VisConflicts: Visualizing Conflicts of Interest in Conference Reviewing

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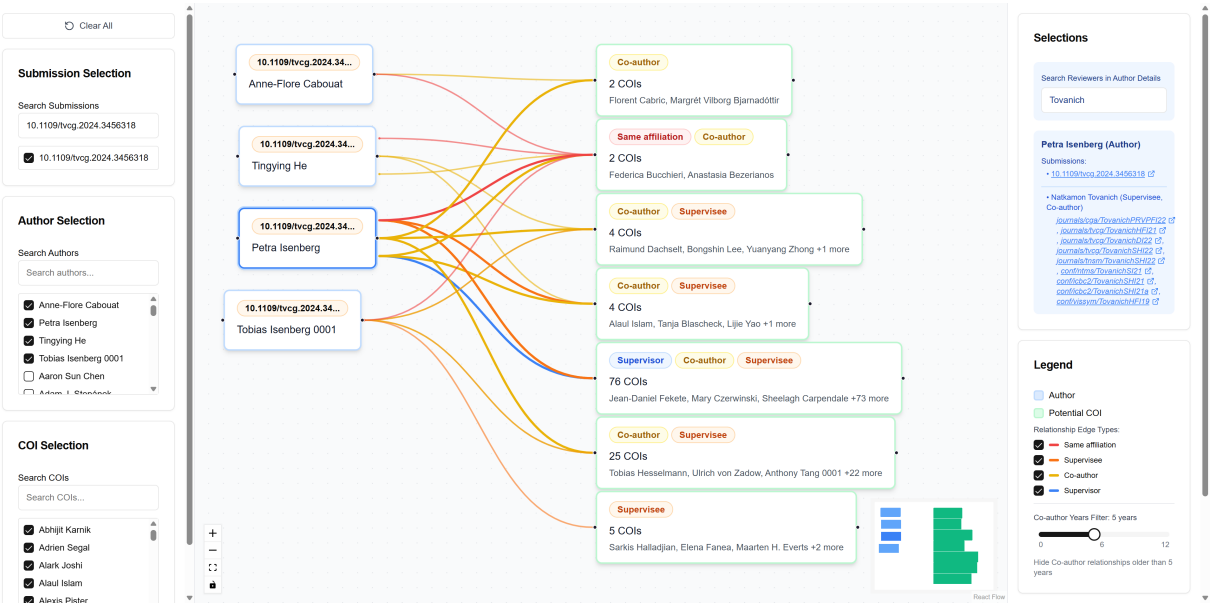

Figure 1: **VisConflicts** visualizes all conflicts of interest (COIs) as links from authors (left) to potential reviewers from DBLP (right).

Abstract

We built **VisConflicts**, an interactive visualization tool designed to support conflict-of-interest (COI) detection in the academic peer-review process. It visualizes the network of relationships between authors and potential COIs, such as co-authorship, supervision, and institutional affiliation. By making these relationships transparent, our tool aims to improve the fairness and efficiency of the reviewer assignment process for IEEE VIS and other academic conferences.

Index Terms: Conflict of interest, reviewer assignment, academic peer review, scholarly data, interactive visualization

1 Introduction

Assigning reviewers to conference papers is a time-consuming and complex task, requiring that the submission's content match the reviewers' expertise and, most importantly, that no conflicts of interest (COIs) are present. This challenge scales with conference size and the variety of possible COIs (e.g., recent co-authorships, shared affiliations, supervisory relationships, and personal ties), as highlighted in a recent IEEE VIS blog post [7]. Manual COI declarations are particularly problematic, as authors often have no overview of their co-authors' conflicts [5]. Popular conference management systems (e.g., *EasyChair*, *EDAS*, and *PCS*) can detect apparent conflicts, such as with program committee (PC) members, but they often operate as black boxes and only within their ecosystems, providing binary conflict flags without context or explanation.

Prior work has integrated co-authorship and citation networks to support reviewer selection [2, 3]. However, such approaches often fall short in providing interpretable conflict paths or seamless integration into committee workflows. To address this, we introduce **VisConflicts**, an interactive tool designed to assist paper chairs and committee members in identifying potential COIs by visualizing historical and contextual relationships, supporting transparent and efficient decision-making. The tool's prototype is available at `https://v0-reactflow-author-data.vercel.app/` with sample data from VIS 2024.

2 Data Preparation

To uncover potential COI, we link authors and reviewers to two well-maintained publication datasets: (1) ***DBLP*** [6], a comprehensive computer science bibliography database, and (2) ***Vispubdata*** [1], a curated IEEE VIS-specific dataset with rich metadata. For demonstration, we use the VIS 2024 accepted papers as our dataset for submissions. We identify three potential conflicts:

Co-authorship First, we match author names to *DBLP* using exact string matching. When we cannot unambiguously match an author name, we manually check with *ORCID*, *Vispubdata*, and *Google Scholar* publications. We then retrieve the list of publications for each author and flag co-authors within the past n years as having a COI.

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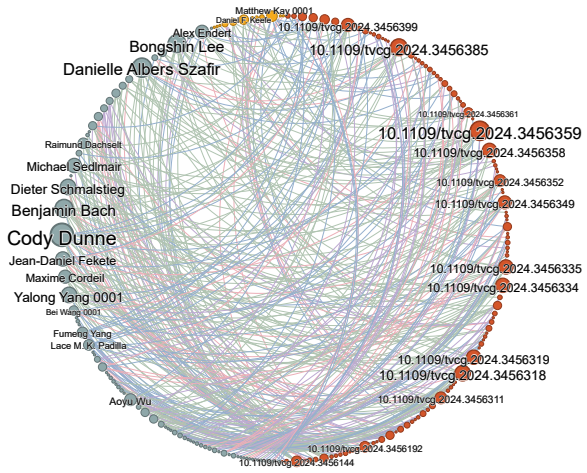

Figure 2: Node-link diagram using a circular layout to show conflicts of interest (COIs) between VIS 2024 papers and members of the paper chairs and program committee (PC). Node size indicates degrees. Each edge represents a type of conflict relationship: co-authorship, supervisor, supervisee, and shared affiliation.

Supervision We infer supervisor–supervisee relationships from *Vispubdata* using three heuristics: (i) the first author is assumed to be the potential supervisee and the last author the potential supervisor; (ii) first authors within 5 years of their first publication are likely supervisees; and (iii) the first author's career must have started ≥ 5 after the last author's.

Current Affiliation We extract the most recent institutional affiliations within five years from *Vispubdata* and use fuzzy matching [4] with a 90% threshold to detect overlaps between authors and potential reviewers.

These COI relationships are encoded in a *heterogeneous graph* that links authors and reviewers via attributed edges, each representing a conflict type: *co-authorship*, *supervision*, or *similar affiliation*. The edges are further enriched with metadata such as publication title, year, or institutional name.

To gain an overview of potential COIs, we construct Figure 2 to visualize the conflict paths between VIS 2024 papers and members of the paper chair and PC. The figure highlights the dense interconnections within the community, emphasizing the importance of transparent conflict detection in reviewer assignment.

3 Visualization Design

As illustrated in Figure 1, **VisConflicts** supports the detection and validation of COIs in the reviewer assignment process through an interactive, transparent visualization interface. A typical use case involves (1) *paper chairs* uploading all submissions with author lists to detect potential conflicts with PC members (as shown in Figure 2); (2) *PC members* using our tool to check for conflicts when proposing reviewers for their assigned submissions; and (3) *paper chairs* uploading completed reviewer and PC assignments and verifying that no conflicts exist before confirming the assignments.

The central visualization is a *node-link diagram* that represents conflict paths as a bipartite graph. Nodes are aligned along the x-axis, with authors on the left (blue boxes) and potential COIs on the right (green boxes). Each edge links an author to all potential COIs listed in DBLP. Edge colors indicate the type of conflict. Multiple edges can appear between nodes if several conflict types apply. Author nodes are tagged with their submitted papers, while each COI is annotated with conflict type(s).

To manage complexity in cases with many conflicts, we group together COIs that are linked to the same author(s) into a single node, reducing visual clutter and highlighting common conflict patterns.

On the left panel in Figure 1, users can select *submissions*, *authors*, or *COIs* to display in the node-link diagram. Search boxes support quick lookup by name or identifier. The selection is dynamic; e.g., choosing a submission automatically highlights its authors and COIs.

Detail-on-demand information is provided in the right panel. When a user selects a node or edge, the panel displays contextual information, including the selected entity, a list of linked authors or reviewers, and specific conflict details, such as DBLP paper IDs or institutional affiliations. The search box enables users to look up potential reviewers and determine whether they have a COI with one or more authors. Moreover, direct links to the corresponding submission on IEEE Xplore and DBLP publications allow users to examine the sources in more detail.

A legend at the bottom of the right panel allows users to filter the relationships displayed in the diagram and adjust the number of past years considered when evaluating co-author conflicts.

This workflow enables both *paper chairs* and *PC members* to proactively identify hidden or non-obvious conflicts, thereby reducing the reliance on opaque flagging mechanisms in traditional conference management systems.

4 Future Work

To further support reviewer assignment and conflict detection, we plan to extend **VisConflicts** in several directions:

1. *Conflict Overview:* Provide an overview visualization to summarize all potential COIs across submissions, supporting a global understanding of the reviewer pool, particularly for large-scale conferences.
2. *Conflict Flagging:* Automatically flag submissions where assigned PC members or reviewers have a detected COI.
3. *Editable Relationships:* Enable users to add or edit inferred relationships manually (e.g., supervision and any personal relationships) to refine and enrich the COI database.
4. *Reviewer Recommendation:* Integrate a recommendation system to suggest qualified reviewers with no detected conflicts, based on topic similarity and areas of expertise.

These components will be integrated into **VisConflicts** to support conflict-aware reviewer assignment, helping identify the best-matching reviewers while avoiding COIs. Our tool can be integrated with real submission data and reviewer lists from the existing submission platforms.

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