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NameClarifier: A Visual Analytics System for Author Name Disambiguation

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Name ambiguity

by

Wang Wei

？？？？？

王伟，王维，王威，王玮，汪卫， 汪伟， 汪威

Name ambiguity: People with different names

[WEI WANG]

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Small scale library

Manual Check

➡ Library in Universities(No error allowed)

Automatic approach

➡ Large public bibliography database

(A small number of errors are allowed)

- Purely author names.
- Publication attributes: titles, shared coauthors, venues, self-citation. Etc.
- Additional web information.

Major challenge 1/2:

The name ambiguity problem are **case by case**.

- Limited collaborators or wide range of collaborators
- One research interest or multiple research interests

Major challenge 2/2:

Uncertainties of every attribute:

- Venue cover different size of scopes (IJCV for Vision V.S. TVCG for computer graphics + visualization)
- Shared coauthors: suffer from name ambiguity themselves!
- Etc.

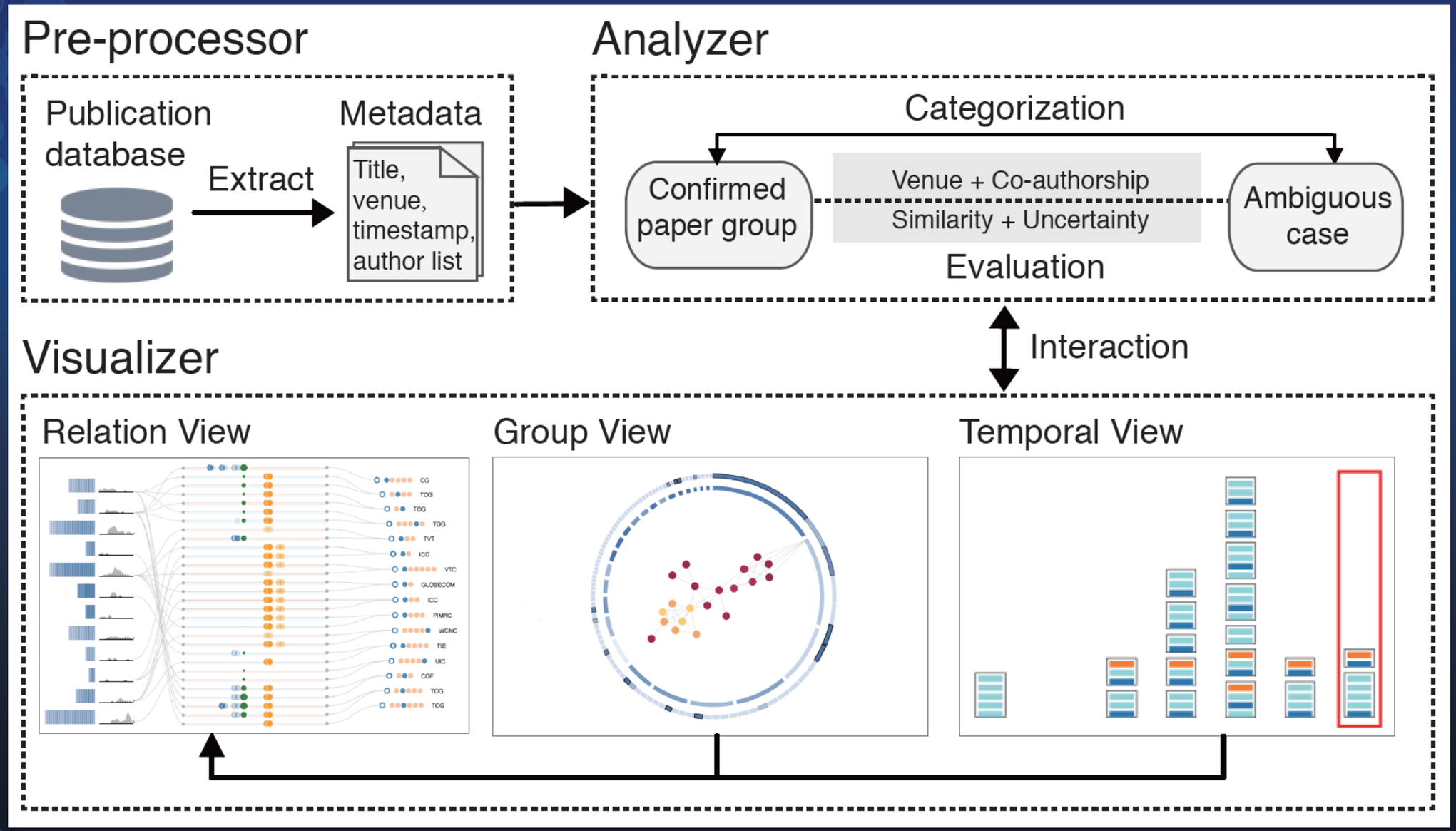
➡ No universal model

Get people involved

Our solutions:

- Customize the disambiguation on a case-by-case basis
- Mining metrics + visualization
- Traditional black box solution -> white box procedure

System framework


Pre-processor
Publication database
Extract
Metadata
Title, venue, timestamp, author list
Analyzer
Categorization
Confirmed paper group
Venue + Co-authorship
Similarity + Uncertainty
Ambiguous case
Evaluation
Interaction
Visualizer
Relation View
Group View
Temporal View

Preprocess and Data Analysis

- Confirmed authors and confirmed papers
  - Indexed authors who have been **identified**.
  - Each conformed author will associated **with multiple papers(confirmed papers group)**.

Search “Rui Wang” form dblp:

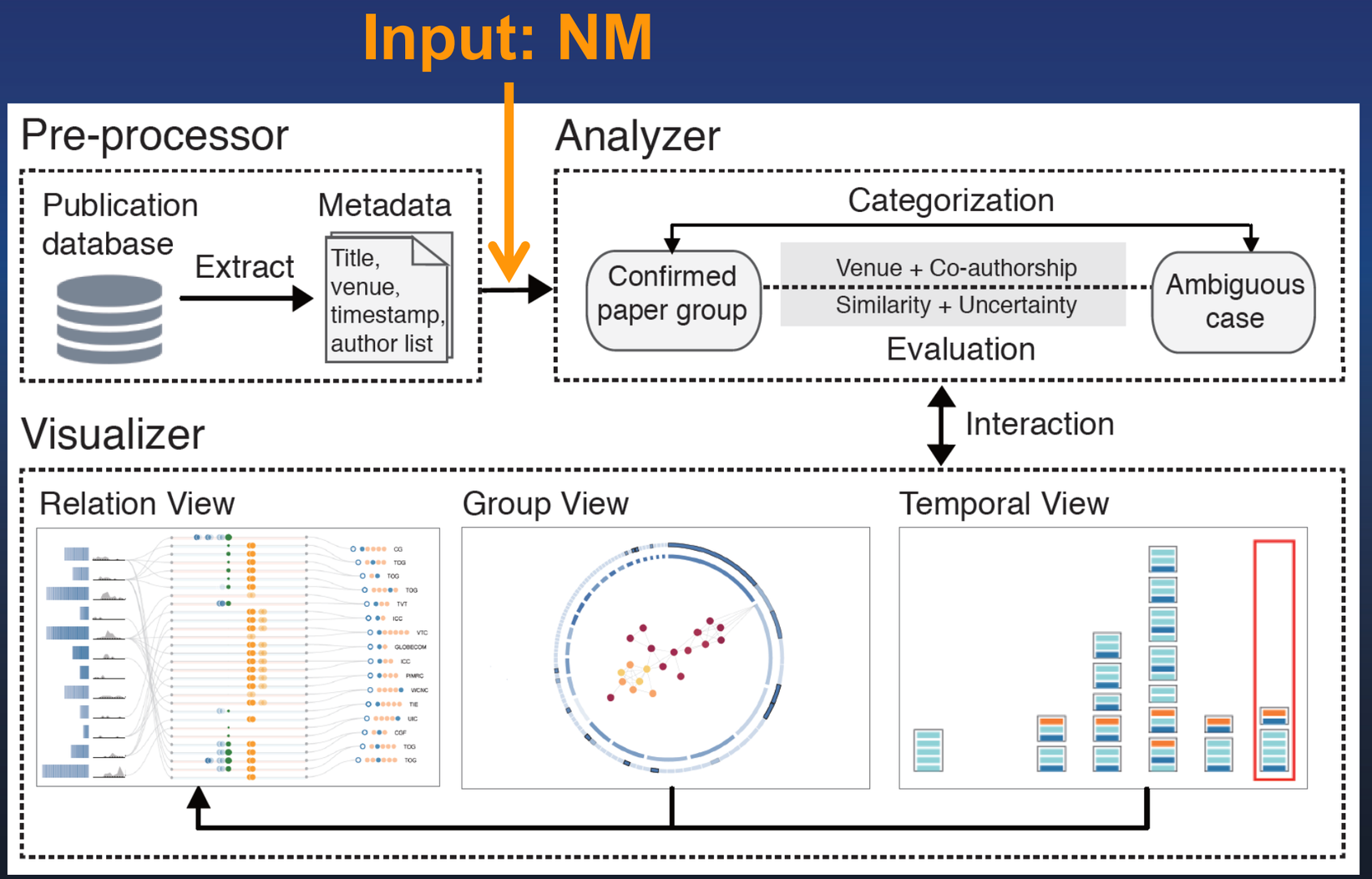
Confirmed Authors

Preprocess and Data Analysis

- Confirmed authors and confirmed papers
  - Indexed authors who have been **identified by the system**.
  - Each conformed author will associated **with multiple papers(confirmed papers group)**.

- Ambiguous names and ambiguous papers:
  - The author names which have not been identified.
  - The papers with no confirmed authors are ambiguous papers.

Preprocess and Data Analysis



Given an author name **NM**, a collection of publications with the name NM(or approximate to NM) listed as an author will extracted from digital librariy.

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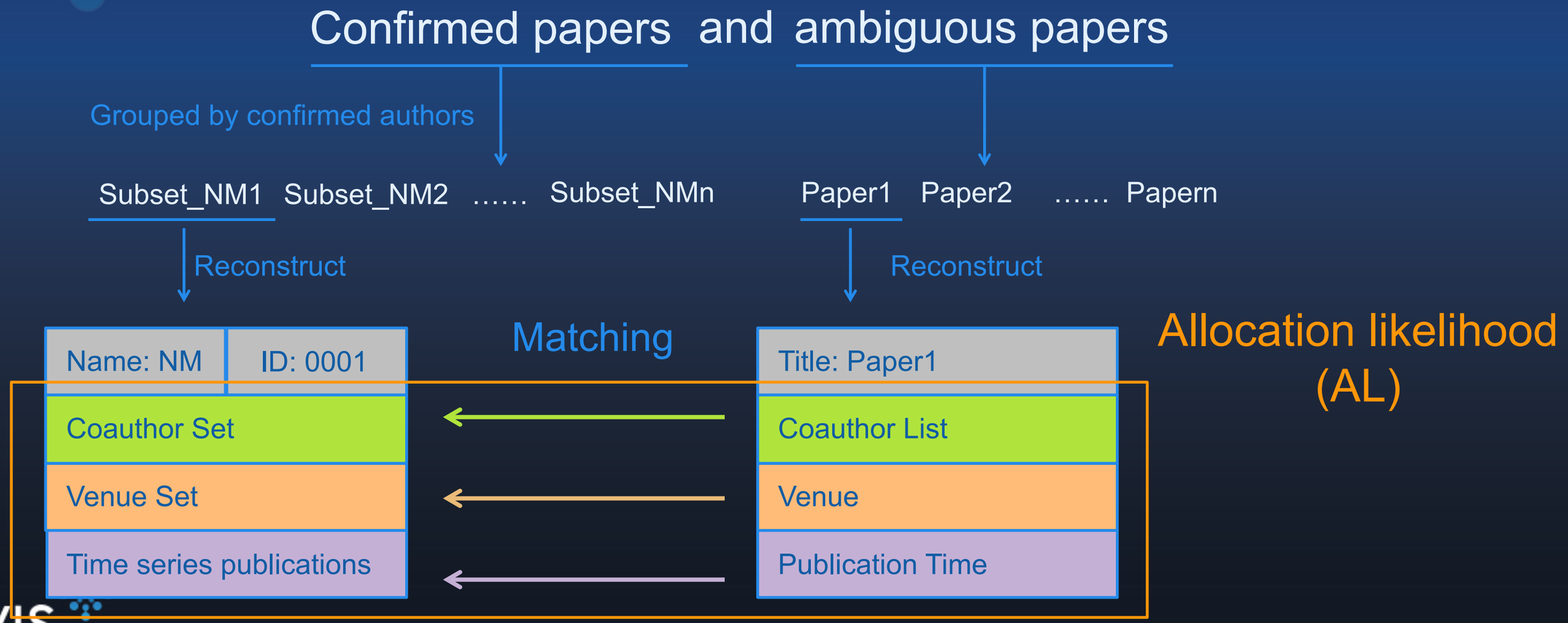
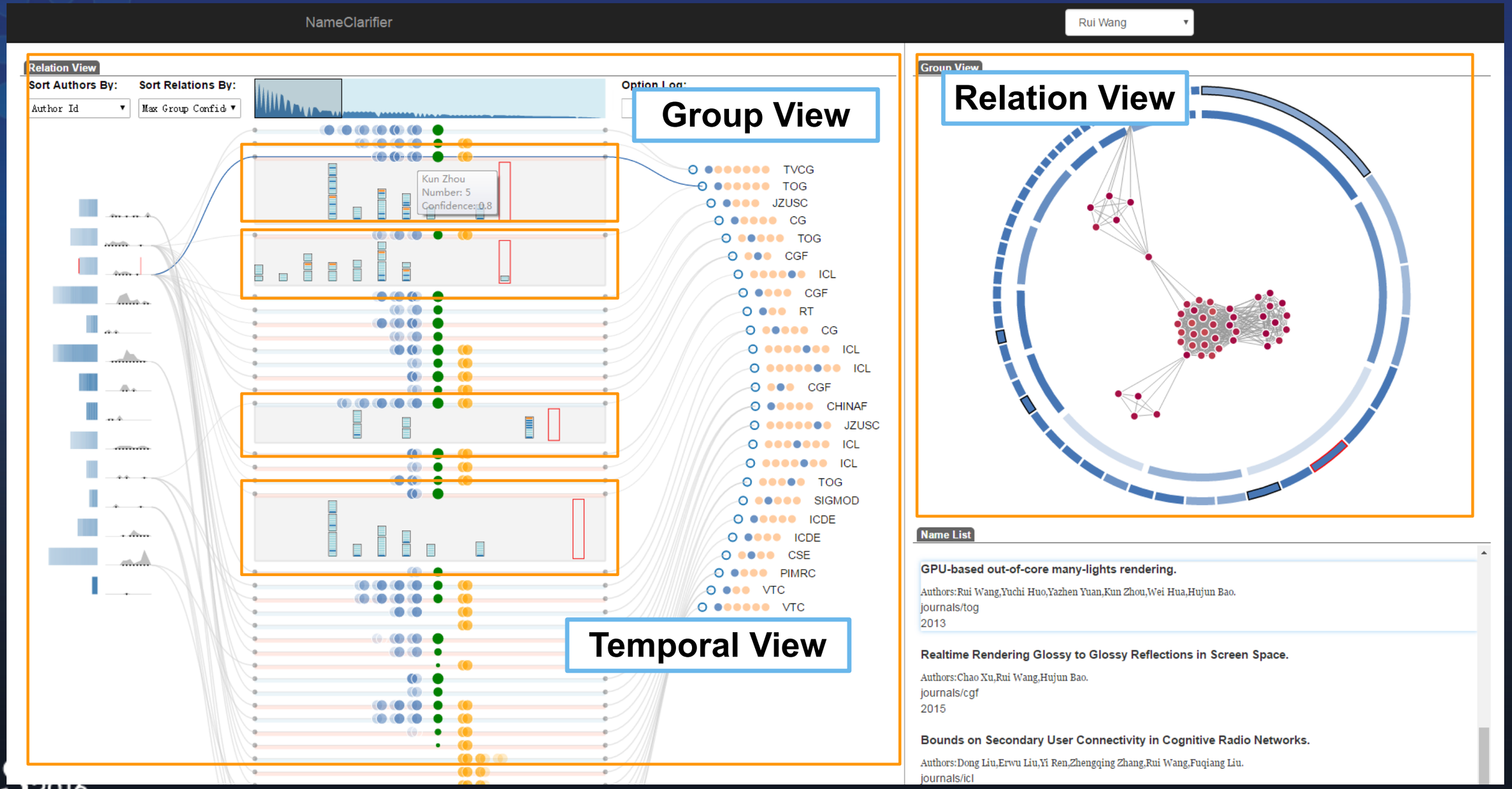
Preprocess and Data Analysis

- With the input name NM:

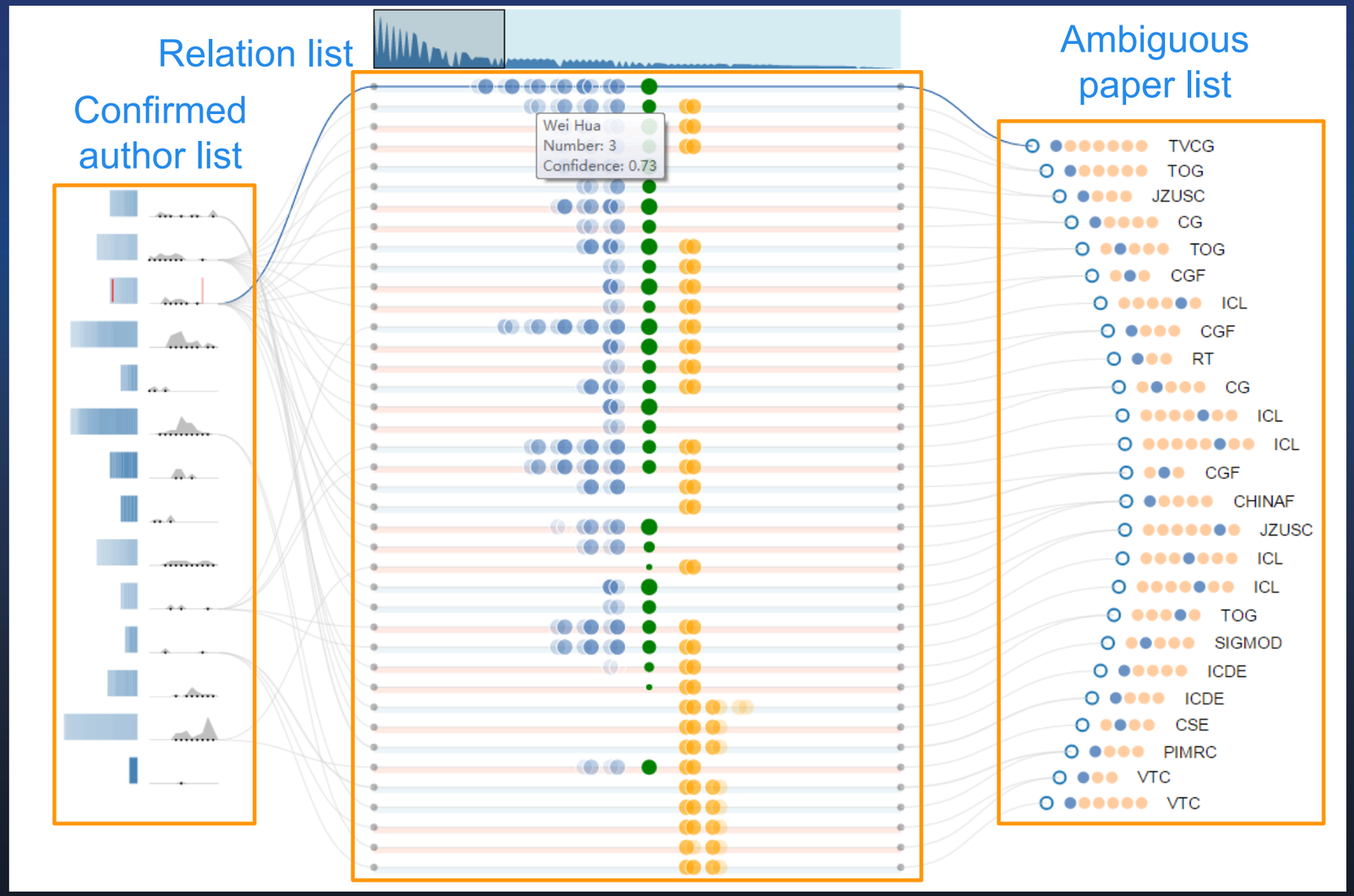


Visual Design

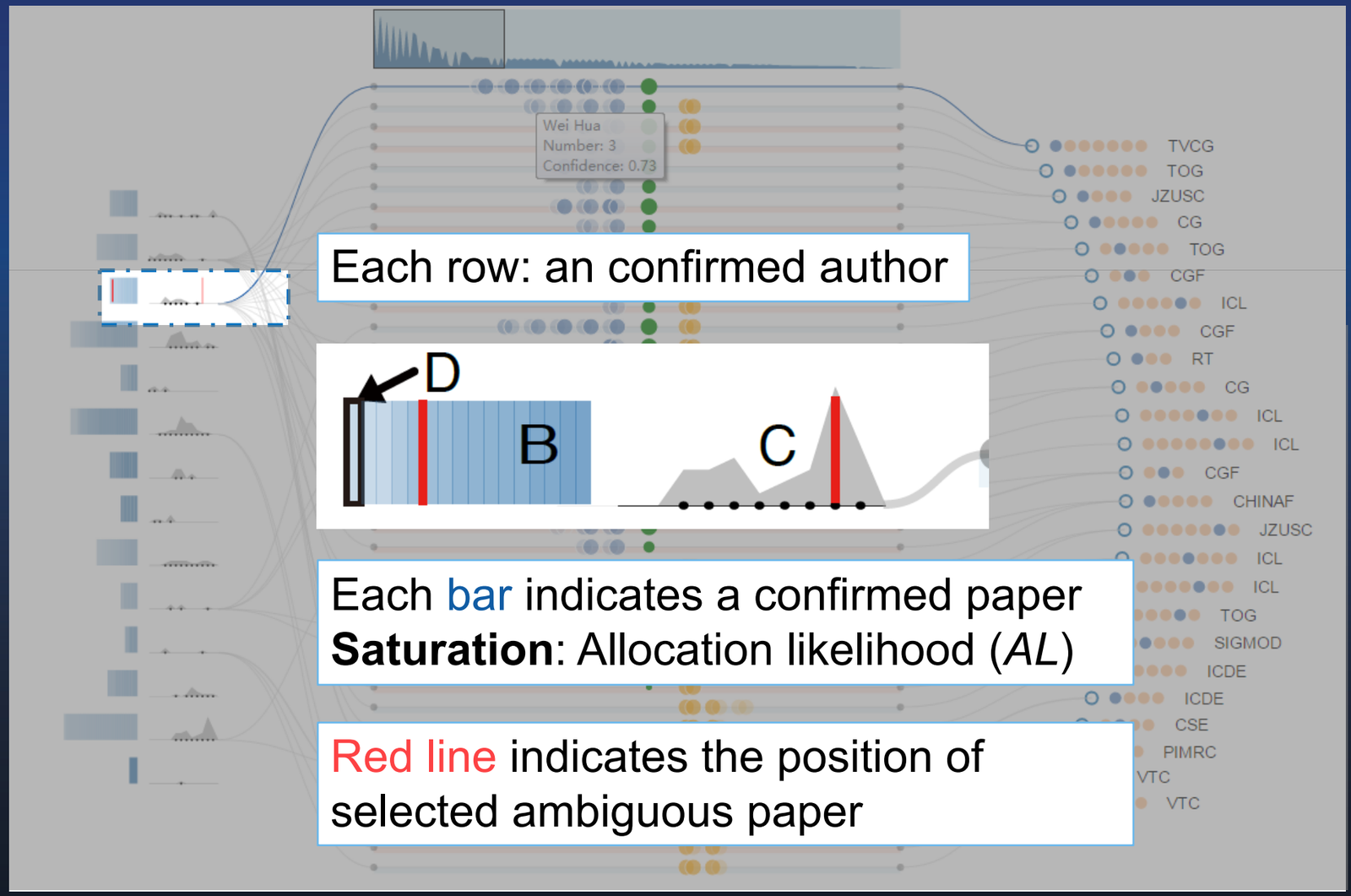
System Overview



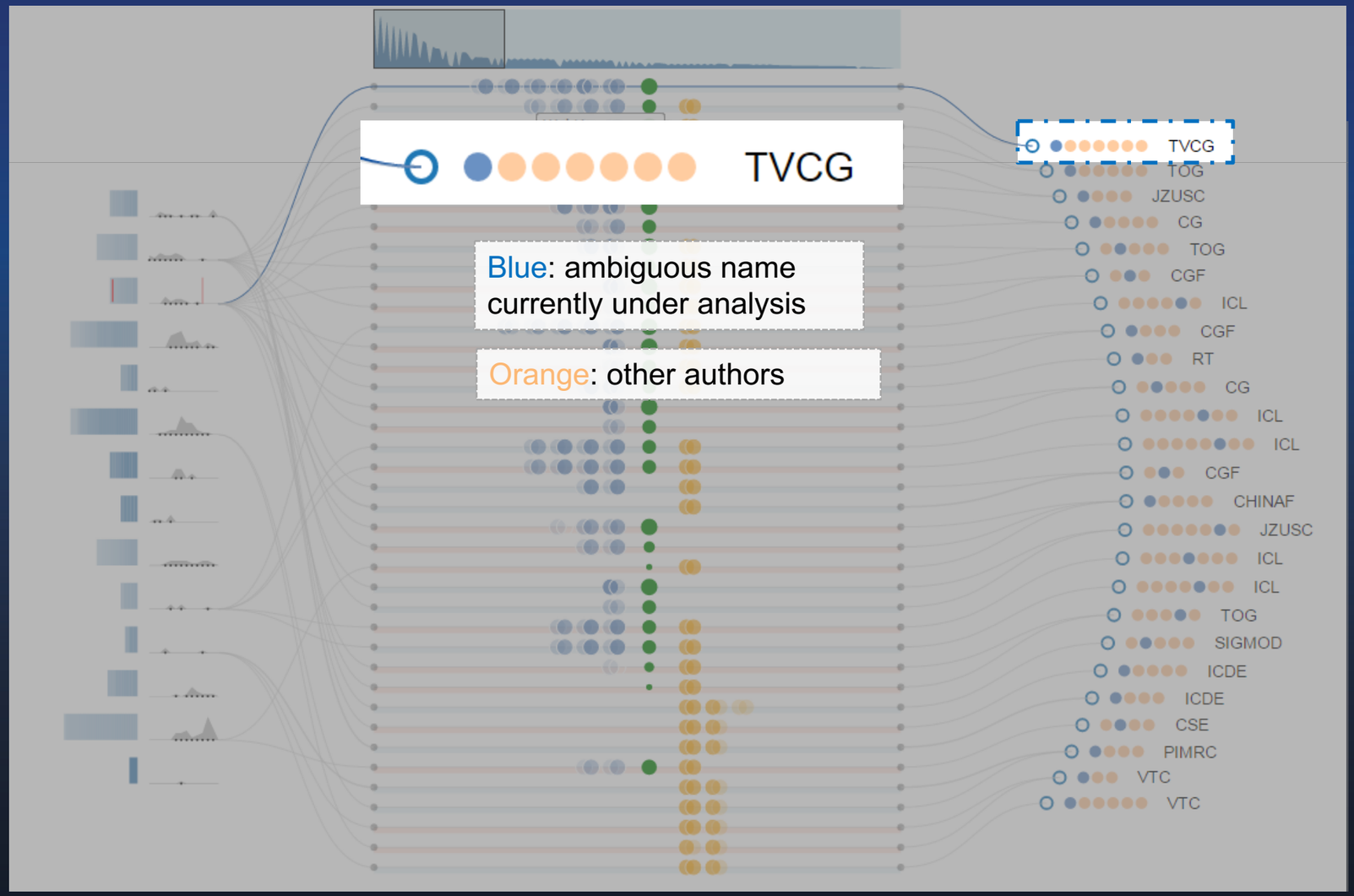
Relation View



Relation View



Relation View



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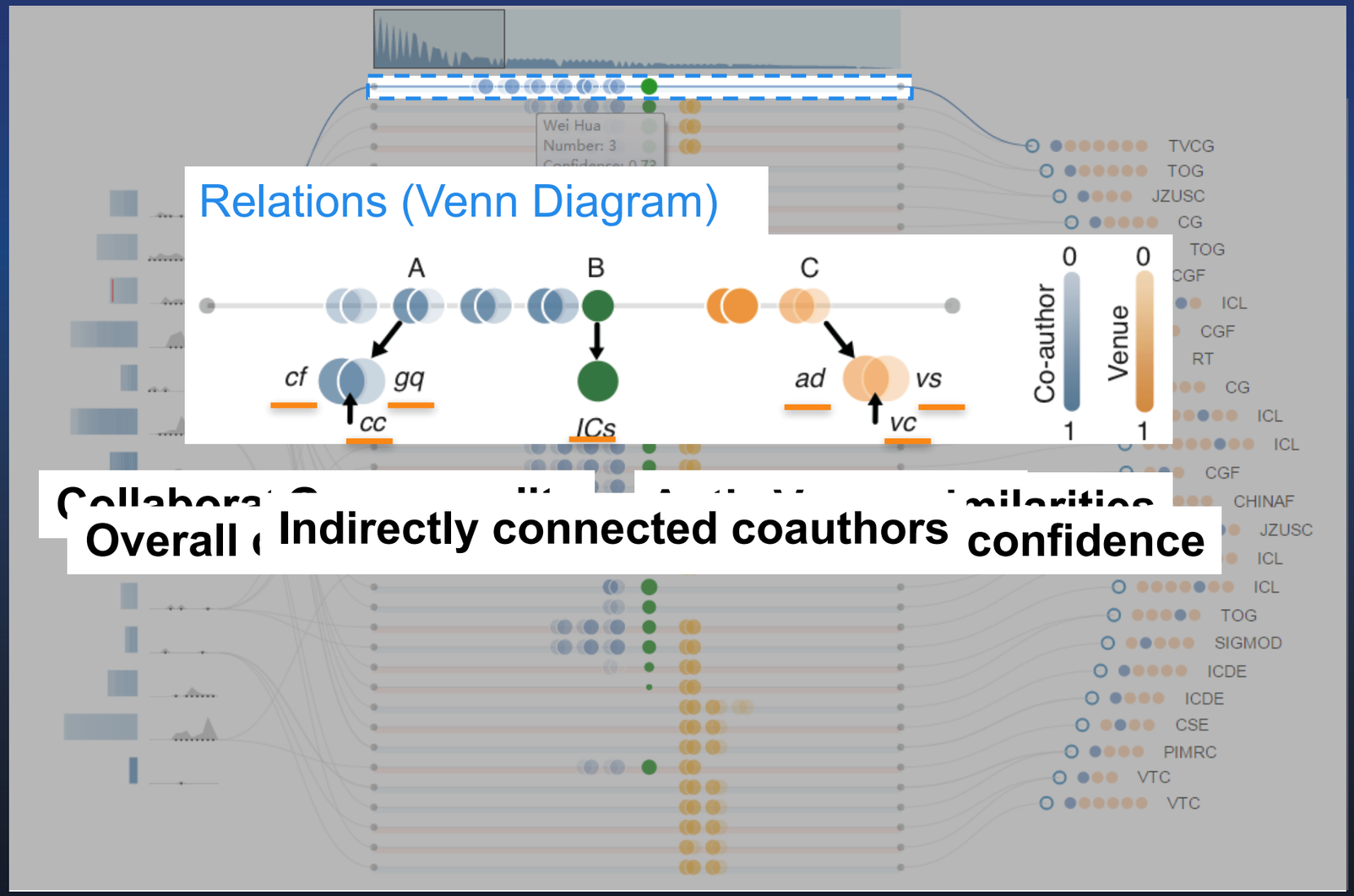
Relation View



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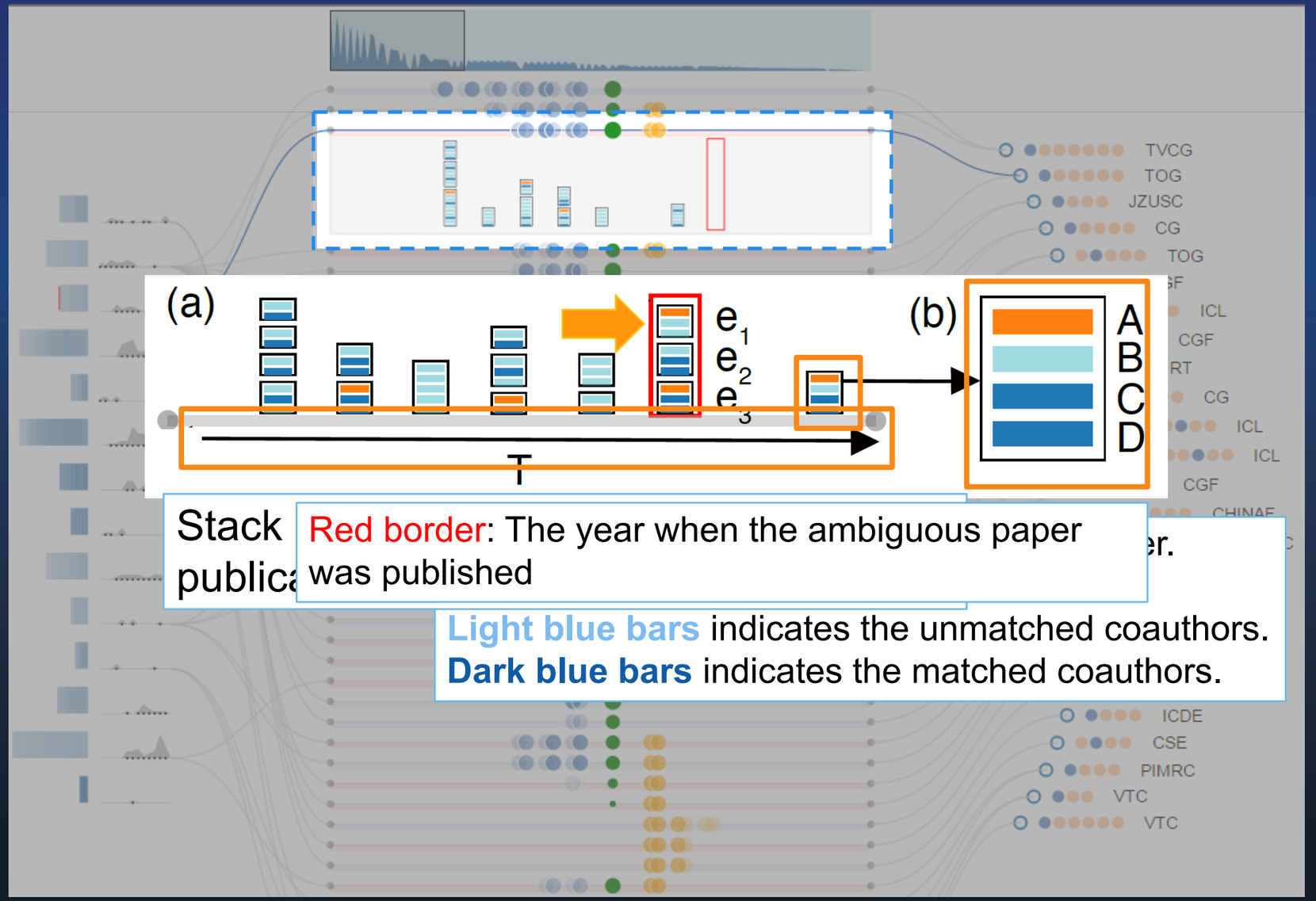
Temporal View



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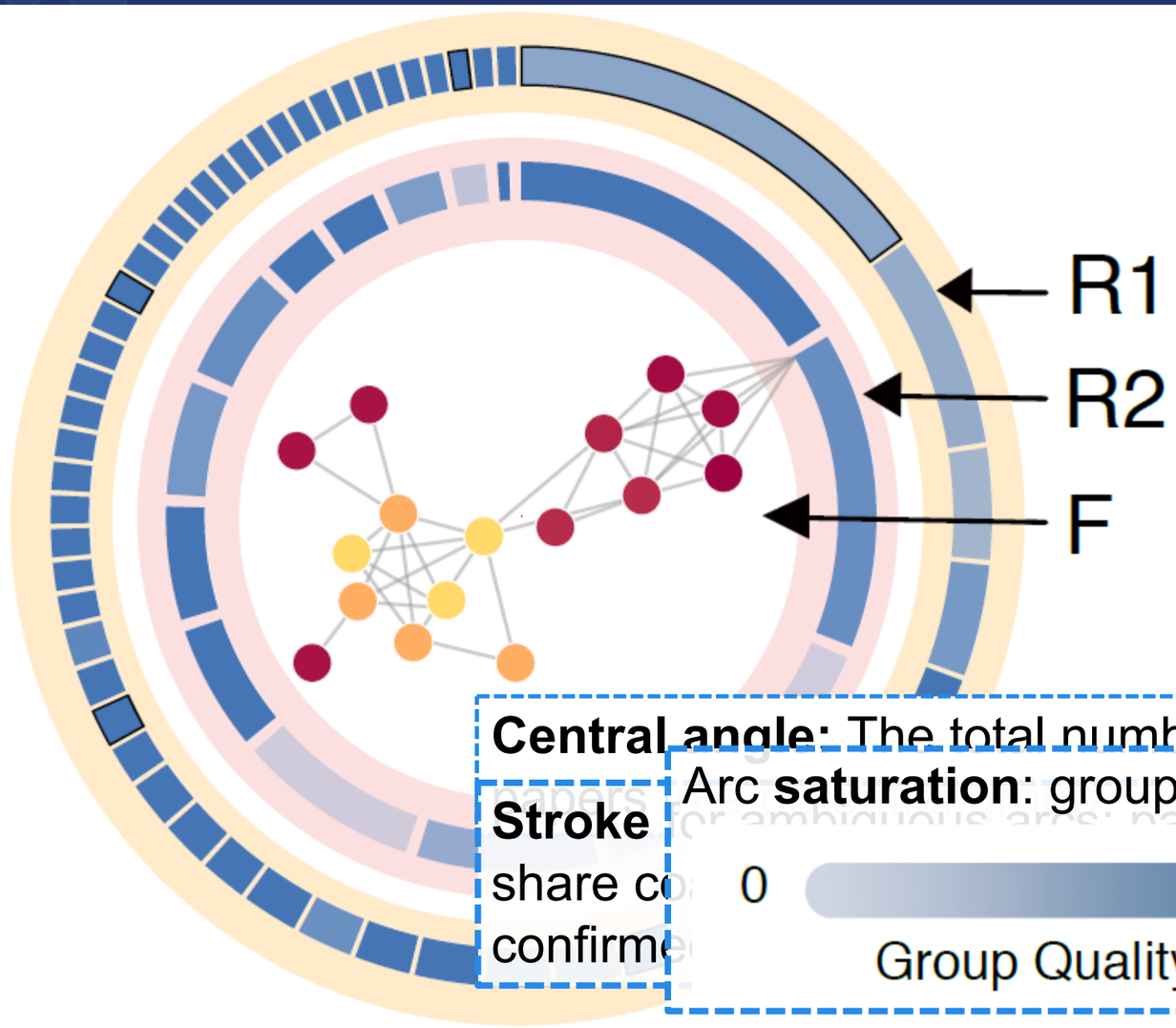
Group View



Outer ring(R1):

- Ambiguous paper group
- In each arc papers only share coauthor/venue with those in the same group

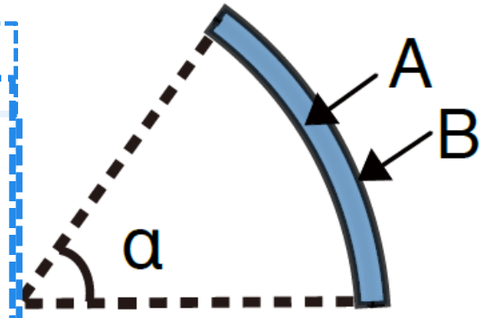
Inner ring(R2):

- Confirmed authors
- Every arc: a confirmed author

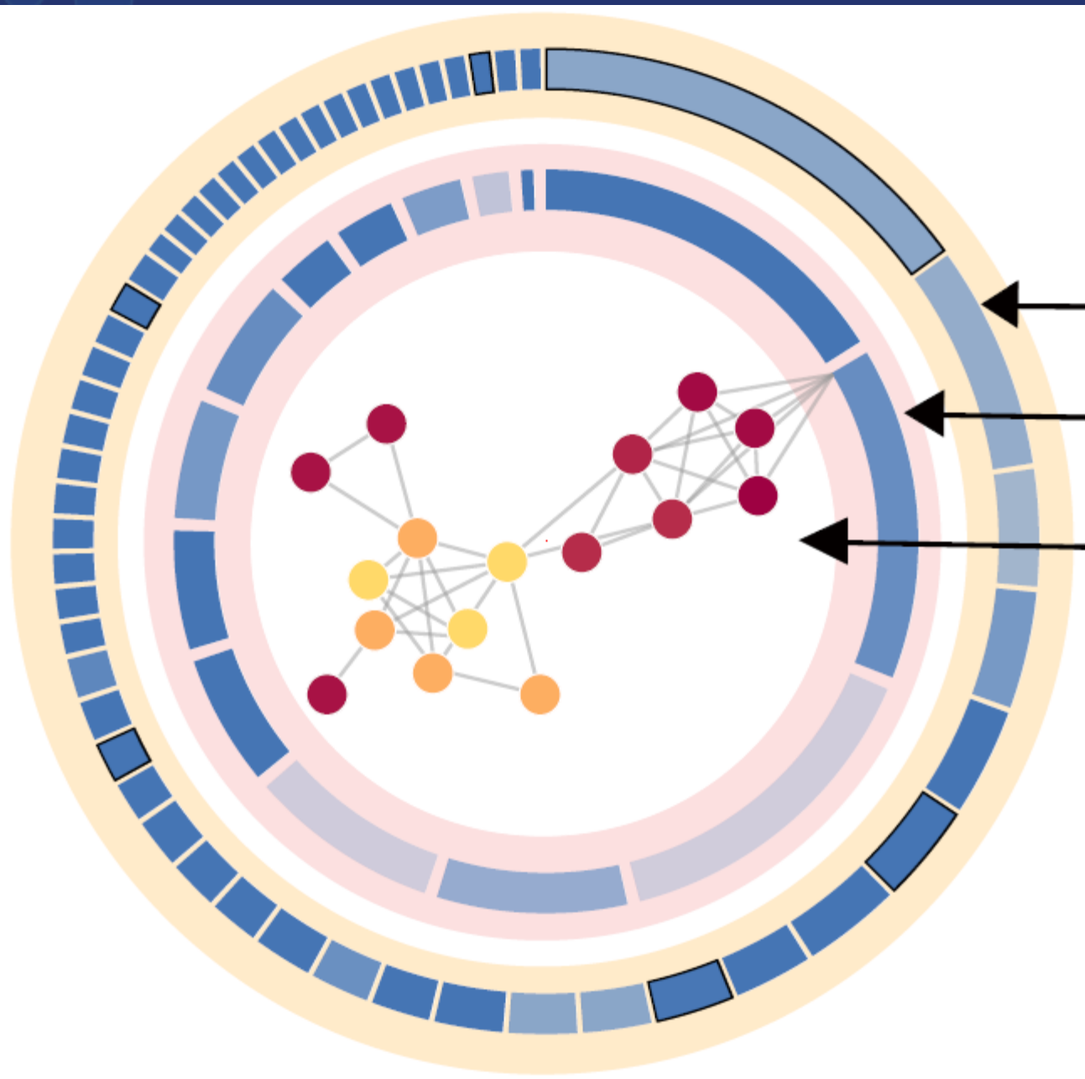
Central angle: The total number of papers for ambiguous arcs: papers

Stroke
share co
confirme

Arc **saturation**: group quality



Group View



(F) Nodes: papers in a selected ambiguous(paper) arc

Edges:

- Two ambiguous papers share coauthors
- Ambiguous papers share coauthors with confirmed authors

Node colors: publication years

Case study

Case Studies

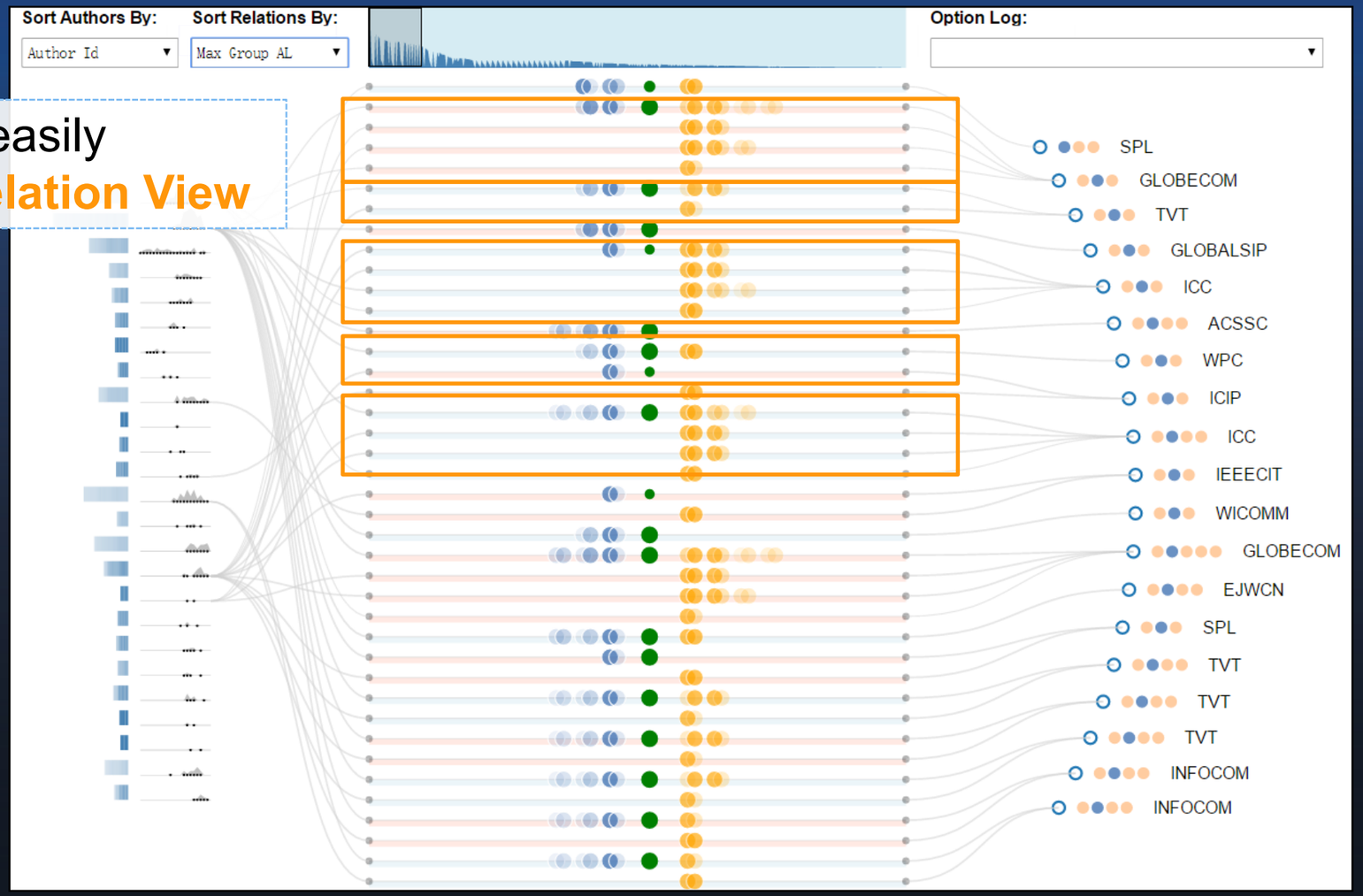
Case1: Wei Chen

Sort by Max Group Relation Allocation Likelihood

 # Total paper: 1170

- *573 ambiguous*
- *597 confirmed papers for 25 confirmed authors*

The most cases can be easily addressed directly by **Relation View**



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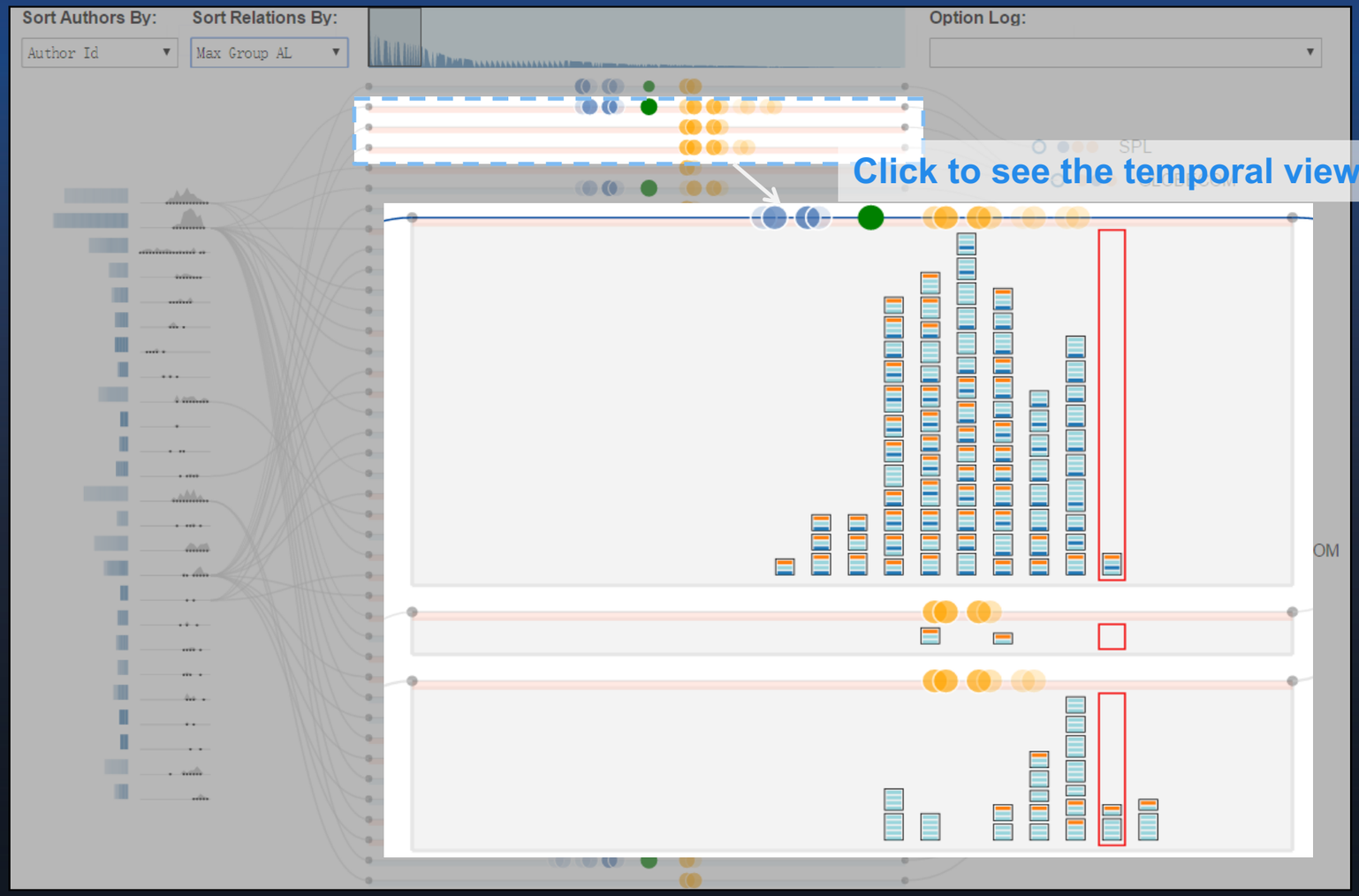
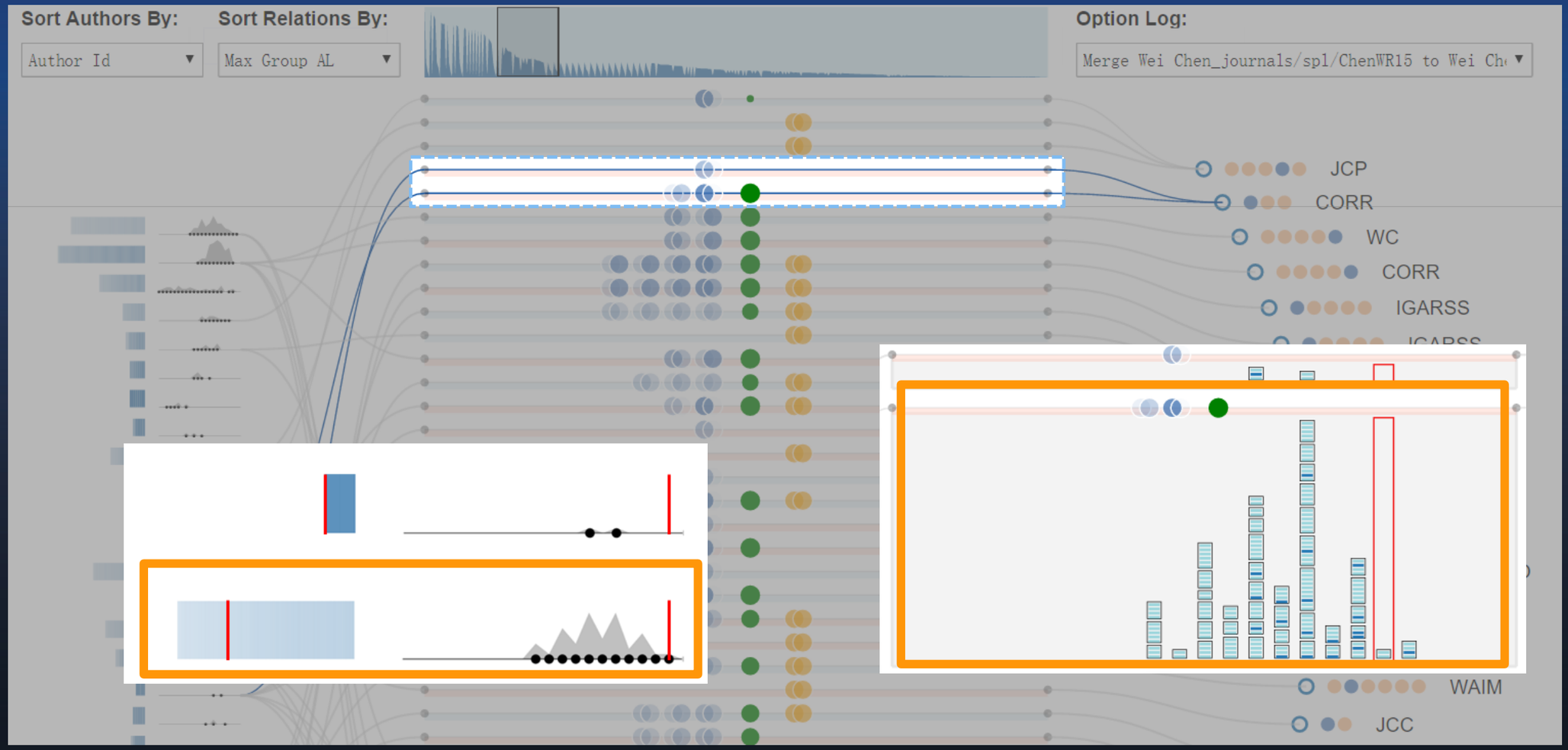


Case Studies

Case1: Wei Chen

In some cases, the allocation likelihood is different from the visual pattern.



Case Studies

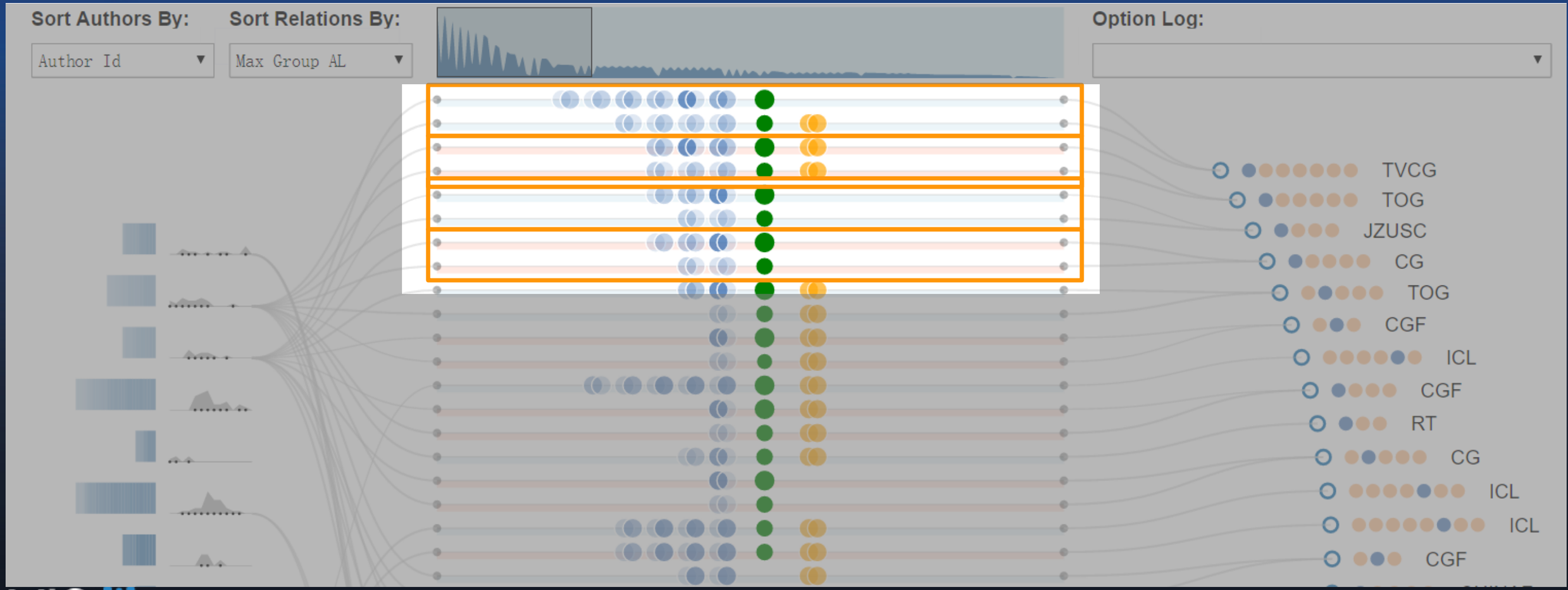
Case2: Rui Wang

 # Total paper: 560

- *179 ambiguous + 381 recognized papers*
- *15 recognized authors*

Sort by Max Group Relation Allocation Likelihood

The most tricky one: It cannot be easily distinguished through comparison link and temporal view



Case Studies

Case2: Rui Wang

Sort by Max Group Relation Allocation Likelihood

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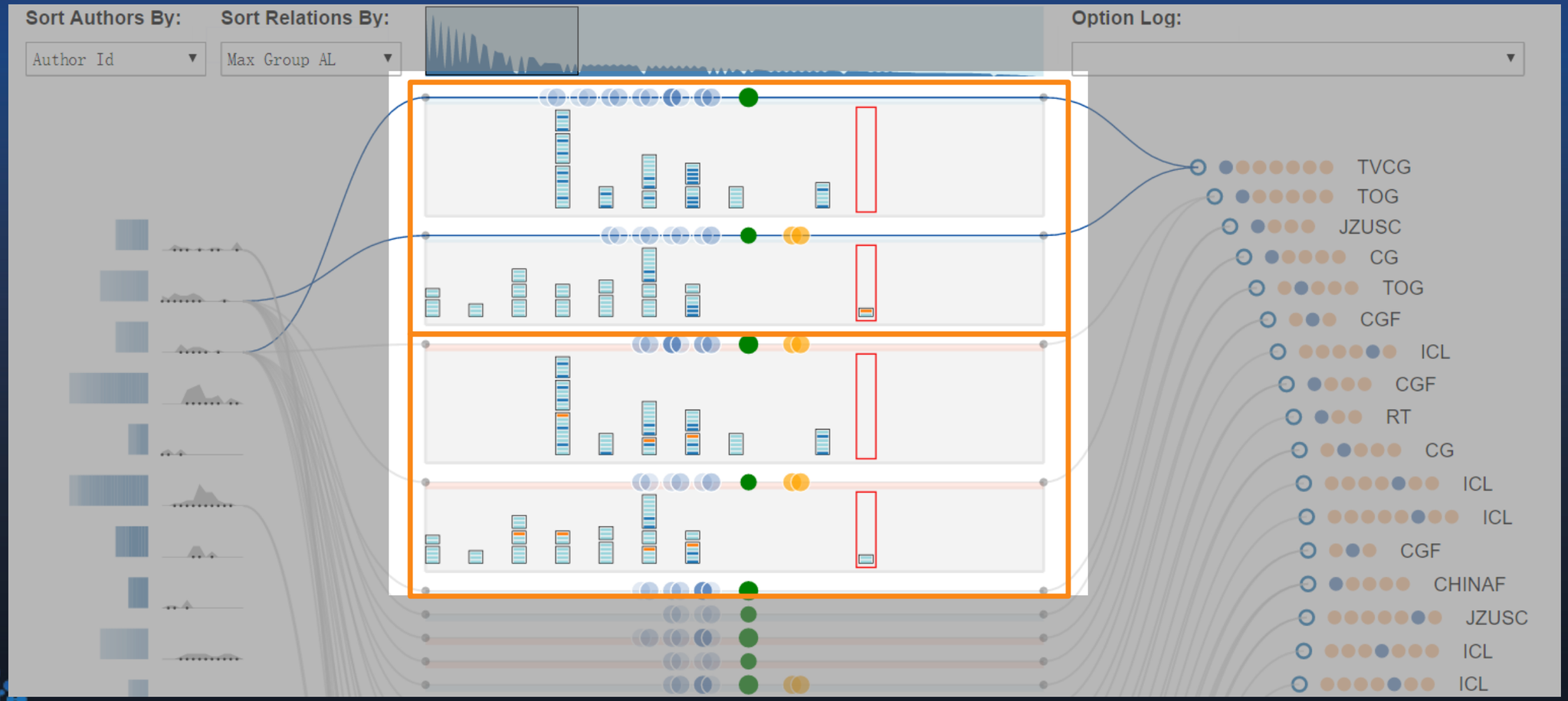


Case Studies

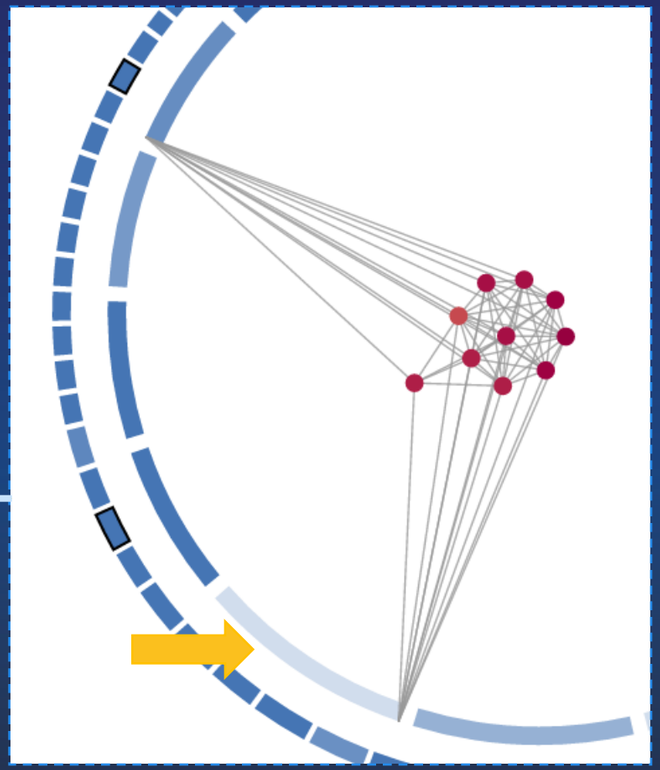
Case2: Rui Wang

Papers closely connected to both these two confirmed authors

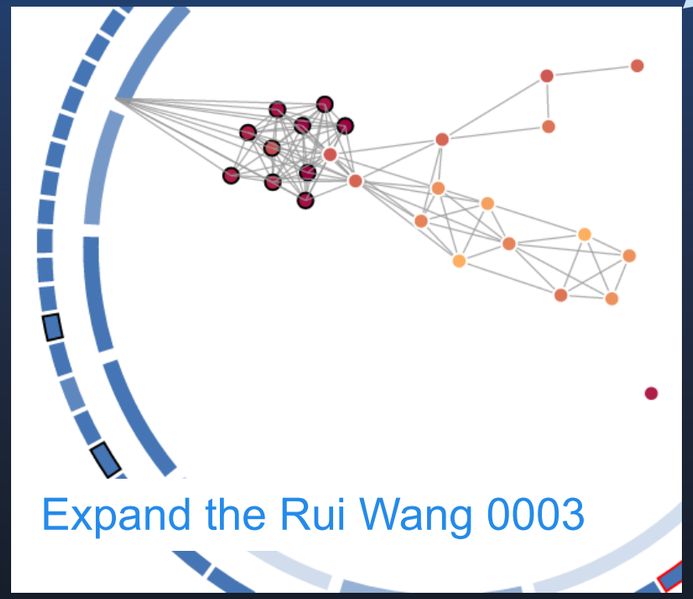
Case Studies

Case2: Rui Wang

Release papers of the Rui Wang 0003



Some nodes with the black strokes are **loosely connected** with those Rui Wang 0003's papers

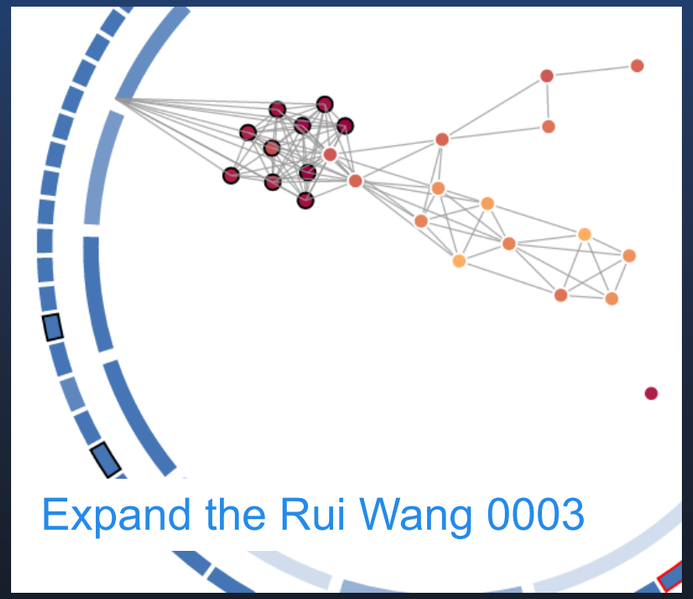


Expand the Rui Wang 0003

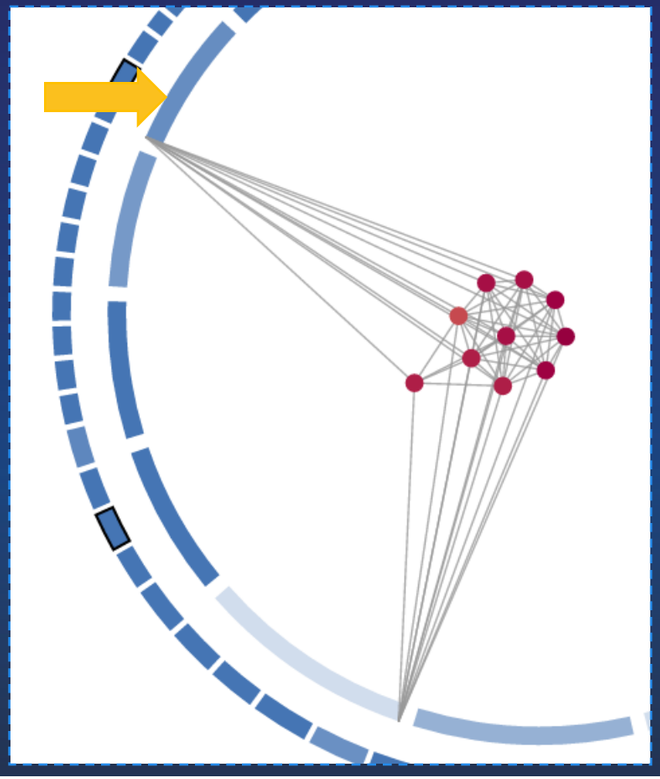
Case Studies

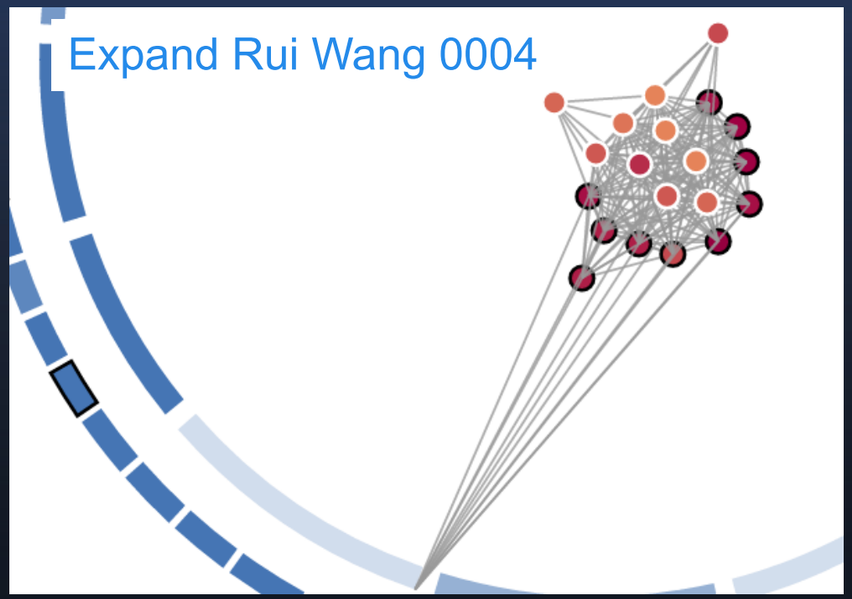
Case2: Rui Wang

Release the papers of the Rui Wang 0004



Nearly **all** the nodes with the black strokes are **tightly connected** with those Rui Wang 0004's confirmed papers.





We tend to think all the ambiguous papers belong to Rui Wang 0004

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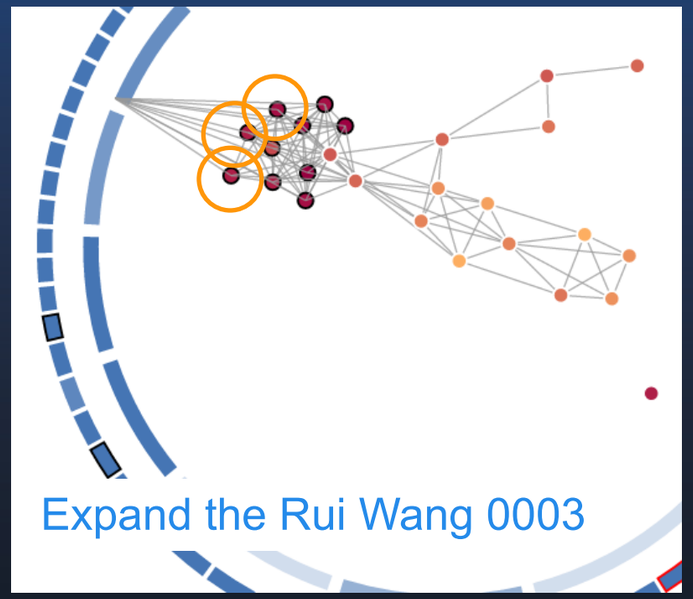
Case Studies

Case2: Rui Wang

Start exploration from the farthest one from 0003



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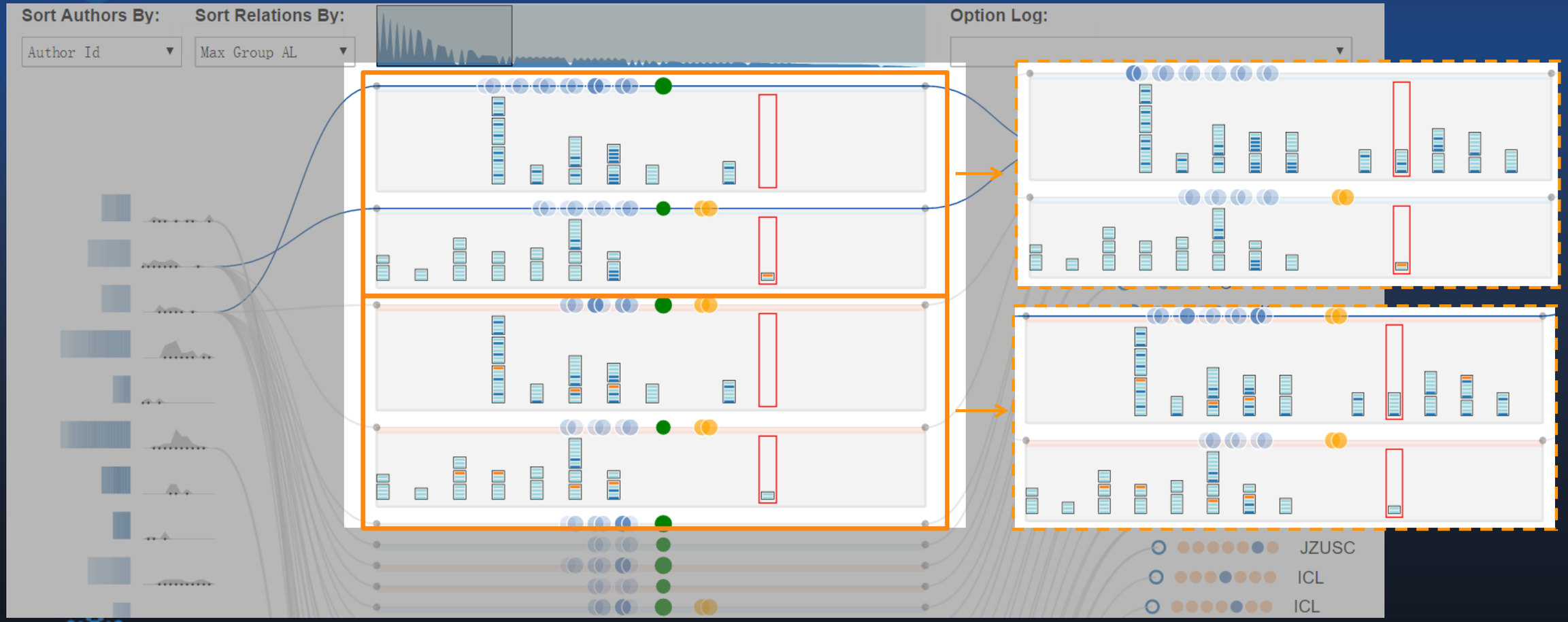
Case Studies

Case2: Rui Wang

Think back to the most tricky one:



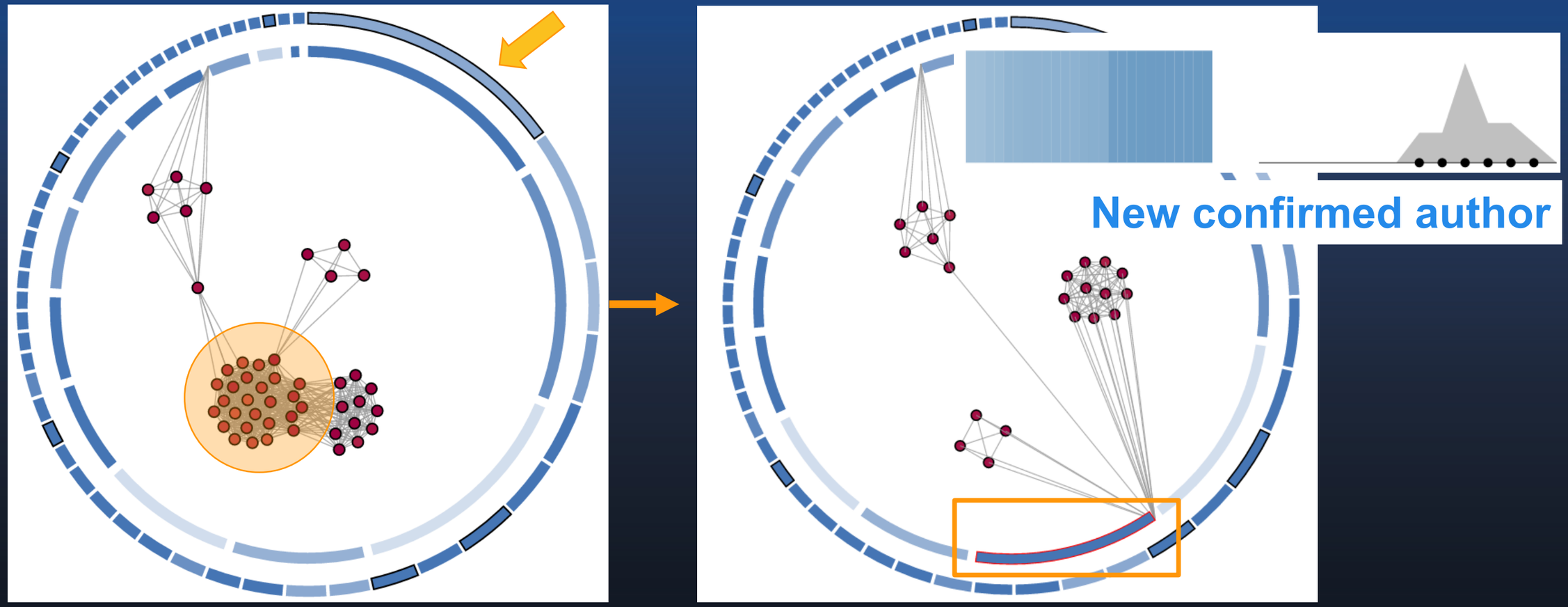
More evidence are provided to make relations **distinguishable**.

Case Studies

Case2: Rui Wang

Start from the largest ambiguous arc.

Select this part and form a new confirmed author.

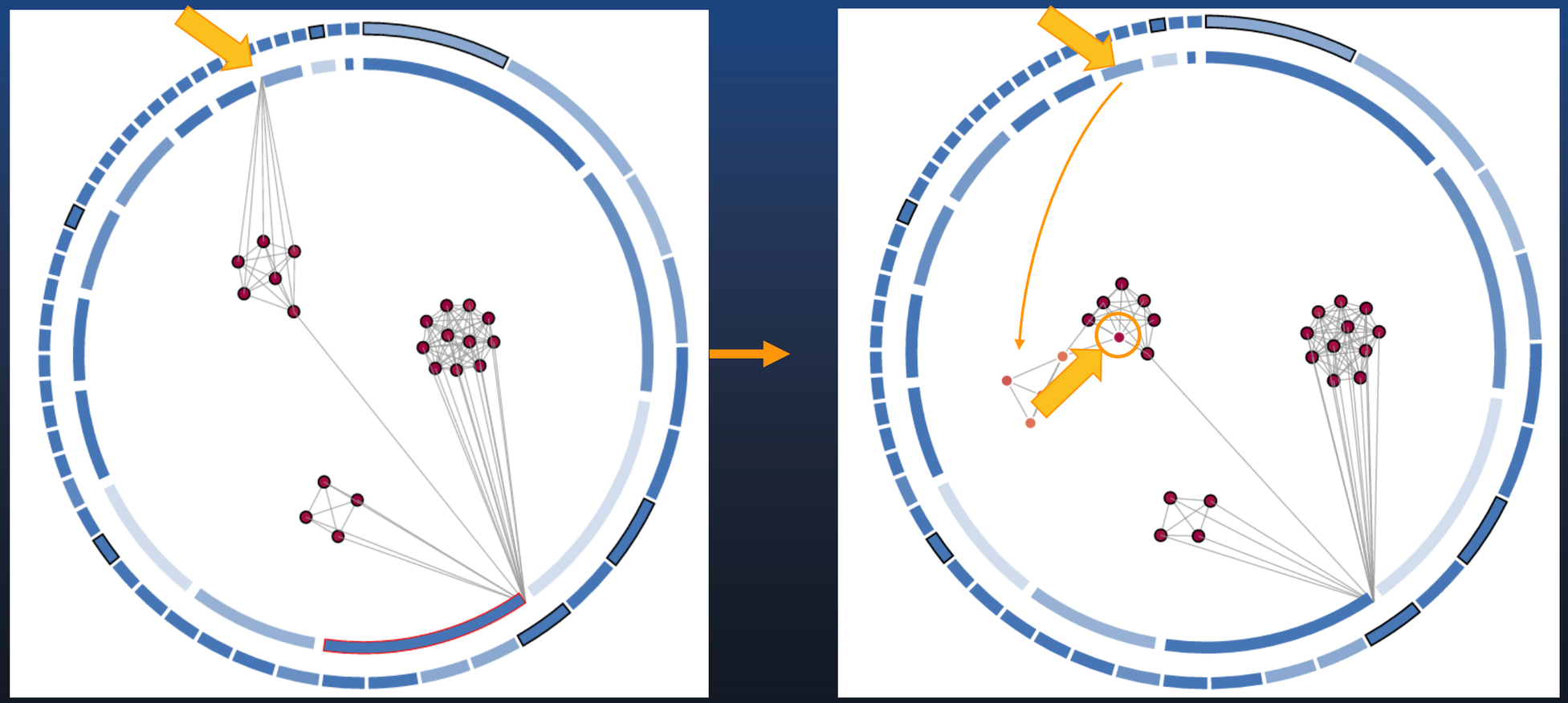


Case Studies

Case2: Rui Wang

Start from the largest ambiguous arc.

Notice that there is one connect with a confirmed authors.



Case Studies

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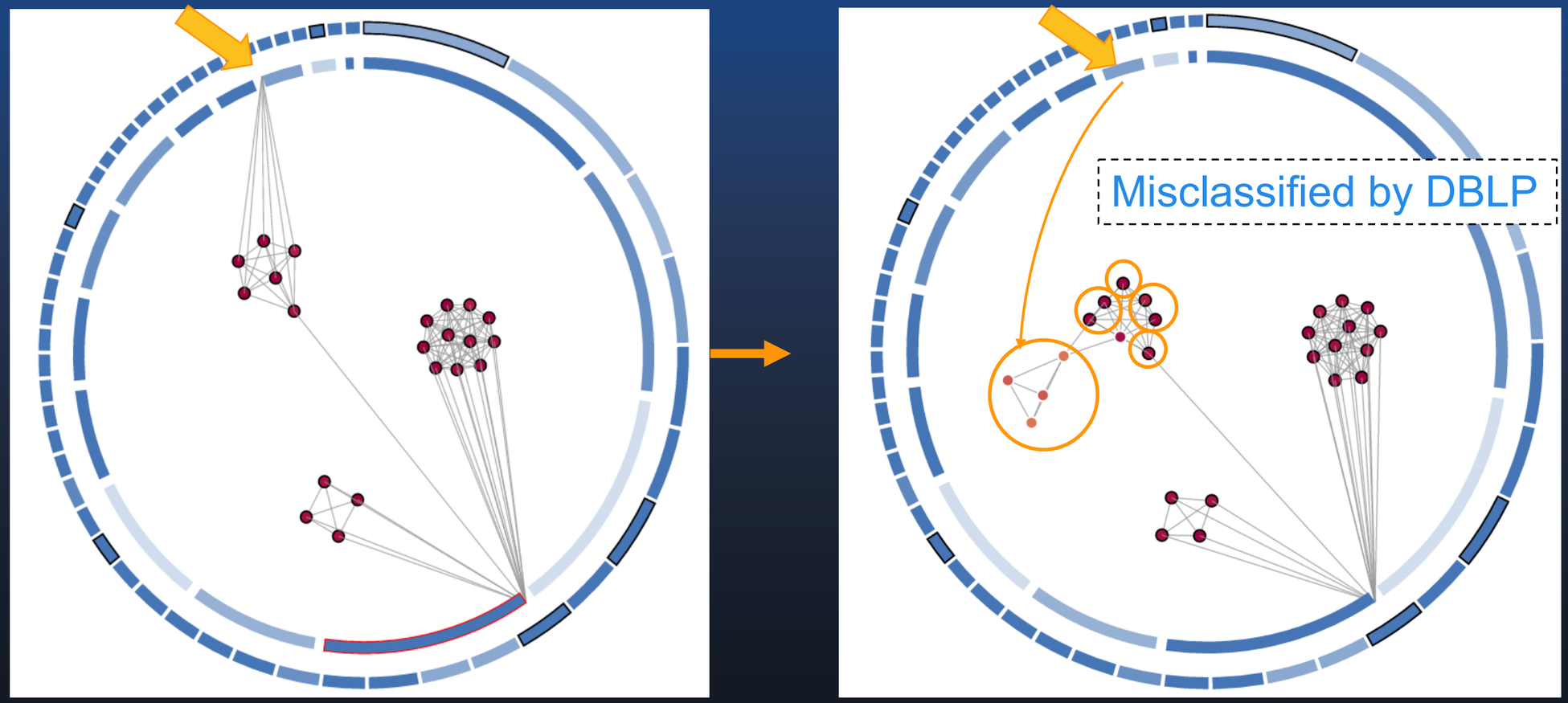


Conclusion

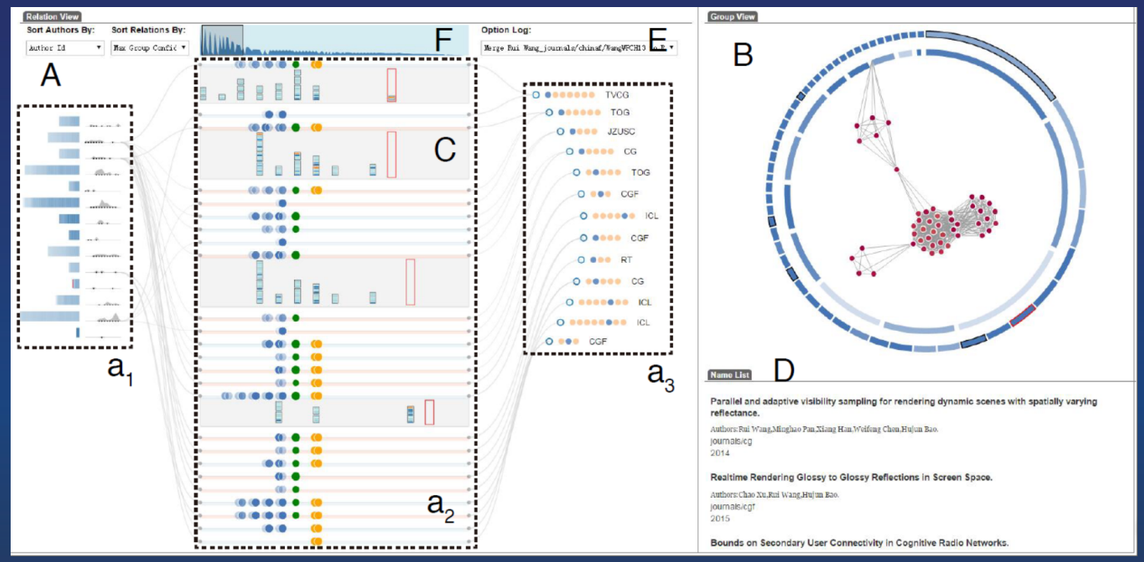
- NameClarifier, an interactive visual system for name disambiguation;
- Turn the traditional black-box solution into a white-box procedure;
- The system provides guidance instead of classification results for ambiguous cases.

Future work

- Extension to more attributes;
- Visual alarming for the improper operation;

Thank you!

Q&A



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Back Up

- Automatic Evaluation
  - **Allocation Likelihood**
    - Co-author Matching
    - Venue Match
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Back Up

- Automatic Evaluation
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    - **Co-author Matching**
    - Venue Match
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Confirmed paper p_i and Ambiguous paper p_A

$$cm_{i,p} = \frac{|C(p_i) \cap C(p_A)|}{|C(p_i) \cap C(p_A)|}$$

Back Up

- Automatic Evaluation
  - **Allocation Likelihood**
    - Co-author Matching
    - **Venue Match**
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Confirmed paper p_i and Ambiguous paper p_A

$$vm_{i,p} = sgn(vs(v_A, v_i) - s)$$

where

$$vs(v_A, v_i) = \left| \frac{|A(v_A) \cap A(v_i)|}{|A(p_i) \cap C(p_A)|} \right|$$

Back Up

- Automatic Evaluation
  - **Allocation Likelihood**
    - Co-author Matching
    - Venue Match
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Confirmed paper p_i and Ambiguous paper p_A

$$AL(A,G) = \frac{1}{n}\sum_{i=1}^{n}(\alpha_c \cdot cm_i + \alpha_\beta \cdot vm_i)$$

Back Up

- Automatic Evaluation
  - Allocation Likelihood
    - Co-author Matching
    - Venue Match
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Confirmed paper p_i and Ambiguous paper p_A

$$cc(c) = 1_{DC}(c) \cdot (cf(c) + gq(c))$$

Back Up

- Automatic Evaluation
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    - Venue Match
  - Confidence Measurements
    - Co-author Confidence
    - Venue Confidence

Confirmed paper p_i and Ambiguous paper p_A

$$vc(p_i, p_a) = 1_{vr}(v_i) \cdot (ad(v_i) + vs(v_i, v_A))$$