

CiteVis: Visual Analysis of Overlapping Citation Intents as Dynamic Sets



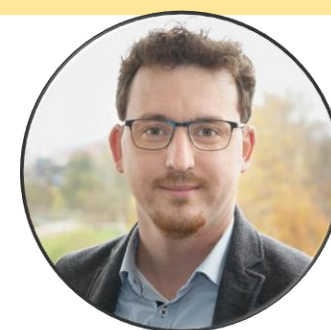
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Abstract:

A scientific article can be cited with different intents over several years. The citation intents can be inferred by classifying the citation text into different categories. With multiple citations to the same article, the **citation intent categories overlap**, making their analysis more challenging. We model the **categories as dynamic sets** and propose an approach to visualize **temporal citation trends** of an article across overlapping citation intents. The approach supports comparison between the citation trends of two seed articles of interest. The implemented prototype supports searching and selecting seed articles from a **Semantic Scholar dataset**.

Example:

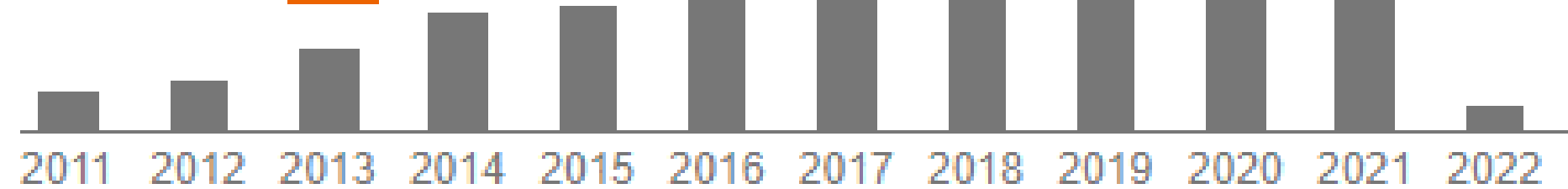
Seed Article A: Narrative Visualization:
Telling Stories with Data [1]

Seed Article B: UpSet: Visualization of
Intersecting Sets [2]

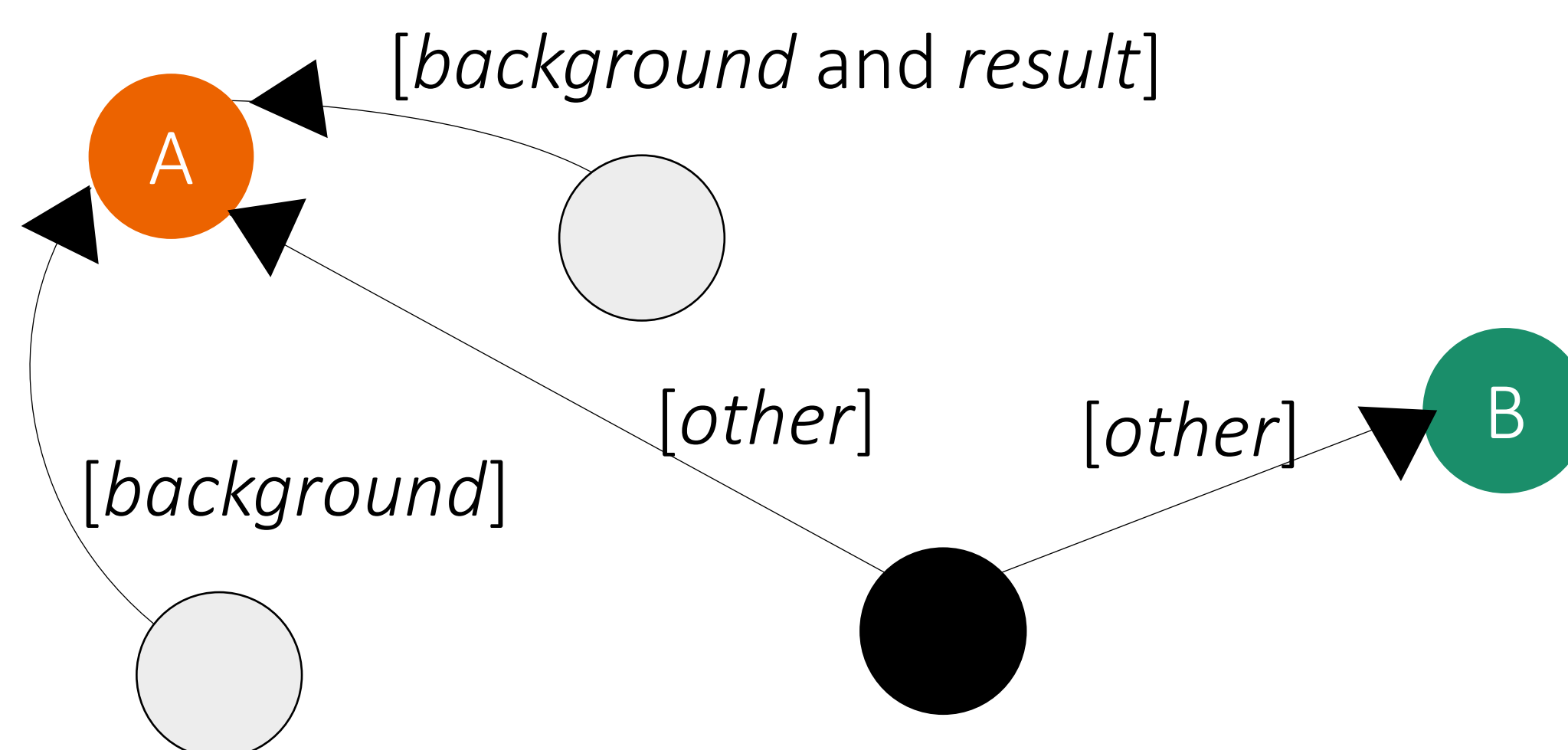
Citation Intents:

1. **background:** "The citation states, mentions, or points to the background information giving more context about a problem, concept, approach, topic, or importance of the problem in the field" [3]
2. **methodology:** "Making use of a method, tool, approach or dataset" [3]
3. **result:** "Comparison of the paper's results/findings with the results/findings of other work" [3]
4. **other:** unclassified citations

Citations of A:



Cited for establishing *background*?,
comparing *results*? *other*?



Analysis Questions:

1. How to analyze the **trends in overlapping citation intents** of an article?
2. How to **compare the citation intents** of two articles?

Only one common citation,
suggesting **clearly distinct themes**

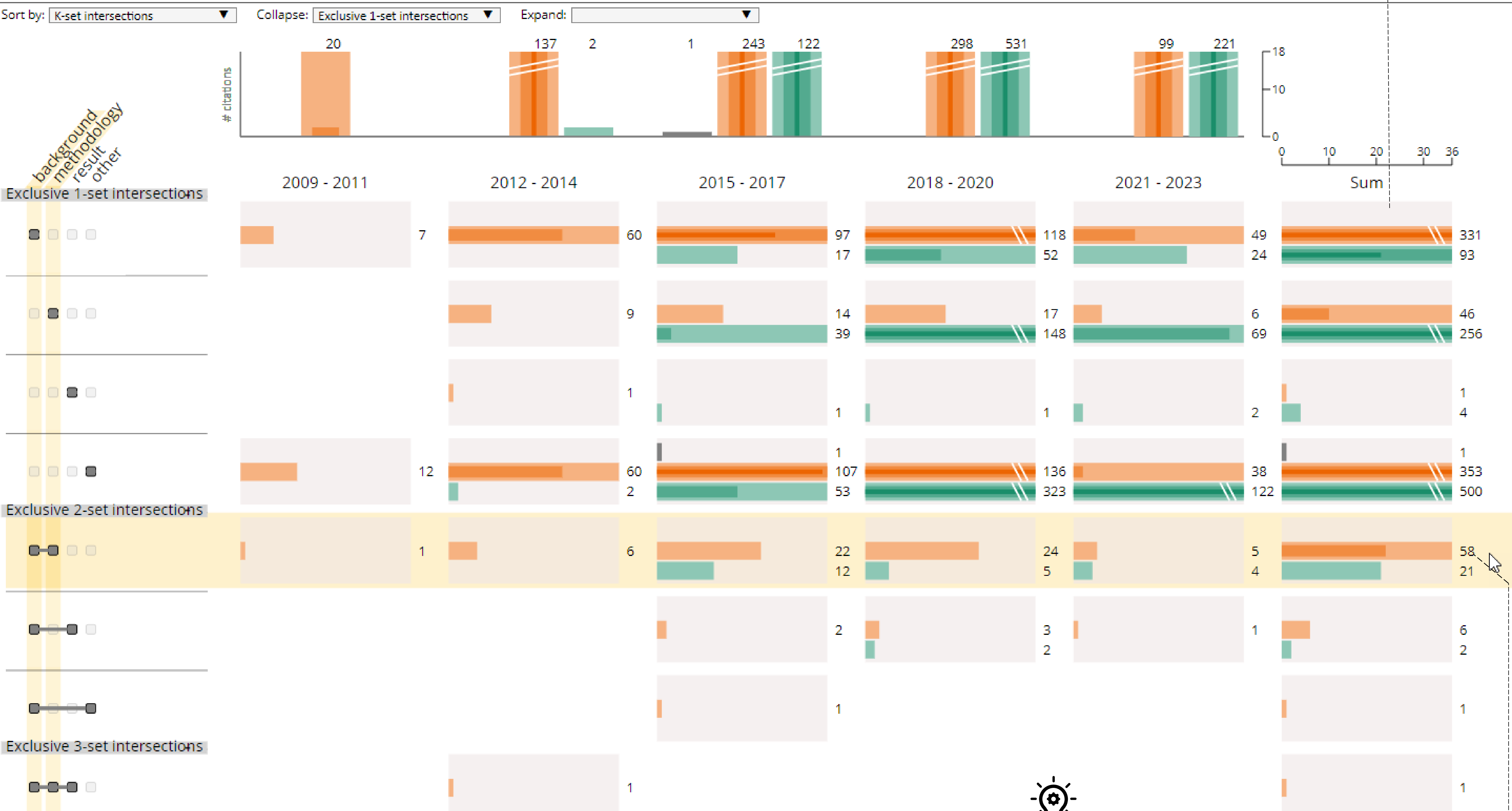
- **Seed A** cited mostly as *background* (#331); cited with two intents *methodology* and *background* (#58)
- **Increasing citations** of **Seed B** as *methodology* (#256) for its contribution of a set visualization technique

Search and Select: Search (Semantic Scholar) by paper title

Select as seed A Select as seed B

Common Citations: 1

Seed A | #Citations: 797 – E. Segel and Jeffrey Heer "Narrative Visualization: Telling Stories with Data." IEEE Transactions on Visualization and Computer Graphics **2010**. DOI [x]
Seed B | #Citations: 876 – A. Lex et al. "UpSet: Visualization of Intersecting Sets." IEEE Transactions on Visualization and Computer Graphics **2014**. DOI [x]



Highlighted Article

[2018] *Similarity Detection among Academic Contents through Semantic Technologies and Text Mining*
CITES
A: [2010] *Narrative Visualization: Telling Stories with Data* as [background]

Citing Articles

- Search Element
- 1 : 797 : 876
- Visual Analytic Methods f...
 - Similarity Detection amon... x
 - The Science of Visual Dat...
 - Analyzing gaze behavior f...
 - Worki ng With or Next to ...
 - aiding designers to make
 - Visualization Assessment...
 - Contextualised, Memorable...
 - The world's wealth in piz...
 - Aesthetics in Data Visual...
 - StoryIcon: A Prototype fo...
 - Geographical Design: Spat...
 - Showing Data About People...
 - Breathing smarter: A crit...
 - GraphScape: A Model for A...
 - The Transformation of Inf...
 - SIGCHI Conference Proceed...
 - Visualization of Cultural...
 - Current Barriers to Open ...
 - Linea: Building Timelines...
 - Is Seeing Intriguing? Pra...
 - Automatic Annotation Sync...
 - Visualization Authoring f...
 - Structured and uncertain...
 - The Evolution of Data Jou...
 - Insight provenance for sp...
 - Digitalisation, Innovatio...
 - Integrated Spatio-tempora...

Discussion:

CiteVis helps in analyzing:

1. the **type of contributions** an article makes and **comparing** to another article
2. the **character of joint research** at the intersection of the selected articles
3. **shifts in the perception** of an article over time

References:

- [1] E. Segel and J. Heer, "Narrative Visualization: Telling Stories with Data." in IEEE TVCG, 2010
- [2] A. Lex et al. "UpSet: Visualization of Intersecting Sets." in IEEE TVCG, 2014
- [3] A. Cohan, et al. "Structural scaffolds for citation intent classification in scientific publications." In NAACL, 2019

Both articles were cited as *background* and *methodology*;
citation count of **seed A** is **higher** in the combination

Details: <https://s-agarwl.github.io/citevis>

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