egoSlider

Visual Analysis of Egocentric Network Evolution

Presented by:
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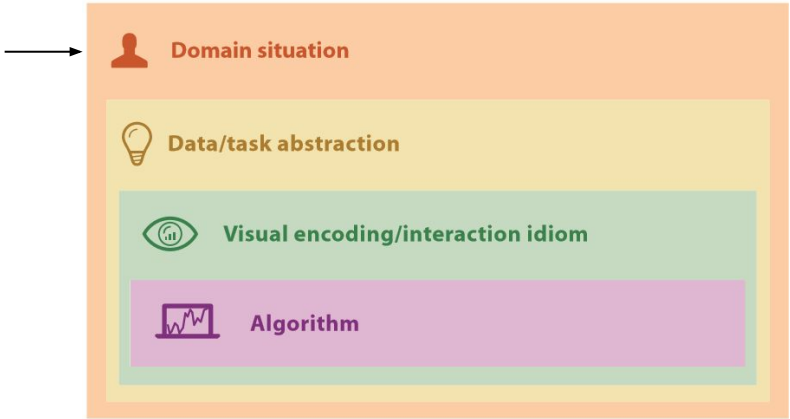
Why: Social Network Analysis

Egocentric-Networks represent relationships between a specific individual - the **ego** - and the people connected to it, known as - **alters**.

Why? Investigating information flows and people relationships.

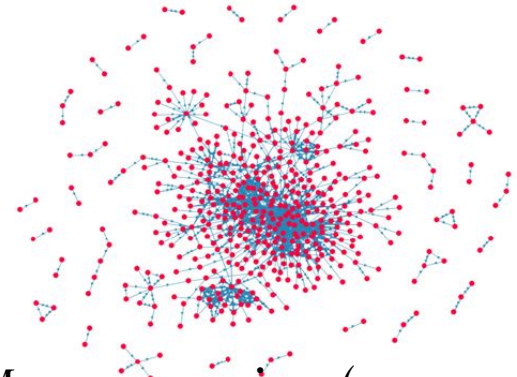
Understanding how networks evolve over time.



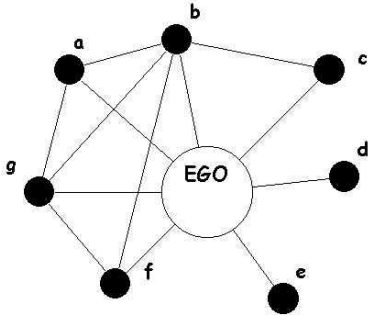
Why: Related Work

Most works focus on 1-level ego-net formed by ego and 1 degree alters. These do not capture the changes over time.

Idiom: Node-Link



Macro-overview (many ego's)



or Micro (1-ego + alters).

Why: Social Network Analysis

Need a new way to investigate correlations between topology of ego-nets and the ego's characteristics:

Structural Hole Theory: an individual may gain strategic advantages over others when his or her alters are highly seperated and have a relatively low connection density.

Romantic relationships between two people (ego's) can be recognized based on what extent that their mutual friends (alters) are well-connected.

Some Terms:

Tie Strength: Defined by the linear combination of time, emotional intensity, intimacy and reciprocity (i.e. mutuality).

Density: The proportion of direct ties in a network relative to the total number possible.

Structural holes: The absence of ties between two parts of a network. Finding and exploiting a structural hole can give an entrepreneur a competitive advantage.

Who?

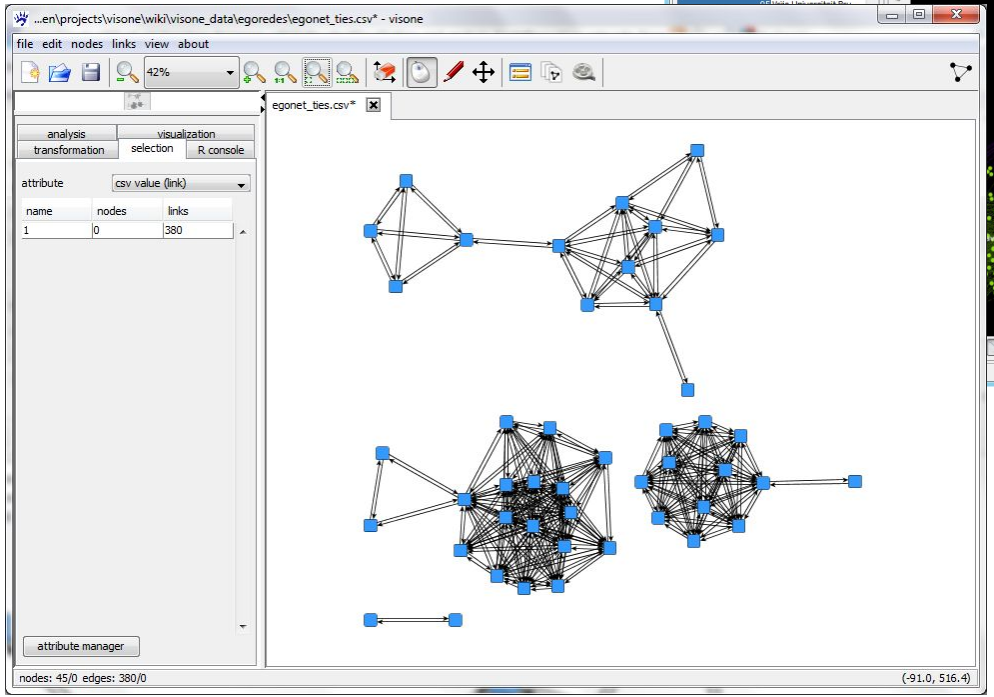
Social network analysis has emerged as a key technique in modern **sociology**.

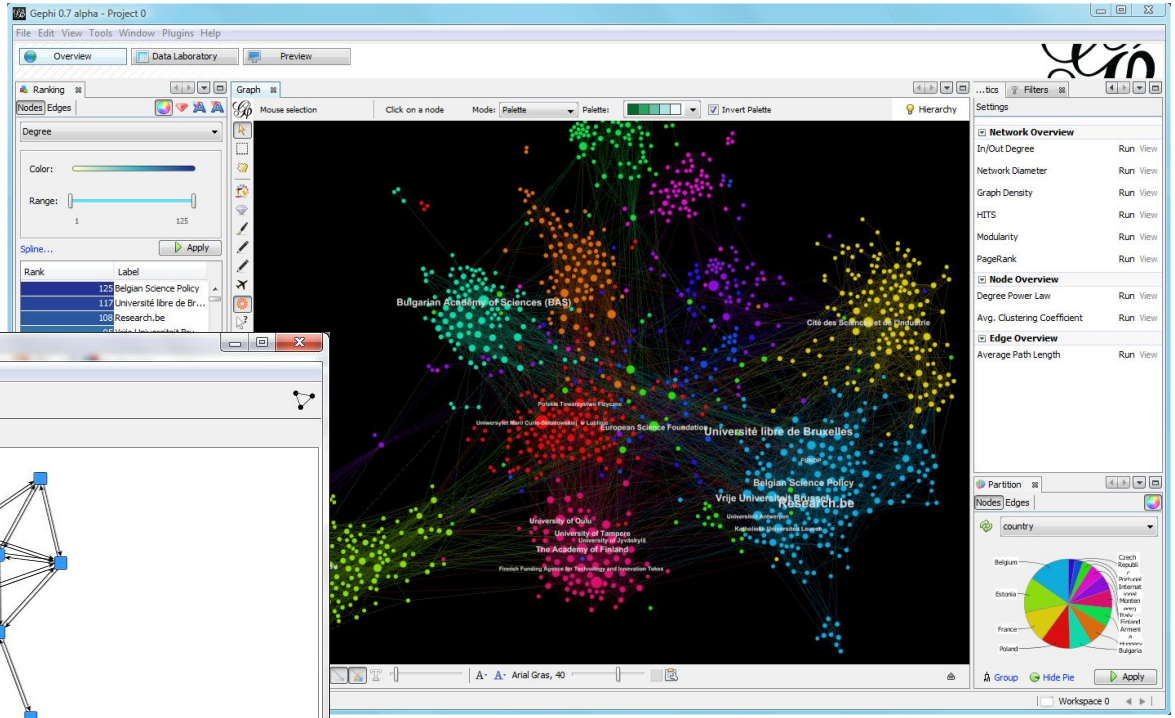
Also: anthropology, biology, communication studies, economics, geography, history, information science, organizational studies, political science, social psychology, development studies, sociolinguistics

Now commonly available as a consumer tool.

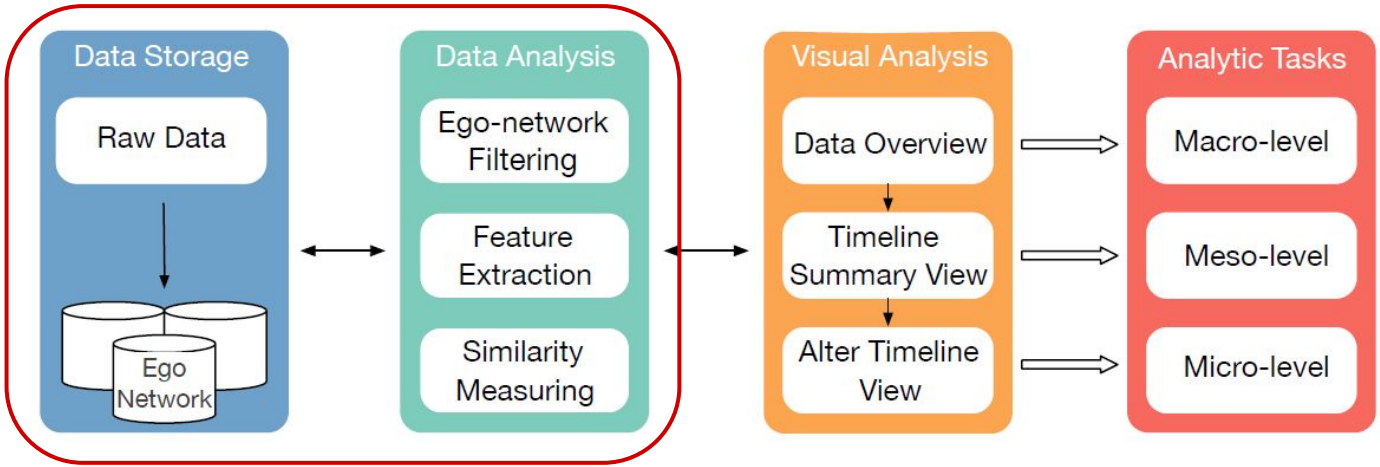
Other Tools:

EgoNet (below) Gephi(right)





What: Social Network Data



Extract ego-network structure from raw dataset such as citation networks.

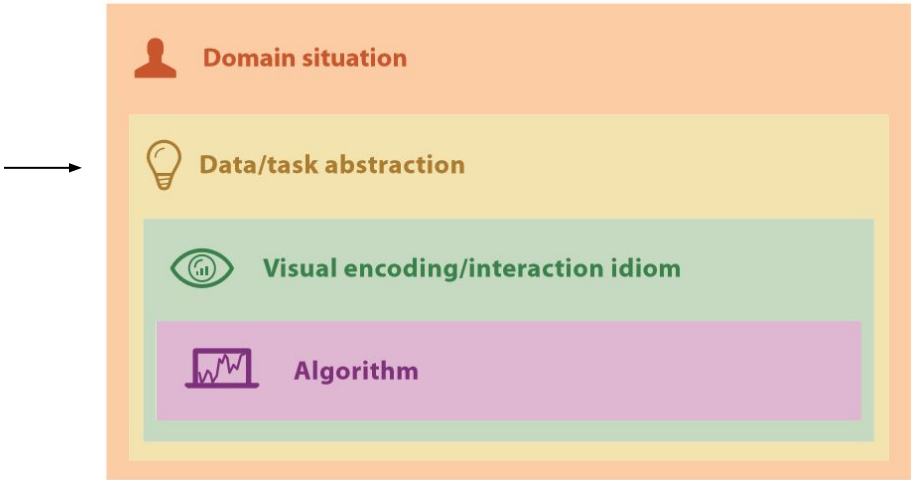
Filters and characterizes with features for measuring similarities.

What: Social(?) Networks

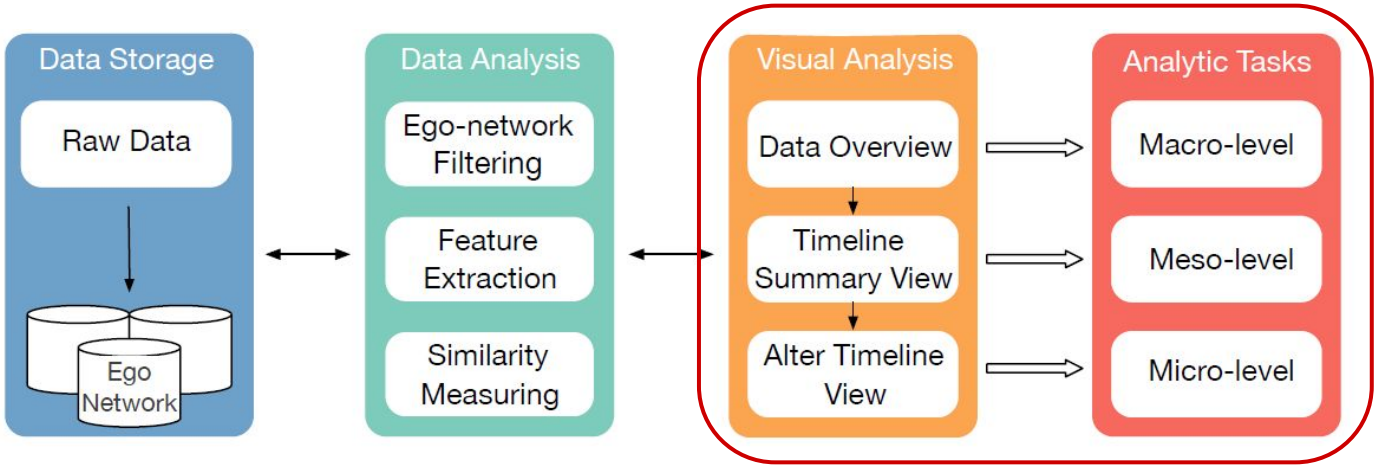
Data sourced from DBLP (computer science bibliography). Parsed and stored on MongoDB.

+52k papers on Info Viz - 64k authors

Also tested on Enron(!) emails.



How:



Angular JS and d3.

3 Views created each aimed at addressing specific questions.

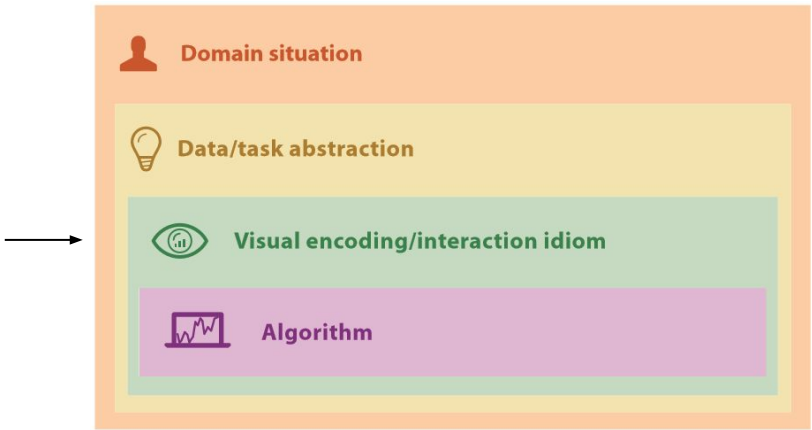
How:

Broken down into 3 seperate visualizations.

Data Overview: **Macroscopic** view of all Ego's

Timeline Summary View: **Mesoscopic** view for comparing the alter networks between different Ego's.

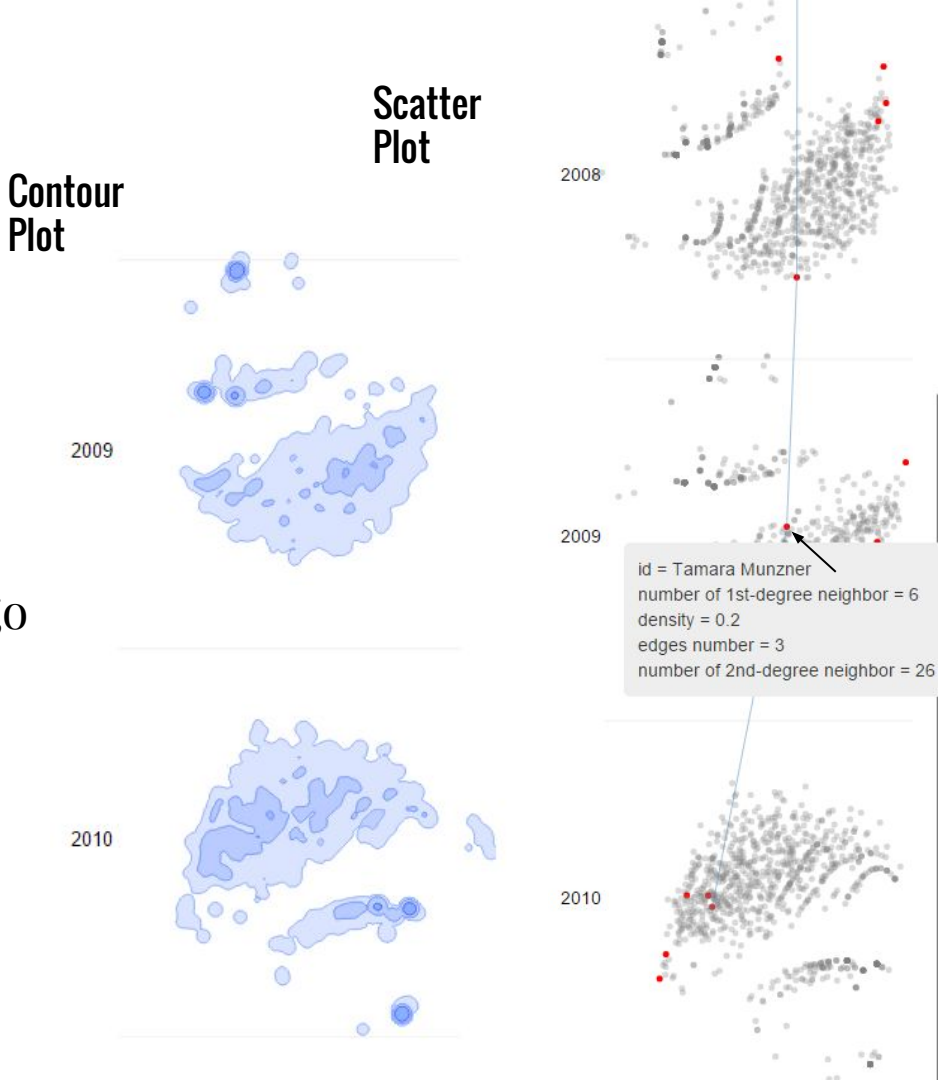
Alter Timeline View: **Microscopic** view for viewing an Ego's relationship with its alters.



Macroscopic Level:

Questions:

1. What are the overall patterns at each time step.
2. What are evolutionary trends of a large group of people's ego net's.



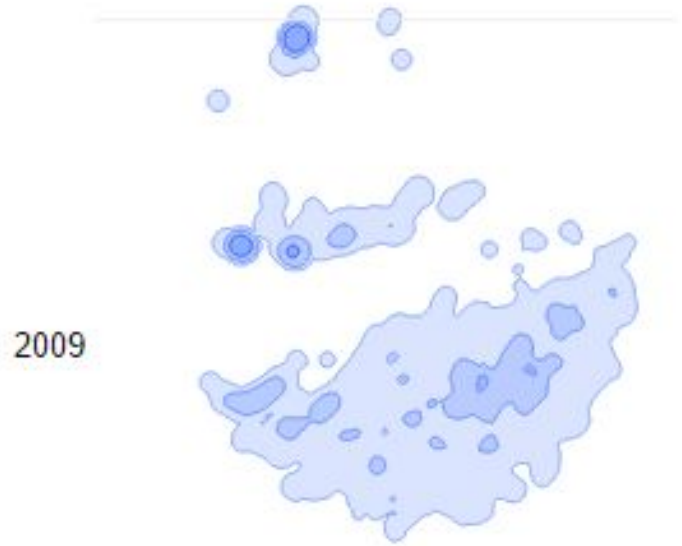
Macroscopic Level:

Clusters of Ego's, MDS layout

Idiom: Contour Plot

Encoding: the "elevations" are related to their number of alters

Doesn't do anything else.



Macroscopic Level:

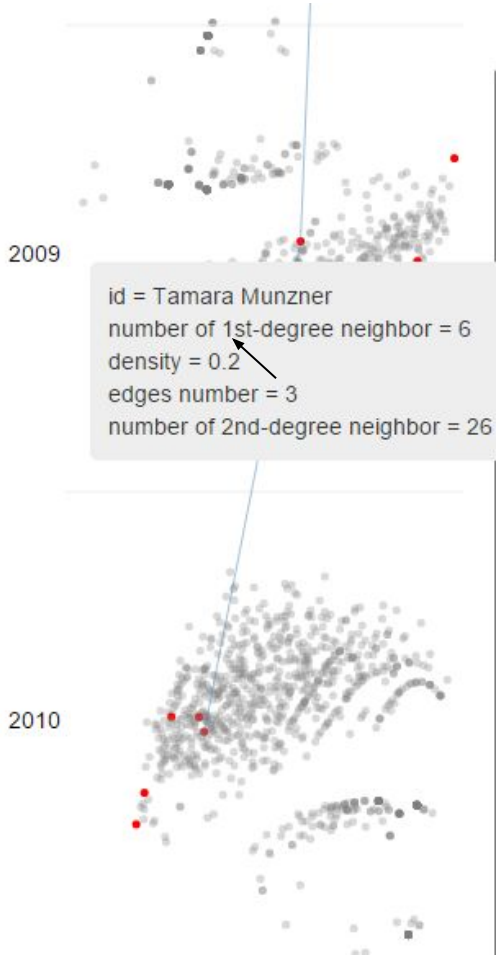
Where individual ego's exist within the clusters.

Idiom: Scatterplot, Manipulate (select/highlight), Small multiples for different years.

Encoding: Darker points have more connected alters.

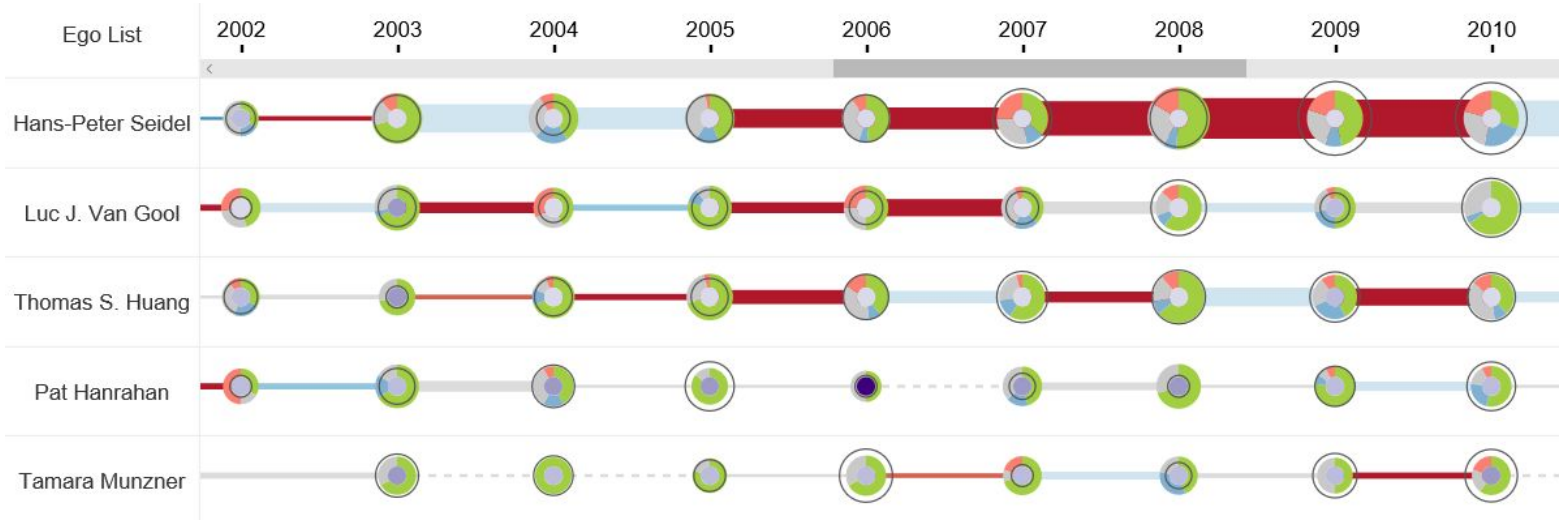
Red points are the Ego's selected for viewing in the Micro/Meso views.

Highlighting to show that Ego's place in the clusters over time.



Mesoscopic Level Questions:

1. What are general similarities between multiple people's ego net's over time?
2. Differences between multiple people's ego net's at a specific time-step?

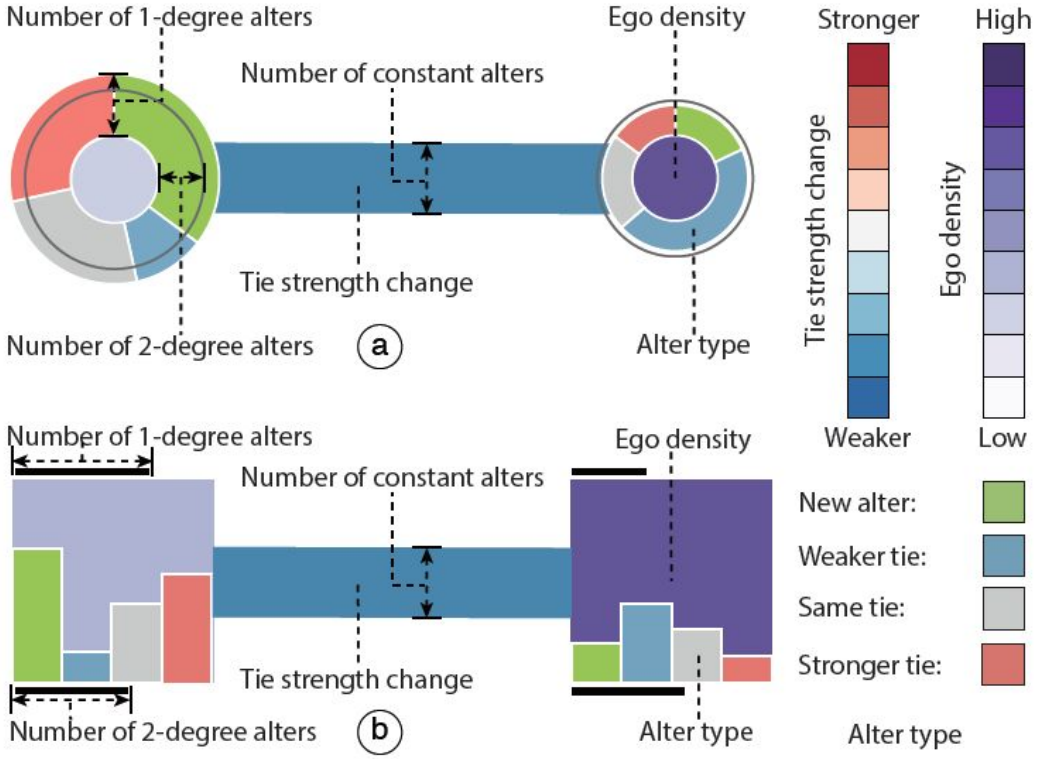


Mesoscopic View:

Idioms: Pie Charts, Bar Charts

Encoding: Colours, line widths.

a. Pie
b. Bar



Mesoscopic View:

Mousing over the pie chart.

Encoding: Red = Increase, Blue = Decrease

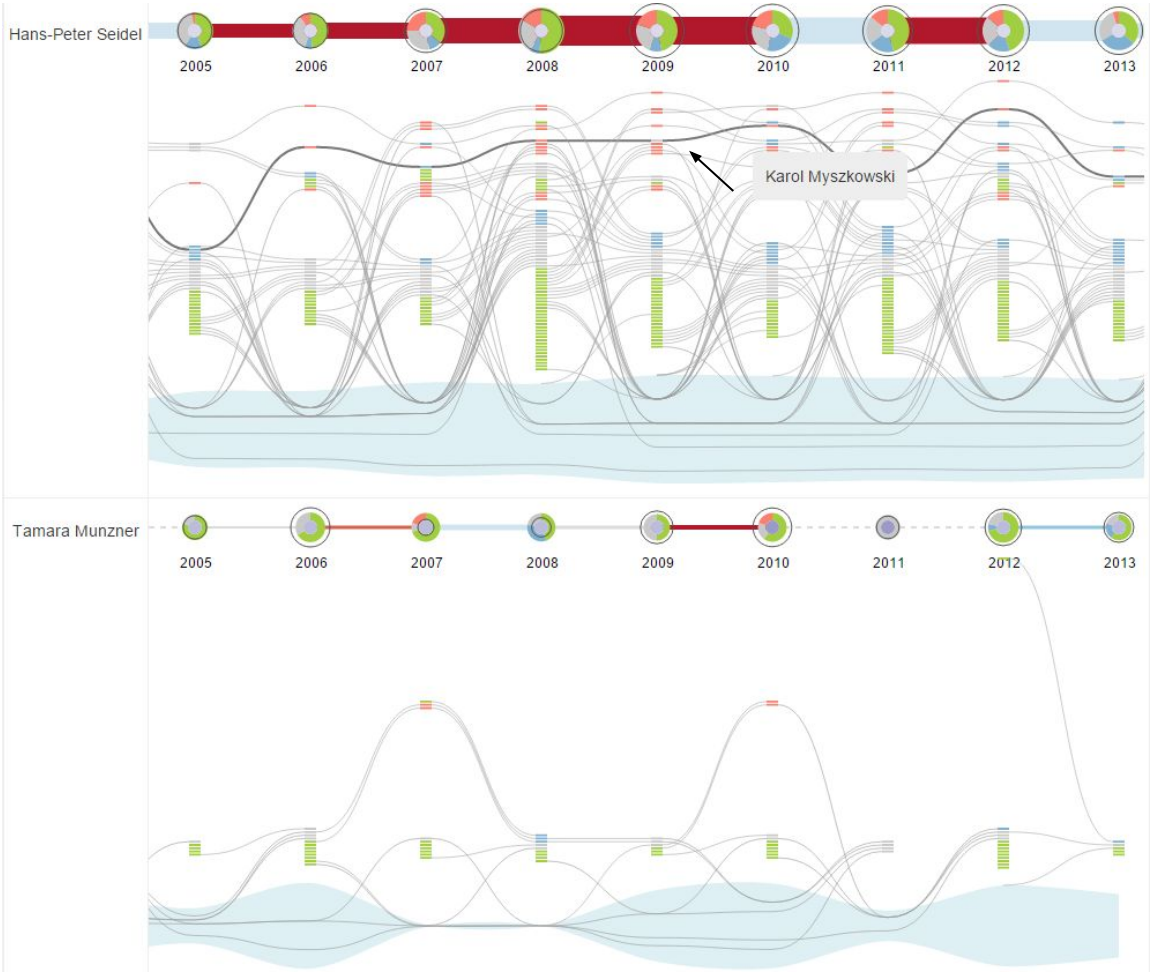
Mouse over centre of Pie = density.

Change View to Bar Chart

Microscopic View:

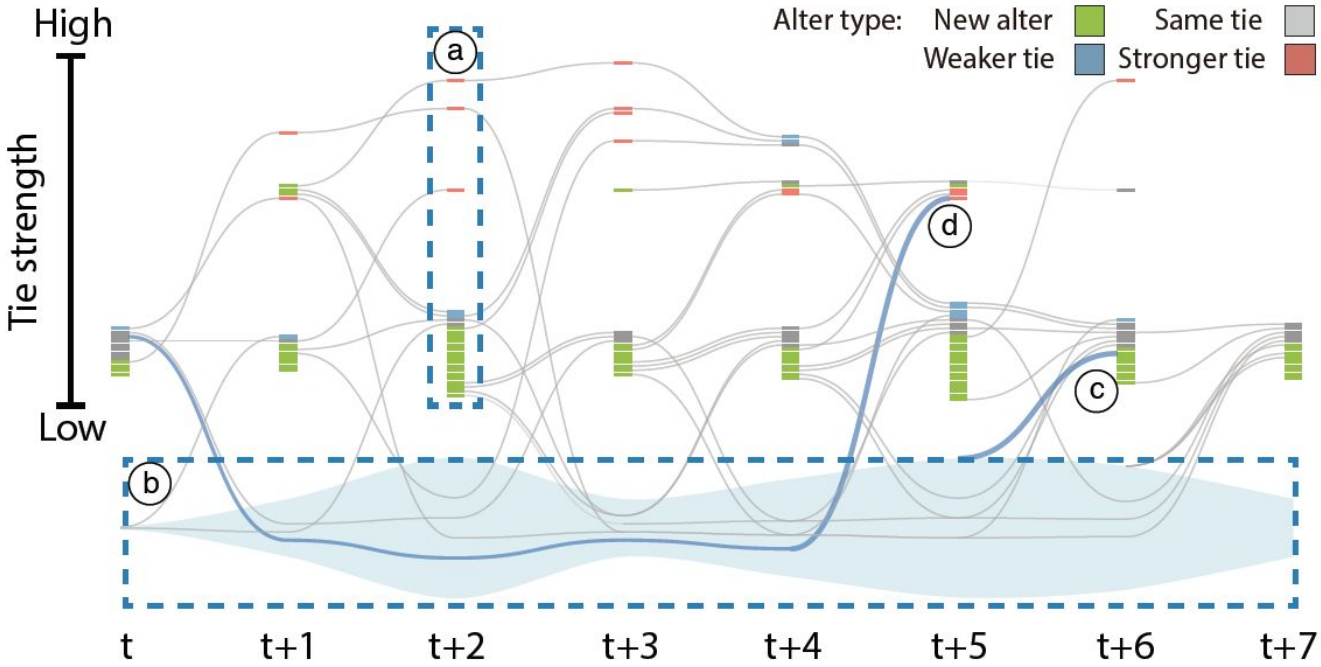
Questions:

1. How does the number of an ego's 1-2 degree alters change over time.
2. How do the tie strengths evolve.
3. How are the alters of an ego connected over time.



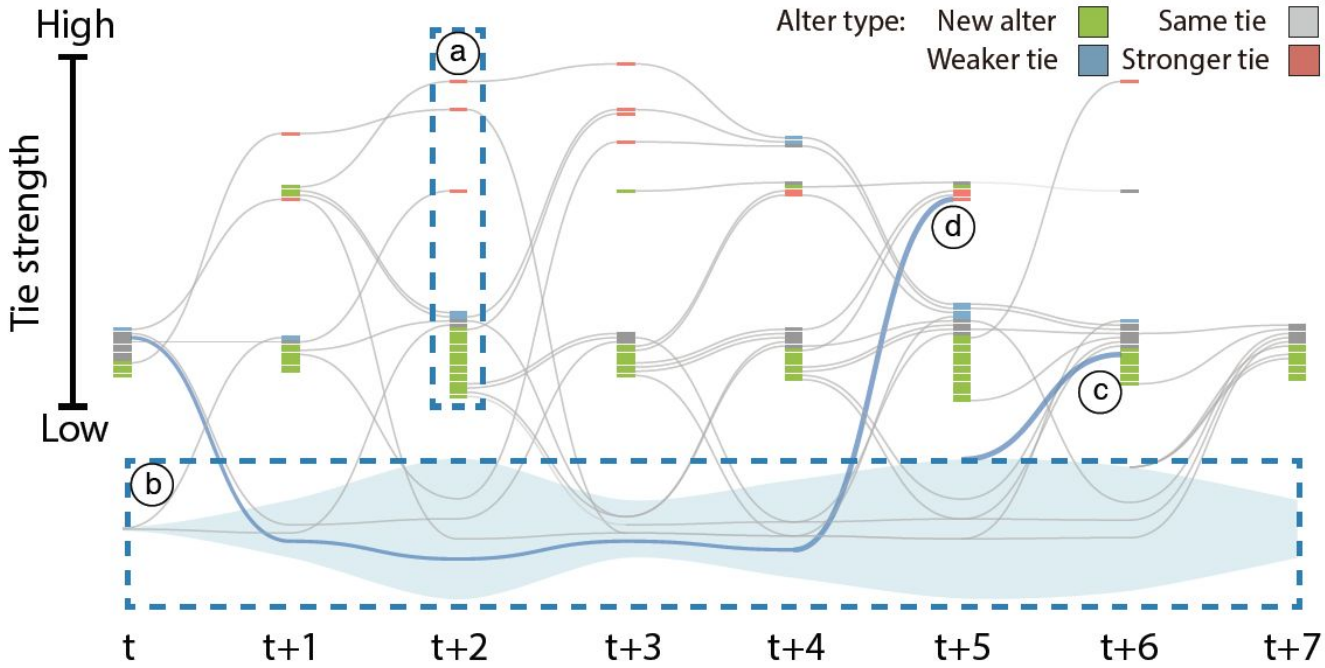
Microscopic View:

a. 1 degree alters
b. 2 degree alter volume flow.
c. A new 1 degree alter who was previously 2 degree.



Microscopic View:

d. Alter becomes ego's 2-degree neighbor - returns to 1 degree after several timesteps

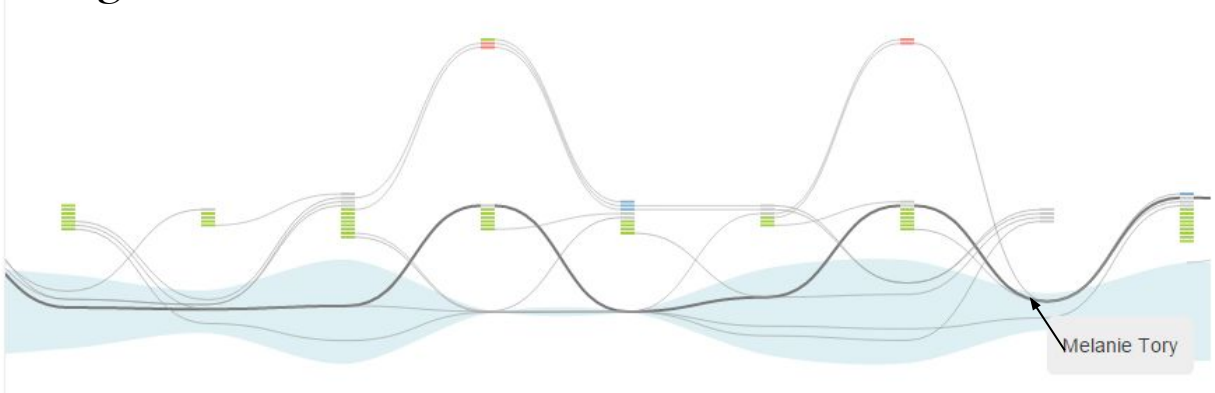


Microscopic View:

Can look at the an Ego's connection to their Alter's individually.

Encoding: Highlighting an individual alter on the micro view allows you to follow the Ego's connection to an alter over time.

Colour Encoding remains the same as other views.



Microscopic View: Encoding

Mousing over the pie chart will link to the alters on the view below (and make it larger)

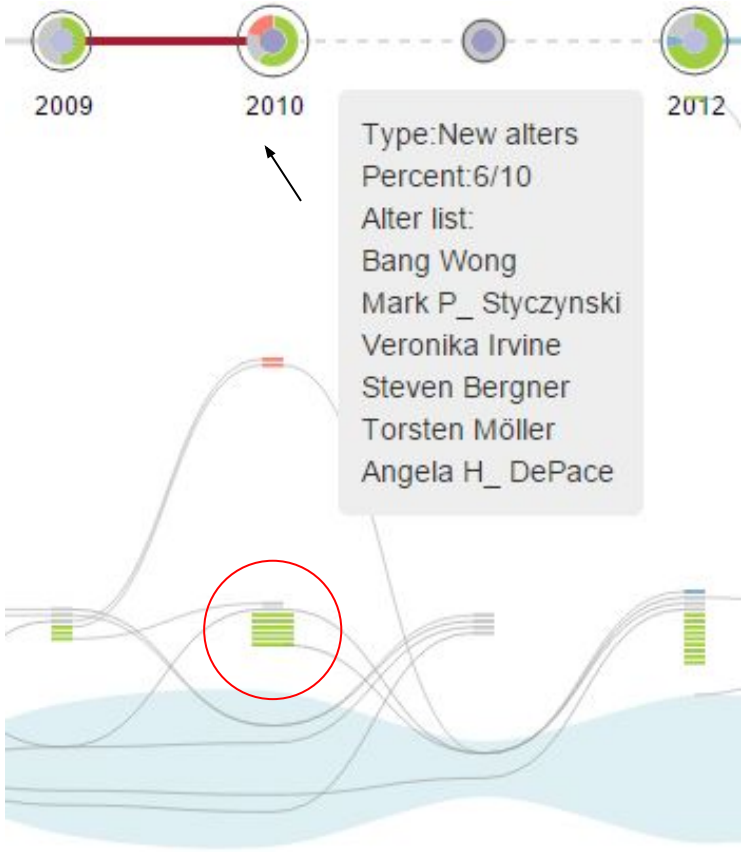
Encoding: Alter bar position is based on the tie strength.

New alter:

Weaker tie:

Same tie:

Stronger tie:



User Study:

15 students, 12 questions. Micro and Meso views only.

Baseline Viz: small multiples with Ego in the centre and alters around it (node-link).

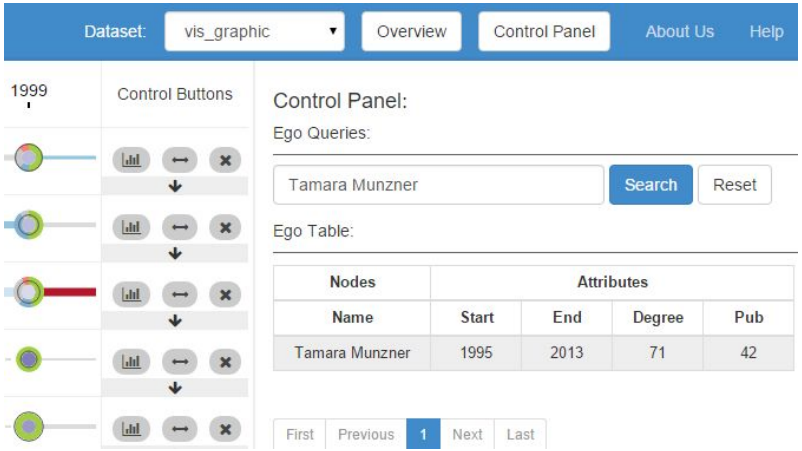
Accuracy: egoSlider: 92.5%, baseline: 83.6%

Time: egoSlider: 16.76s, baseline: 19.55s

Criticisms?

- Scale? Tested with up to 150 Alters. Would not work well with 500+
- Slow? There was no loading spinner so I thought it was broken.
- Visual overload with many ego's.
- Awkward UI.
- Big learning curve.
- No Instructions.

Overall I like it.



http://vis.cse.ust.hk/egoslider/

Questions?

egoSlider: Visual Analysis of Egocentric Network Evolution

by: Yanhong Wu, Naveen Pitipornvivat, Jian Zhao, Sixia Yang, Guowei Huang, and Huamin Qu