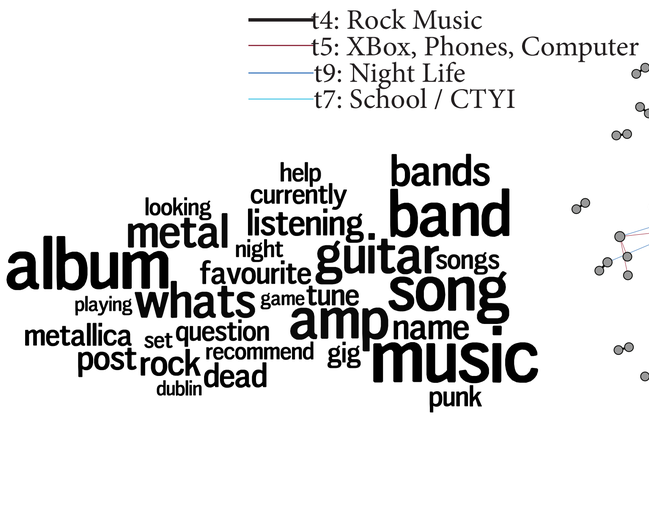
Data from Boards.ie

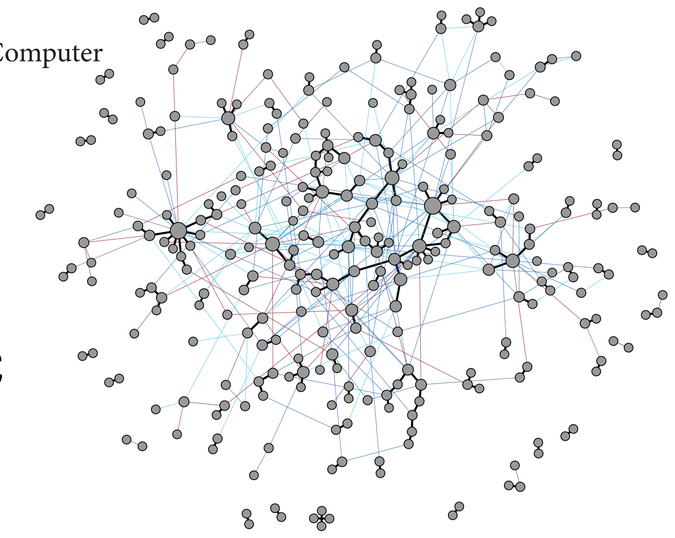
Input data from FOAF
1298 users having posts
4238 friendships.
Vocabulary of size 9022.
66015 items in total.
(Avg degree 6.49, diameter 11, avg cluster coeff 0.209)



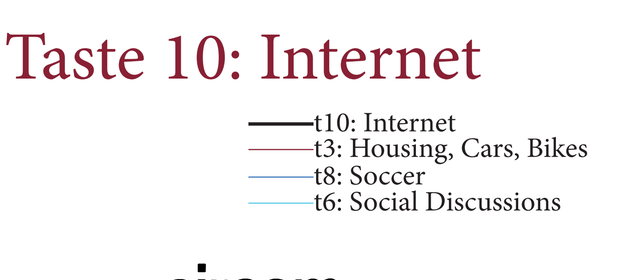
De-layer into 10 different tastes with 90%-shared taste model.

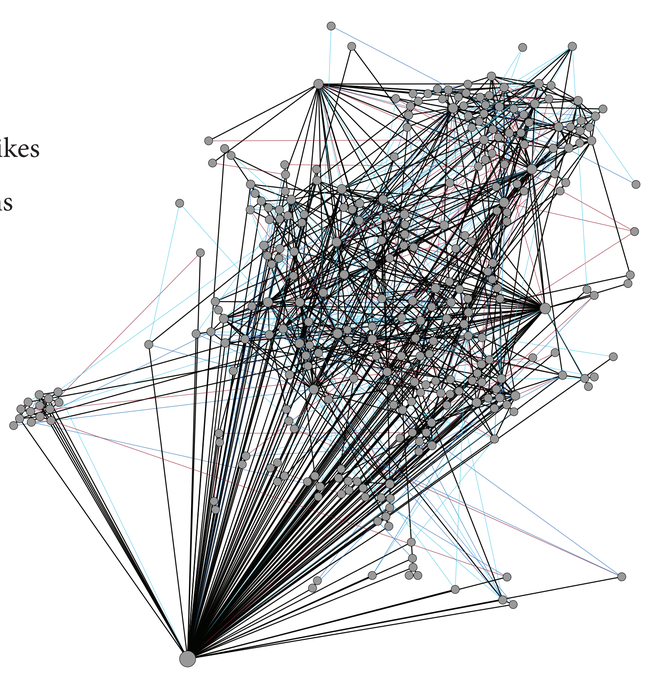
Taste 4: Rock Music



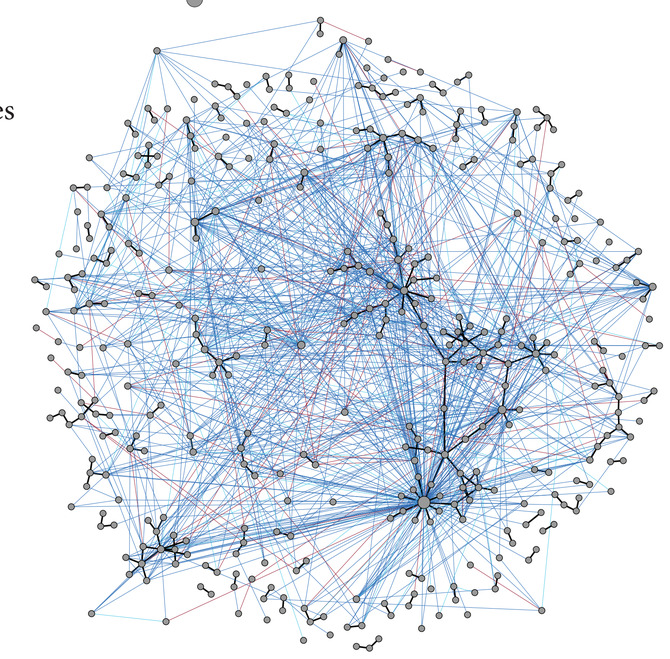


Taste 10: Internet





Taste 8: Soccer



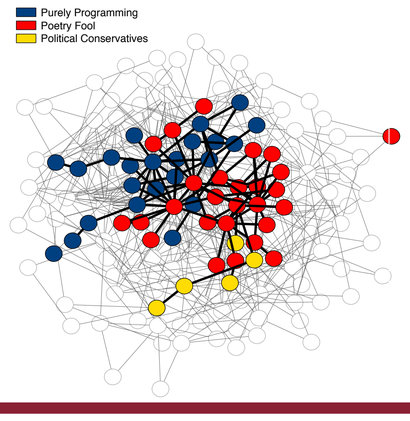
Scalability

Time per iteration: 110 seconds (on a 24 core computer).
Run for 1000 iterations. Memory footprint: 10 GB.

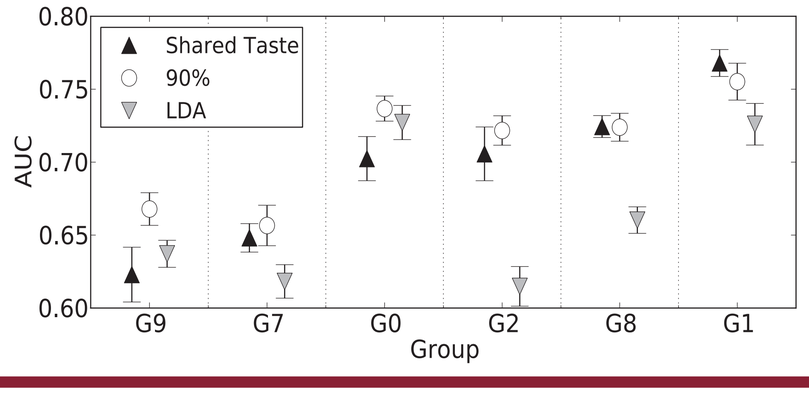
Data from LibraryThing

194 users
22539 items in total
20 topics

Held out:
10 user groups



Prediction of Group Membership via SVM



Group - Topic Pearson Correlation