

SignLens : A Tool for Analyzing Polarized Social Relationship Based on Signed Graph Modeling

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- ① Background
- ② SignLens
- ③ Conclusion and More Information



① Background

② SignLens

③ Conclusion and More Information



- Social Interaction on the Web
 - The vast majority of online social network analysis focused on only **POSITIVE** relationships
 - However, what about the **NEGATIVE** ones ?
- Research Question:
 - When given such signed network, how to analyze these **Positive(+)** / **Negative(-)** links?



Figure: Common social media with signed links



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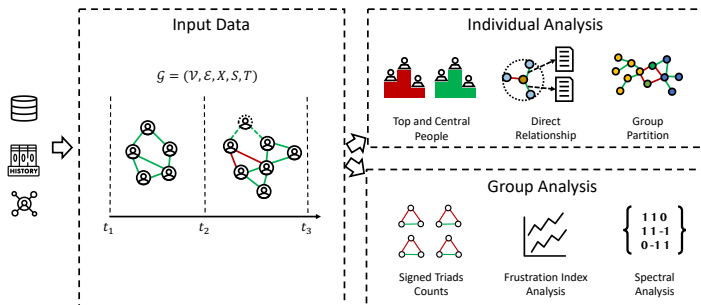


Figure: The illustration of the proposed SignLens . SignLens contains individual analysis and group analysis. The individual analysis will visualize the relationships between nodes that users focus on. Group analysis gives the measures of unbalance of a signed graph over time.

An Example of CBDB

- China Biographical Database Project (CBDB)
- Links: <https://projects.iq.harvard.edu/cbdb/home>
- Features:
 - ① China's historical biographical record
 - ② Contents available free of charge, without restriction, for academic use



Figure: The China Biographical Database is a freely accessible relational database with biographical information

Figure: Does Ouyang Xiu like Wang Anshi?



- Signed Temporal Graph $\mathcal{G} = (\mathcal{V}, \mathcal{E}, \mathcal{X}, S, T)$ as input, where $\mathcal{V} = \{v_i\}_{i=1}^{|\mathcal{V}|}$ is the set of nodes, $\mathcal{E} = \mathcal{E}^+ \cup \mathcal{E}^-$ is the edge list containing both positive (+) and negative (-) links, and \mathcal{X} is the features of nodes.
- For example, we support tsv files upload to input such Signed Temporal Graph.

The screenshot displays the SignLens web application interface. On the left is a navigation menu with items: Introduction, Data Input (highlighted), Individual Analysis, Group Analysis, and About This Project. The main content area is titled 'Data Input' and contains three upload boxes for 'EdgeList', 'Edgelnfo', and 'NodeInfo'. Each box has a folder icon and the text: 'Click or drag file to this area to upload. Support for a single file upload (please upload tsv file)'. Below these is a section for 'Signed Network Info' with a table of statistics:

Data Decription for cbdb		
#Node: 144,184	#Node in Graph: 33,429	#Edge Type: 451
#Positive Links: 144,184	#Negative Links: 4,875	%Negative Ratio: 0.033
Begin Time: 117	End Time: 195	

At the bottom of the interface, there is a footer with the text: 'Ant Design Pro Ant Design Copyright © 2021 Junglee Huang'.

Individual Analysis

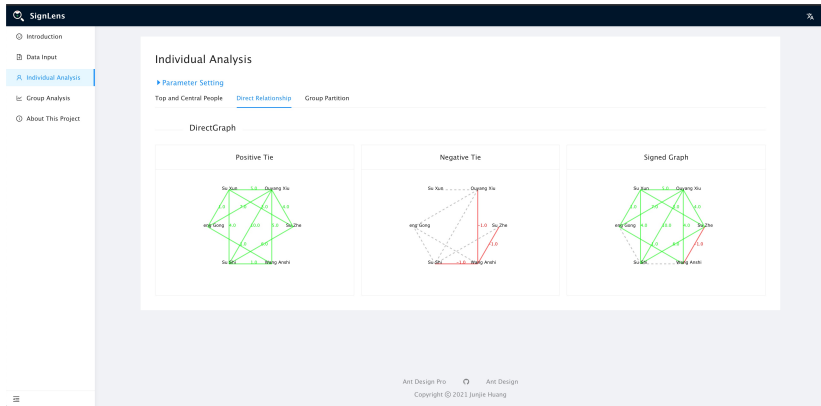
- **Top and Central People:** Who is the “Mr No”
- **Direct Relationship:** Does Su Shi hate Wang Anshi?
- **Group Partition:** What are their parties?

The screenshot shows the SignLens web application interface. The left sidebar contains navigation links: Introduction, Data Input, Individual Analysis (highlighted), Group Analysis, and About This Project. The main content area is titled "Individual Analysis" and includes a "Parameter Setting" section with a "Nodes" input field containing "Ouyang Xiu", "Su Xun", "Su Zhe", "Su Shi", "Wang Anshi", and "Zeng Gong". The "Depth" is set to 0, and the "Algorithm" is set to "Community Detection". Below this are "CONFIRM" and "RESET" buttons. Three tabs are visible: "Top and Central People" (selected), "Direct Relationship", and "Group Partition". Under "Top and Central People", there is a "Subgraph Info" section showing "#Node: 6", "#Positive tie: 3", and "#Negative tie: 75". Below that is a "Centrality of Given People" table.

EngName	ChName	PersonID	Degree Centrality	Betweenness Centrality	Closeness Centrality	Eigenvector Centrality
Ouyang Xiu	歐陽修	1384	0.022	0.046	0.362	0.135
Su Zhe	蘇軾	1493	0.007	0.009	0.338	0.07
Wang Anshi	王安石	1762	0.025	0.054	0.361	0.138

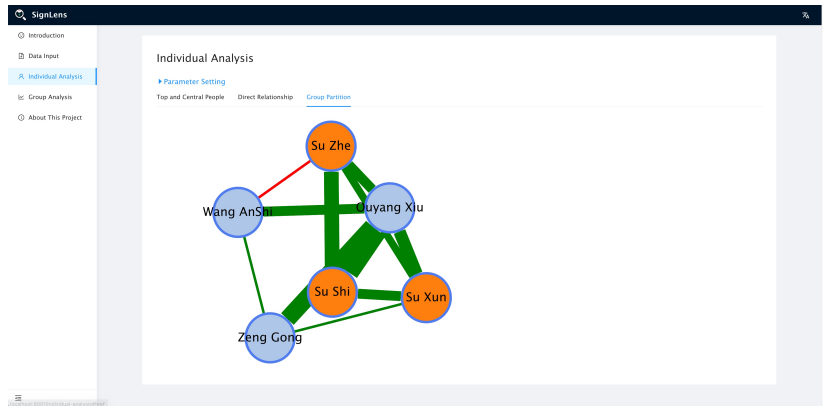
Individual Analysis

- Top and Central People: Who is the “Mr No”
- **Direct Relationship:** Does Su shi hate Wang Anshi?
- Group Partition: What are their parties?

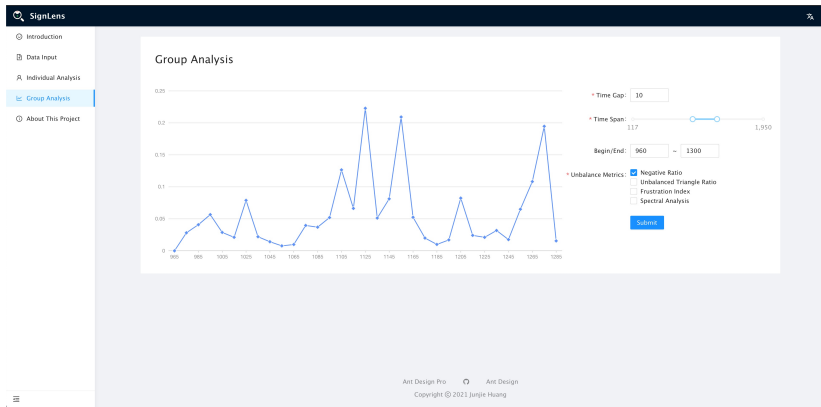


Individual Analysis

- Top and Central People: Who is the “Mr No”
- Direct Relationship: Does Su shi hate Wang Anshi?
- **Group Partition:** What are their parties?



- How to measure unbalance
 - 1 Negative Ratio
 - 2 Unbalance Triangle Ratio
 - 3 Frustrate Index
 - 4 Spectral Analysis



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- We proposed a new tool SignLens for analyzing signed networks.
- Full details for SignLens in conference proceedings
- More details for examples (CBDB, USCV) in github
<https://github.com/huangjunjie-cs/SIGNLENS>
- See you at the live session!

Thank You for your attention