

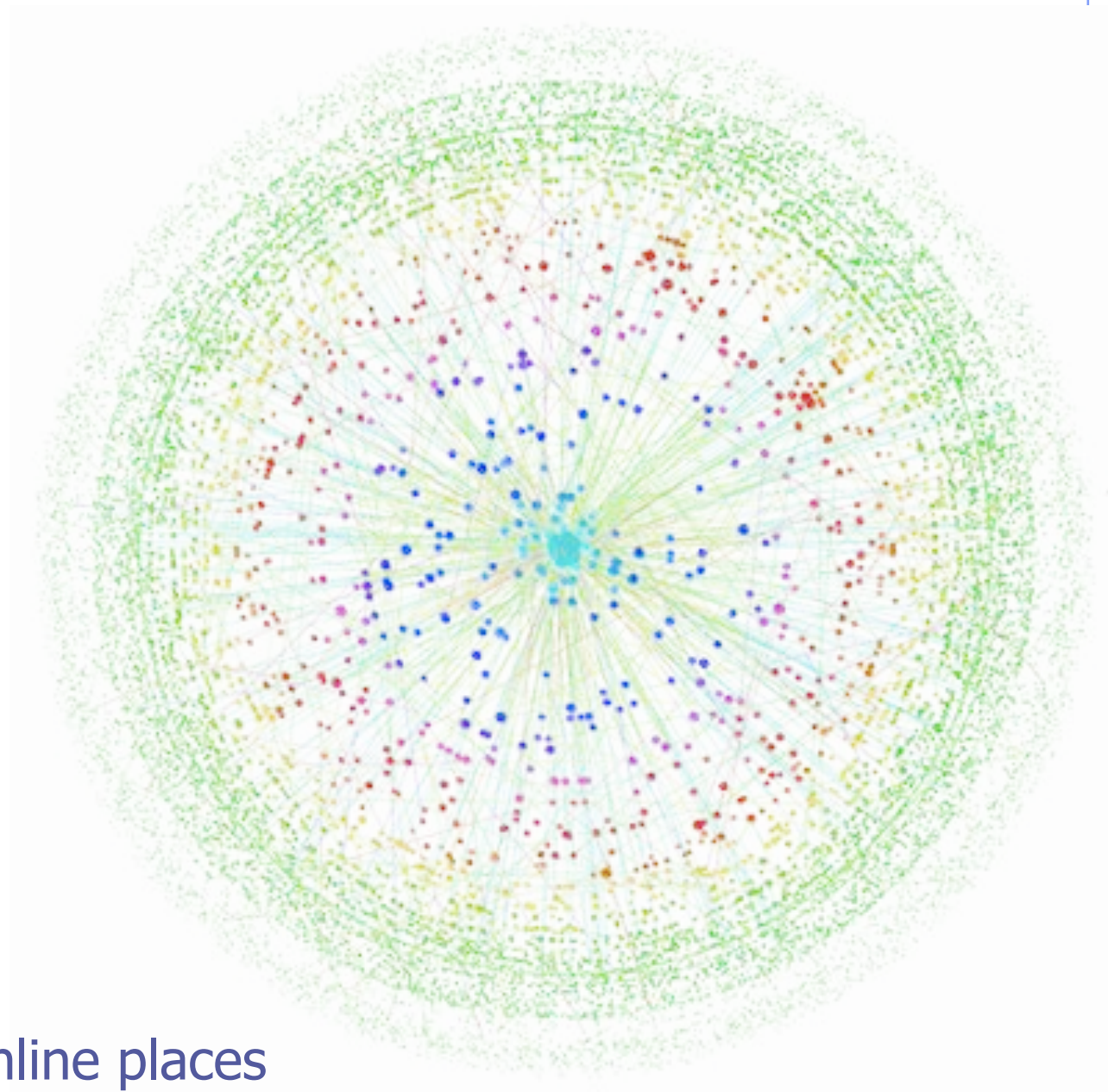


Learning Networks of Places and People Using Location Data

Tony Jebara

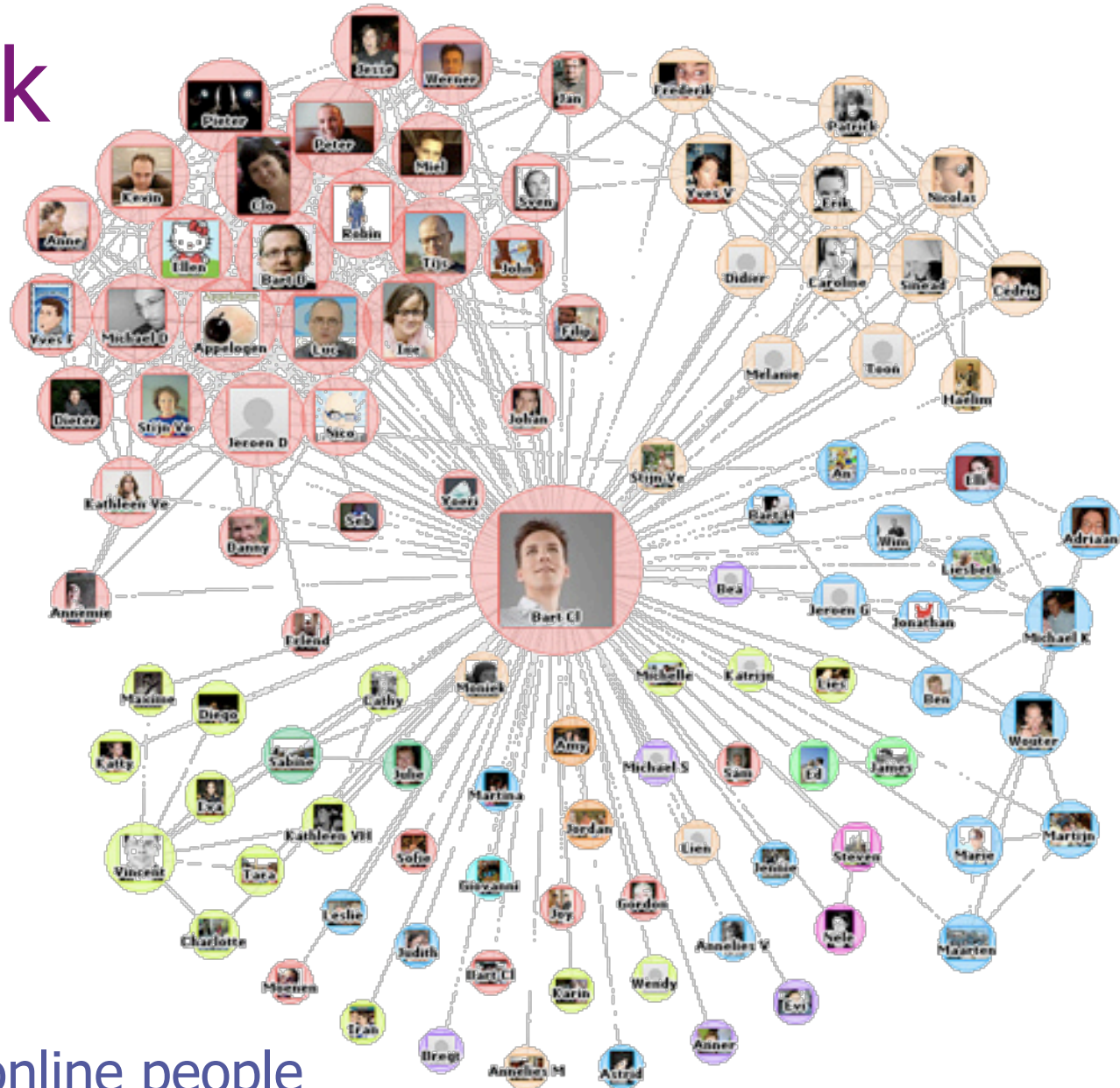
Sense Networks

WWW



A network of online places

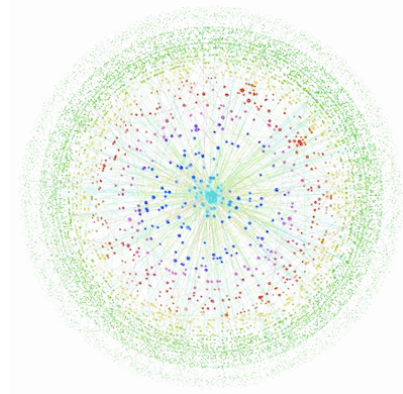
facebook



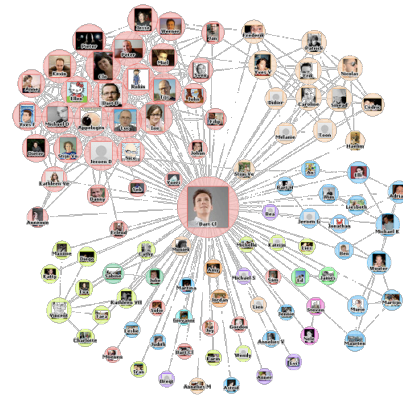
A network of online people

From online to real networks?

What's next?



a network of real places



a network of real people

Online data is easy to get, what about the real world?

From online to real networks?

What's next?



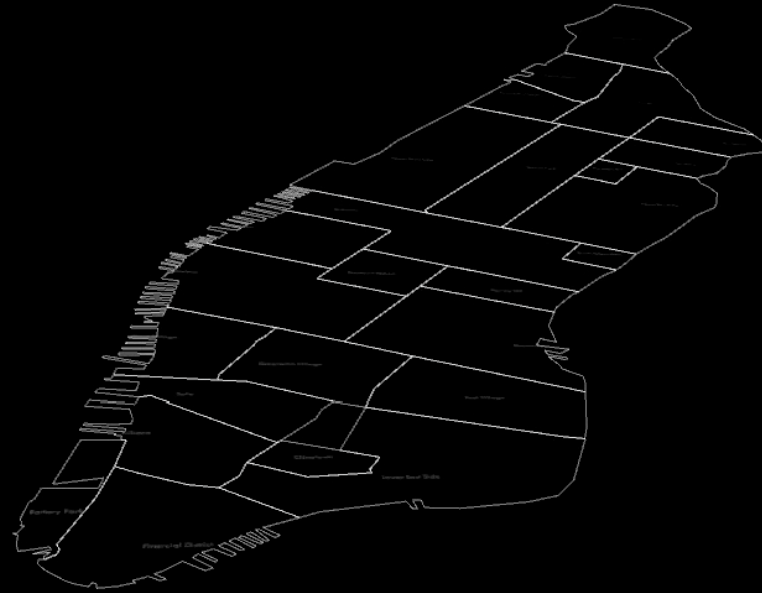
Online data is easy to get, what about the real world?

GPS and location data



GPS and location data





CitySense: where is everyone

- Citysense: real-time density of users at every street corner
- Poisson models find most active bars/restaurants

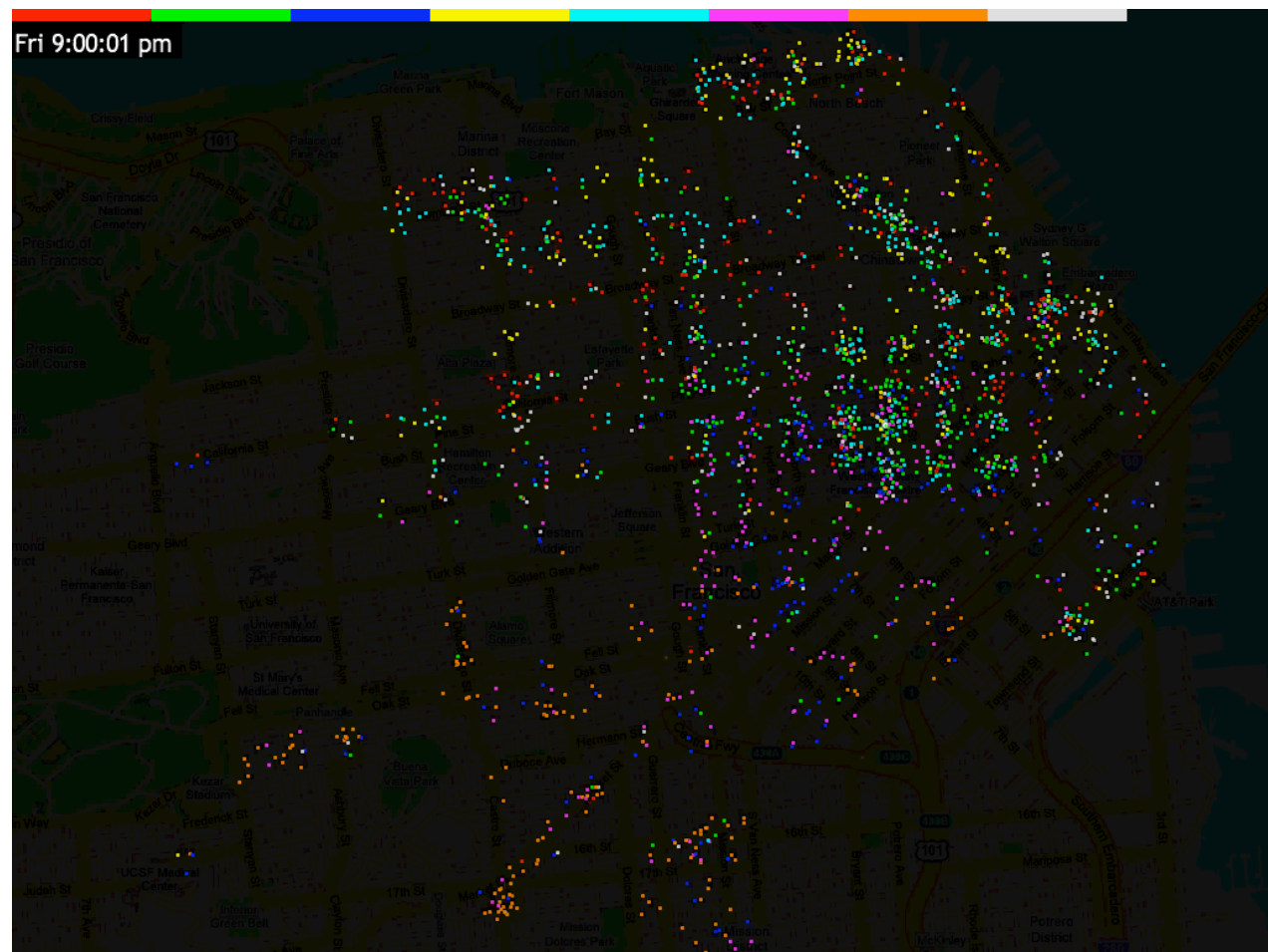


Next: where's everyone like me

Need to have a network of people

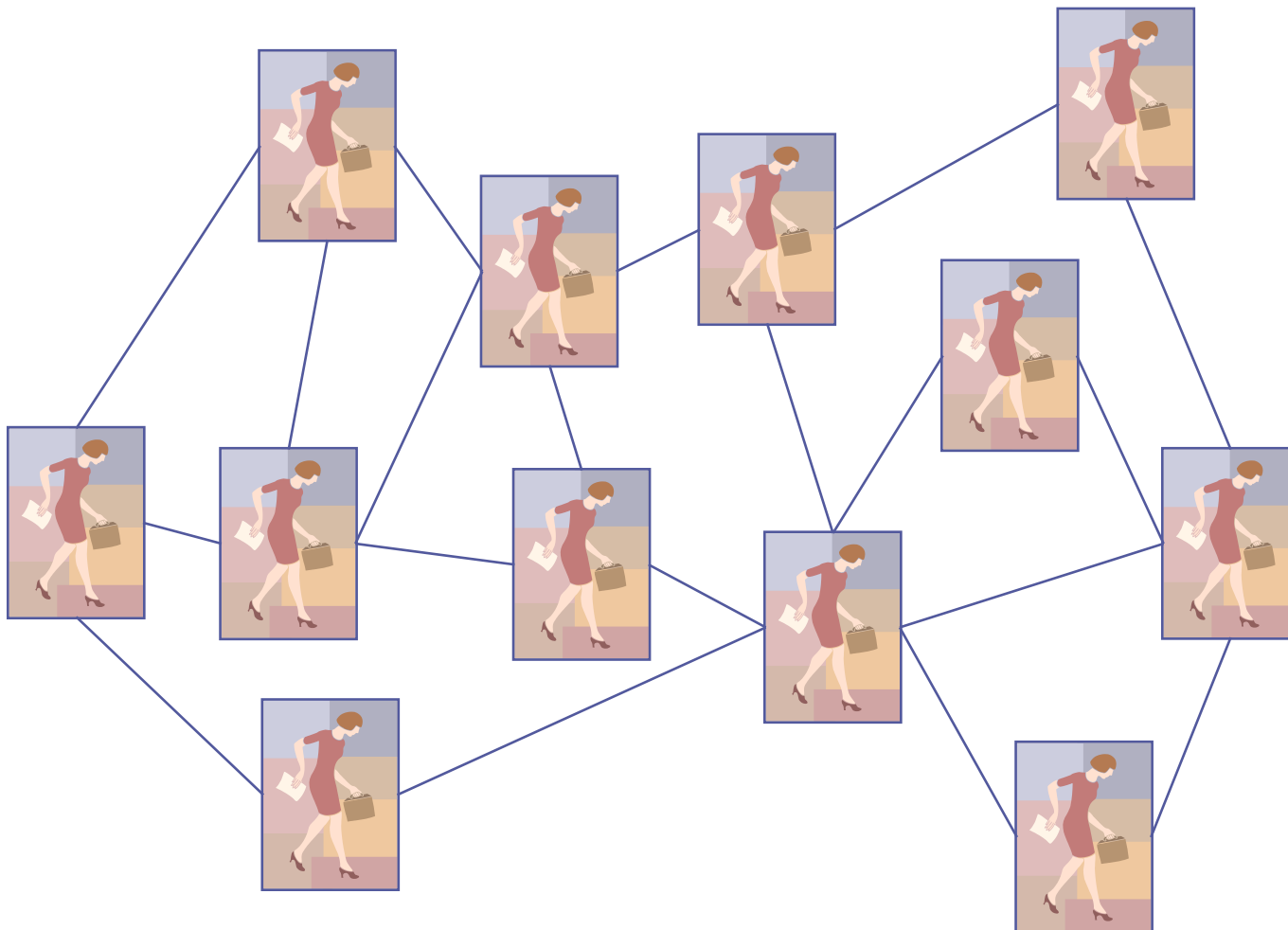
Each dot
is a user

Dot's color
is user's
social
cluster



Network of People

who is like whom? who colocates with whom?



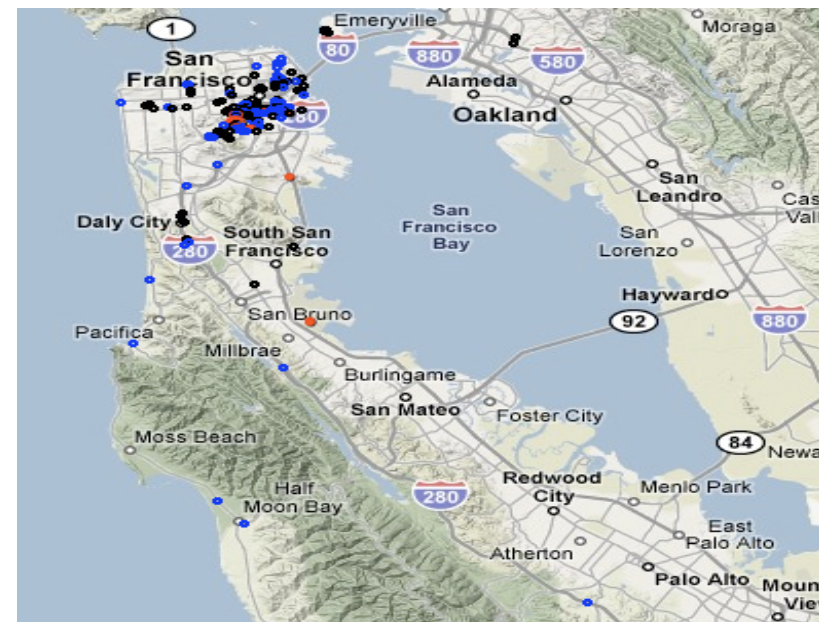
Network of People

Hard to say if User A is like User B...

User A



User B

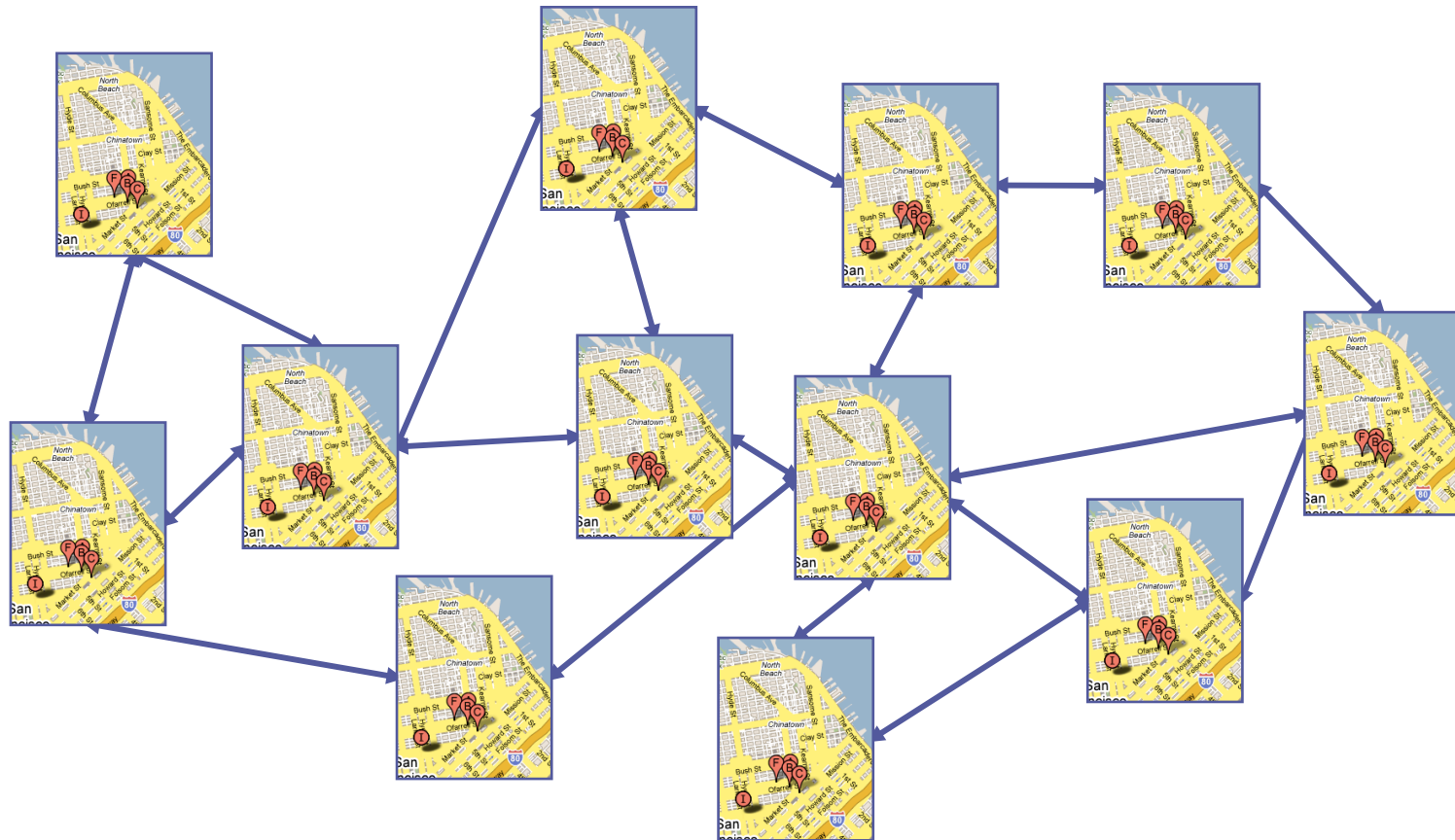


... don't just see if they colocate physically
... do they overlap semantically (network of places)

Network of Places

Is place A like place B?

Look at each place's Flow, Commerce & Demographics



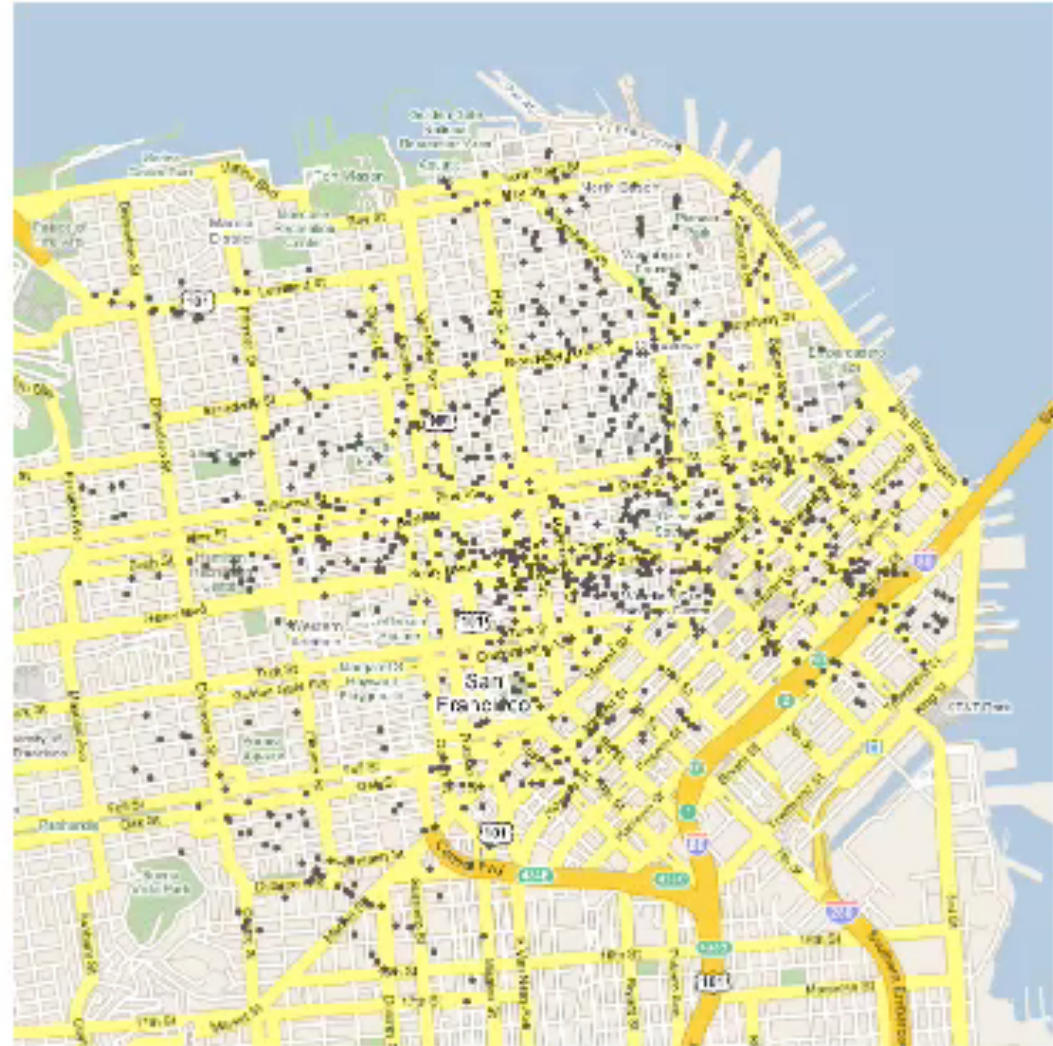
Network of Places: Flow

Look at flow A to B

Markov transition

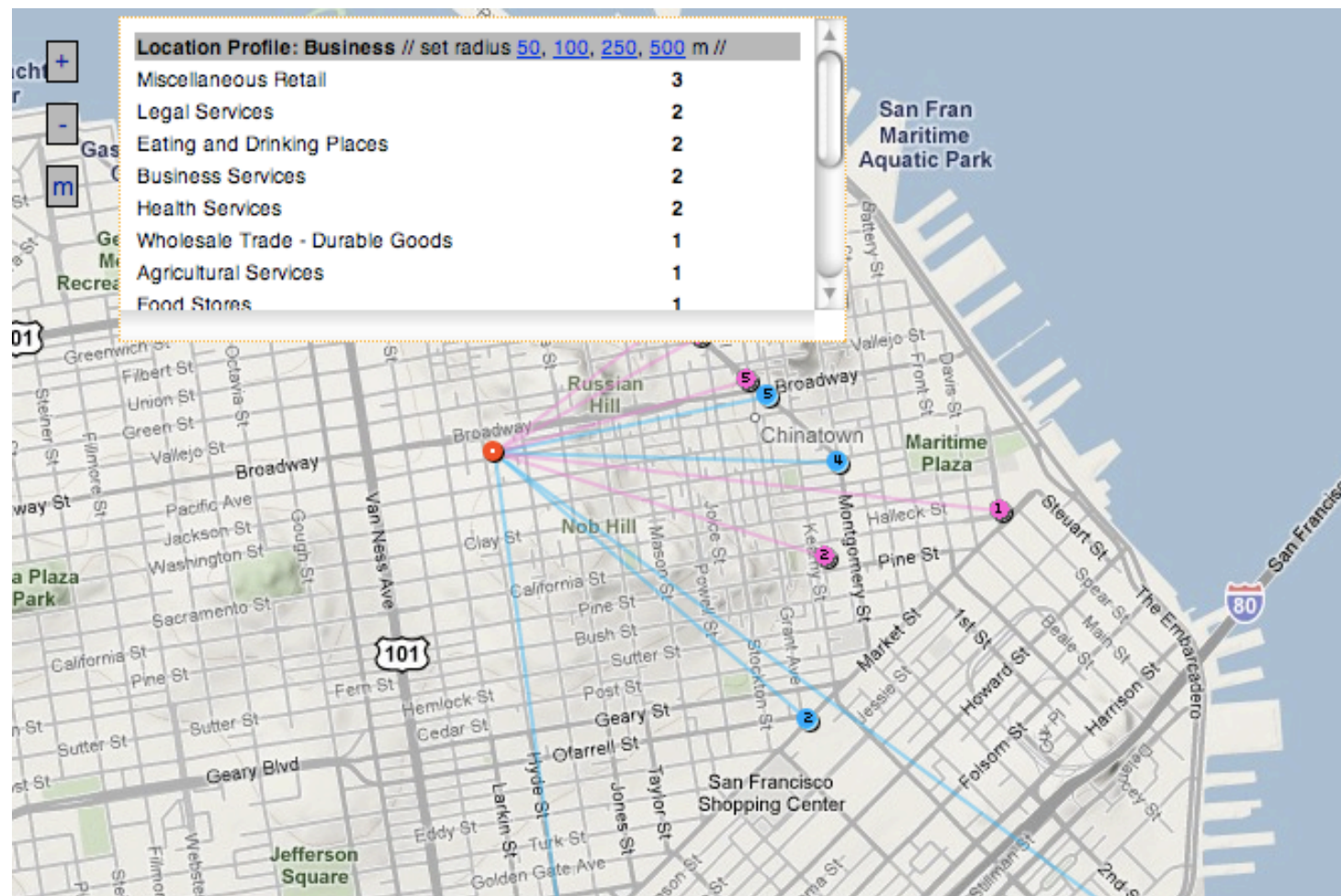
Minimum Volume
Embedding (MVE)

Color code clusters



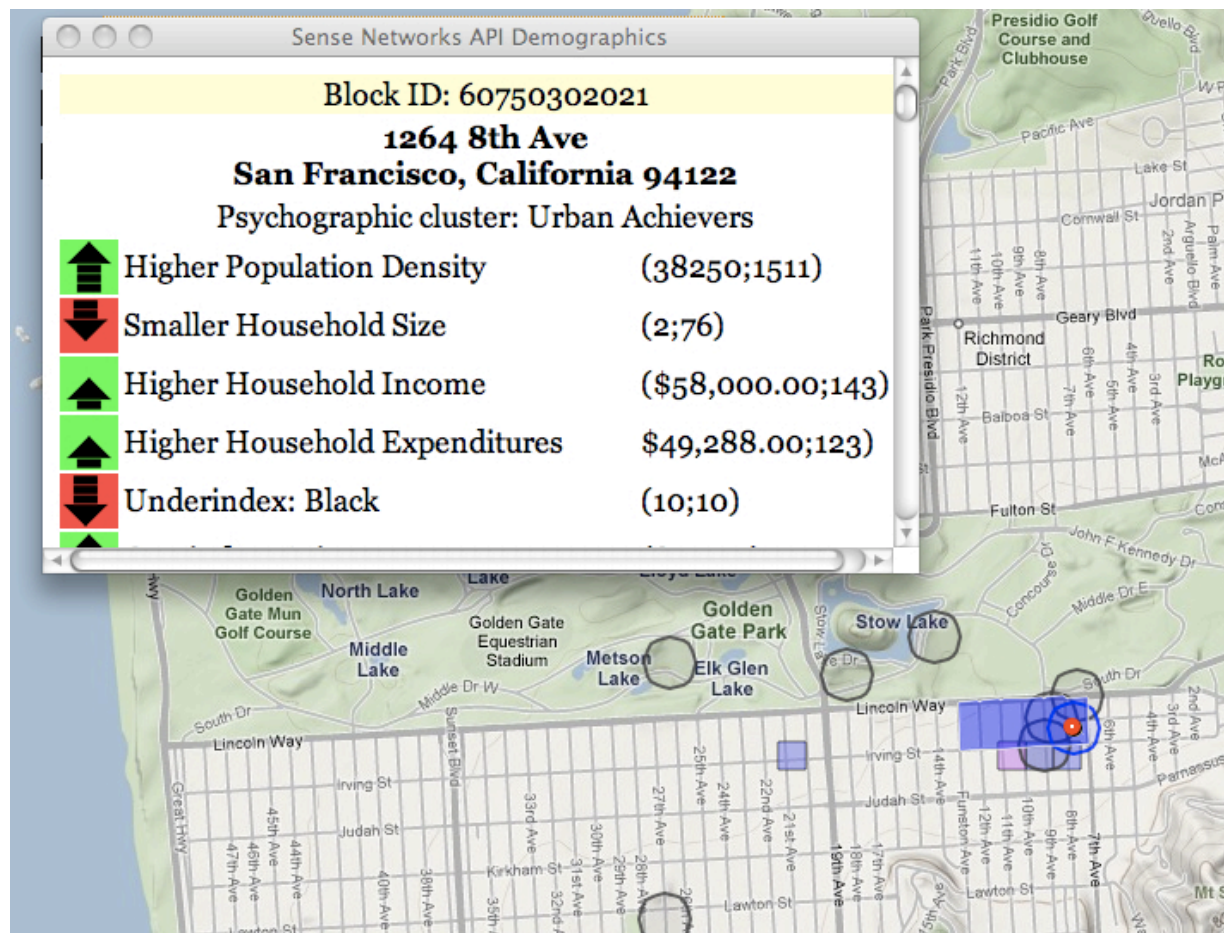
Network of Places: Commerce

Get each block's SIC (standard industrial categorization) code & cluster



Network of Places: Demographics

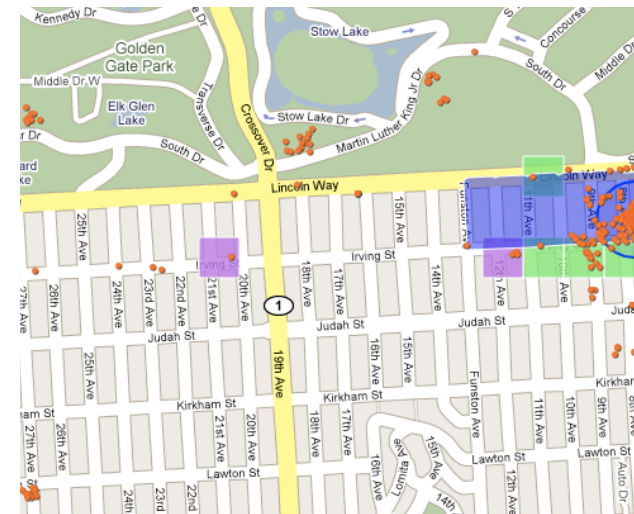
Get each block's census demographic data & cluster



Encoding people

For each user, convert GPS trail into matrix of probabilities for week hour probability of being in

- 1) flow cluster
- 2) sic cluster
- 3) demographic cluster



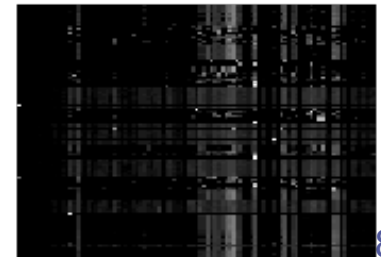
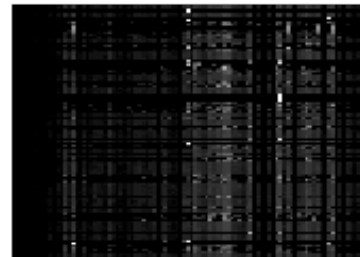
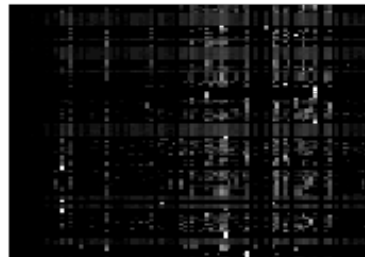
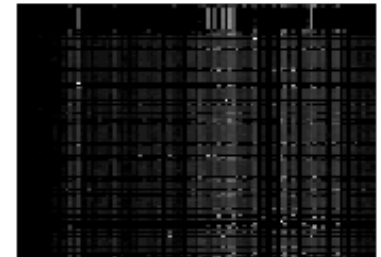
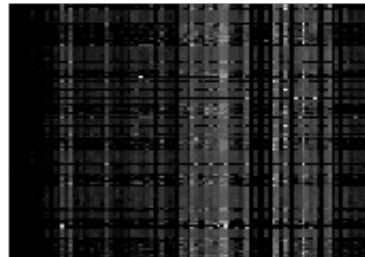
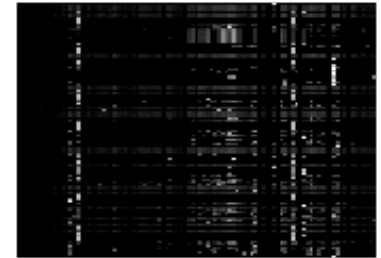
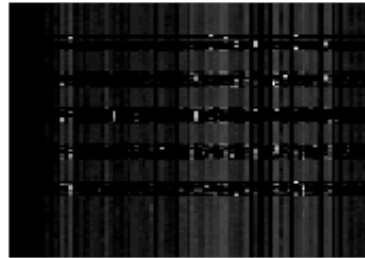
Week Hour	FLO 1	FLO 2	...	FLO 20	SIC 1	SIC 2	...	SIC 97	DEM 1	DEM 2	...	DEM 78
1	.03	.31		.14	.03	.05		.41	.11	.04		.01
2	.14	.34		.02	.04	.05		.52	.01	.01		.00
...												
168	.07	.34		.51	.02	.06		.48	.02	.01		.00

Encoding people

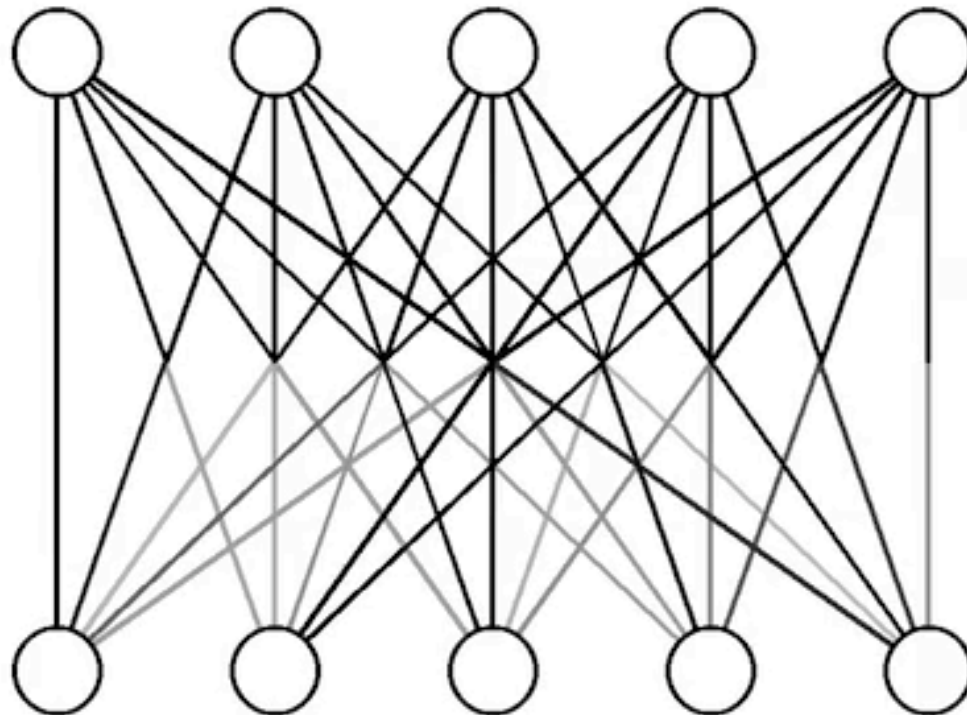
9 example users

compute
pair-wise
overlap
from
weekly
exposure
matrices

real friends
should
colocate!

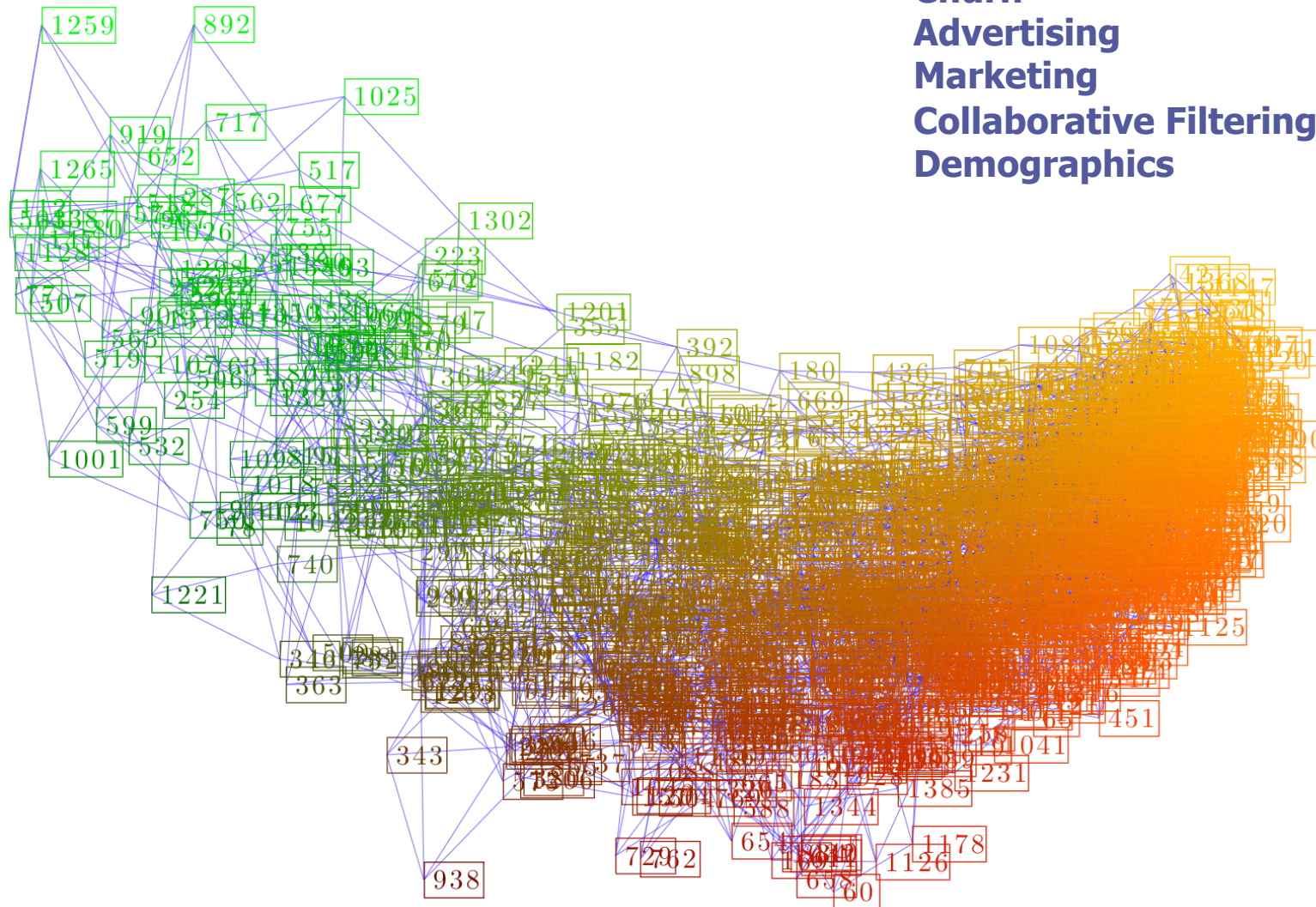


Connecting Similar People



Network of People

Churn
Advertising
Marketing
Collaborative Filtering
Demographics



Network of People → Tribes

How often do they go out each day of the week?

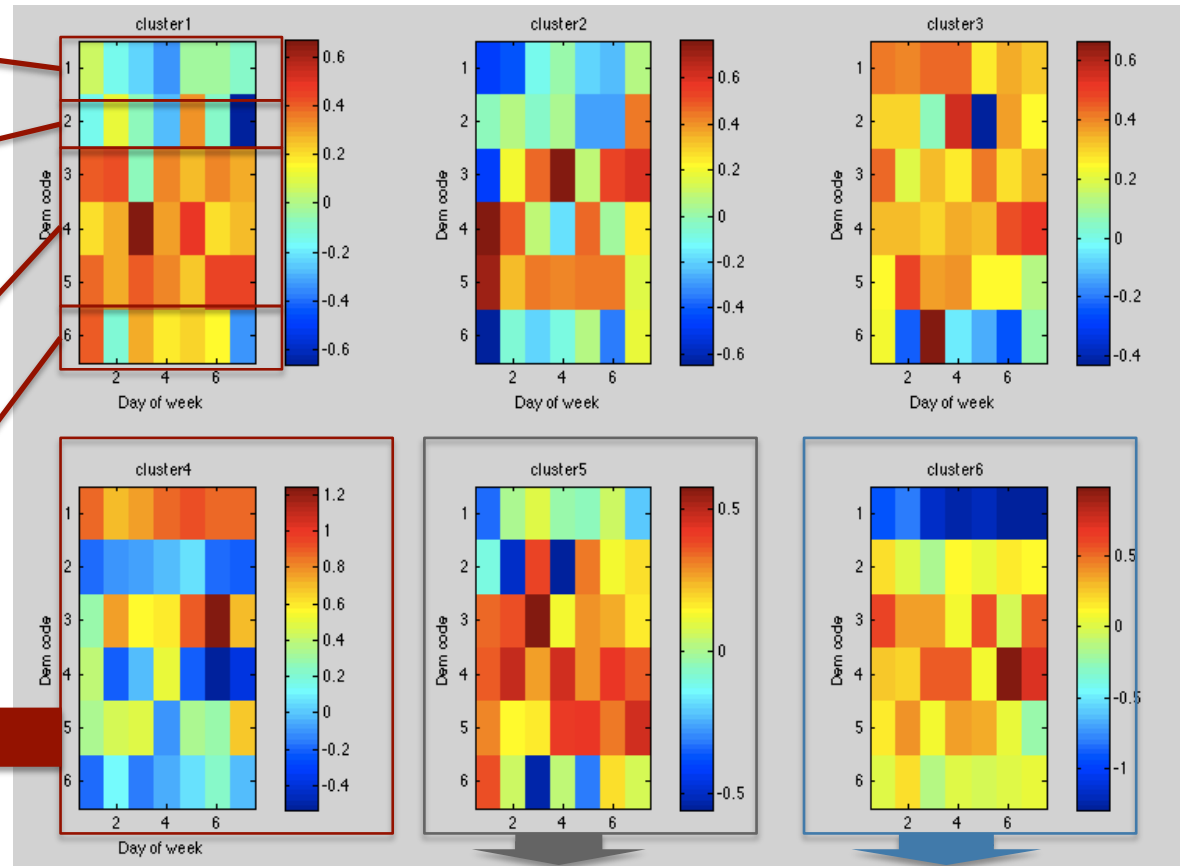
Where do they hang out?

What is the avg age of most people in the neighborhoods they spend time in?

How racially diverse are the neighborhoods they spend time in?

Are the places they spend time in rich neighborhoods or poor neighborhoods?

"Young & Edgy"
 • Out every night in young, racially diverse, low income neighborhoods

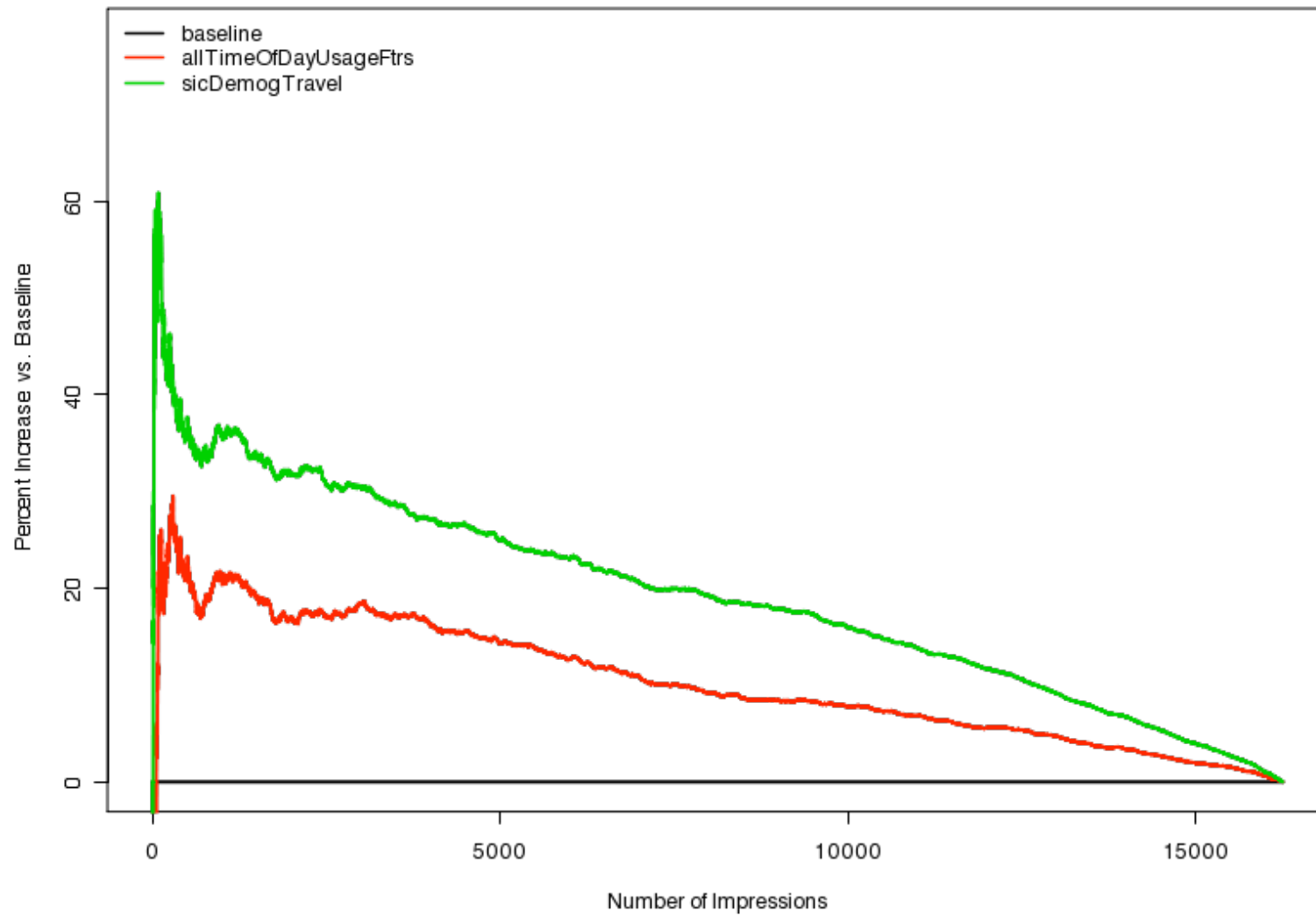


"Weekend Mole"
 • Out occasionally on weeknights, typically middle-aged, Latino, middle-income neighborhoods

"Mature Homebody"
 • Rarely goes out, typically spends nights in mature, white, higher income neighborhoods

Network of People Predictions

Percent Improvement



The Next Net

(Stephen Baker, BusinessWeek)

