

# Visual Querying and Exploring of Large Multilayer Graphs

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Many real world data can be modeled by a graph with a set of nodes interconnected to each other by multiple relationships. Such a rich graph is called **multilayer graph**. We introduce a novel visual platform to query, explore and support the analysis of large multilayer graphs.

## Contributions:

- A **new visual platform** [1] that allows to query large multilayer graphs, visualize retrieved results and suggest query extensions based on the underlying graph structure and the current query results.
- **Interactive mechanisms** to support the synergy between the user and the underlying multi-graph query engine named *SuMGra* [2].

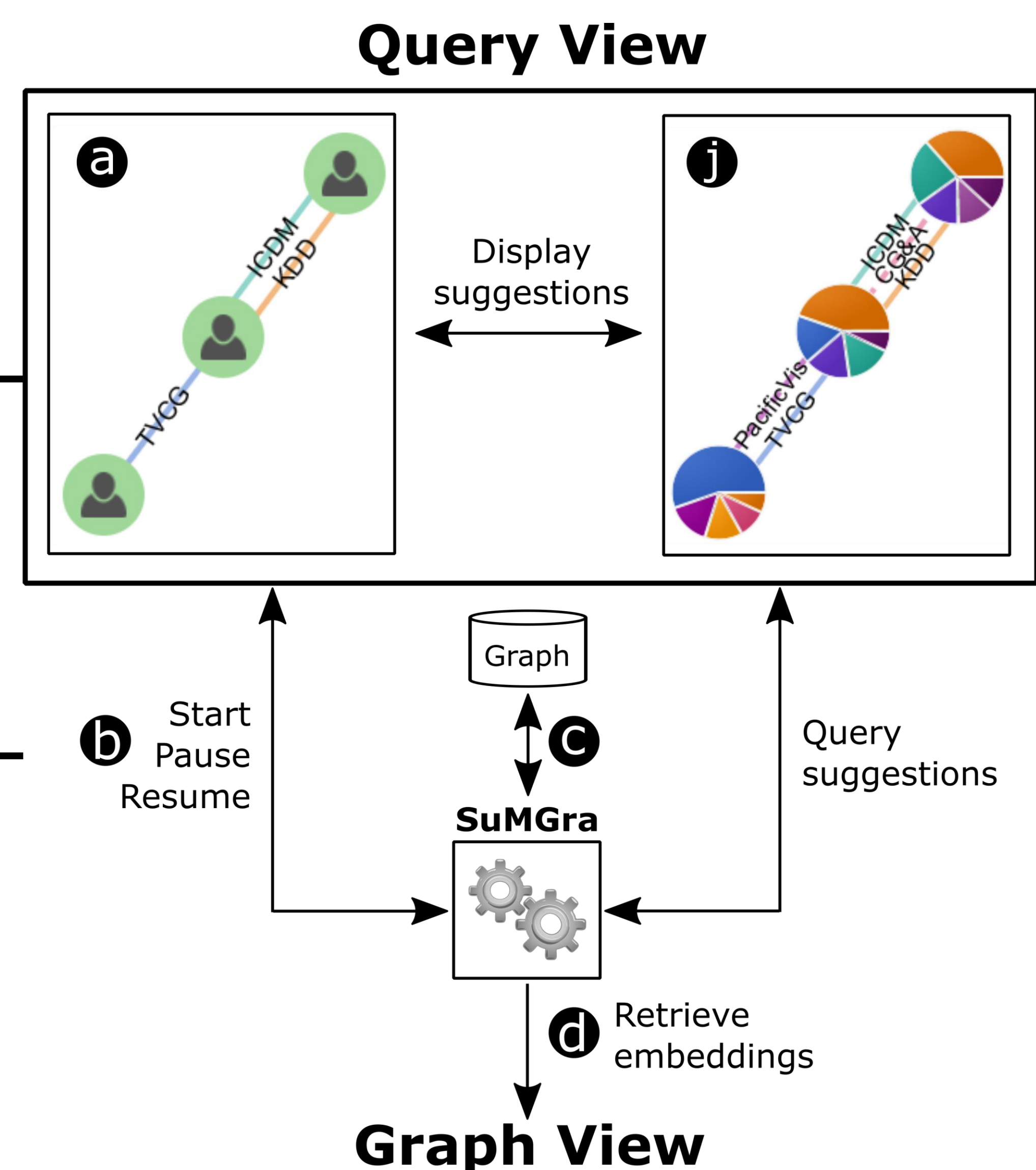
**Scenario:** a user is interested to gain knowledge about authors who have published in the *Visualization* and the *Data Mining/Data Base* domains from the *DBLP* co-authorship network. The goal is to retrieve groups of authors that collaborate together and one of them has publications in both fields.

## Query Construction and Suggestions

The **Query View** allows to visually build the query, e.g. where an author published a *TVCG* paper with one author and he/she also published an *ICDM* and a *KDD* paper with another author (**a**).

Once the construction of the query is finished, the user sends the query to the *SuMGra* engine (**b**). Next, the engine queries the graph (**c**) in order to retrieve the results (**d**).

Based on the retrieved results and the graph, the query mechanism suggests  $k$  new edges using visual representations (e.g. pie charts) (**j**), with the possibility to refine the previous query and execute it again.

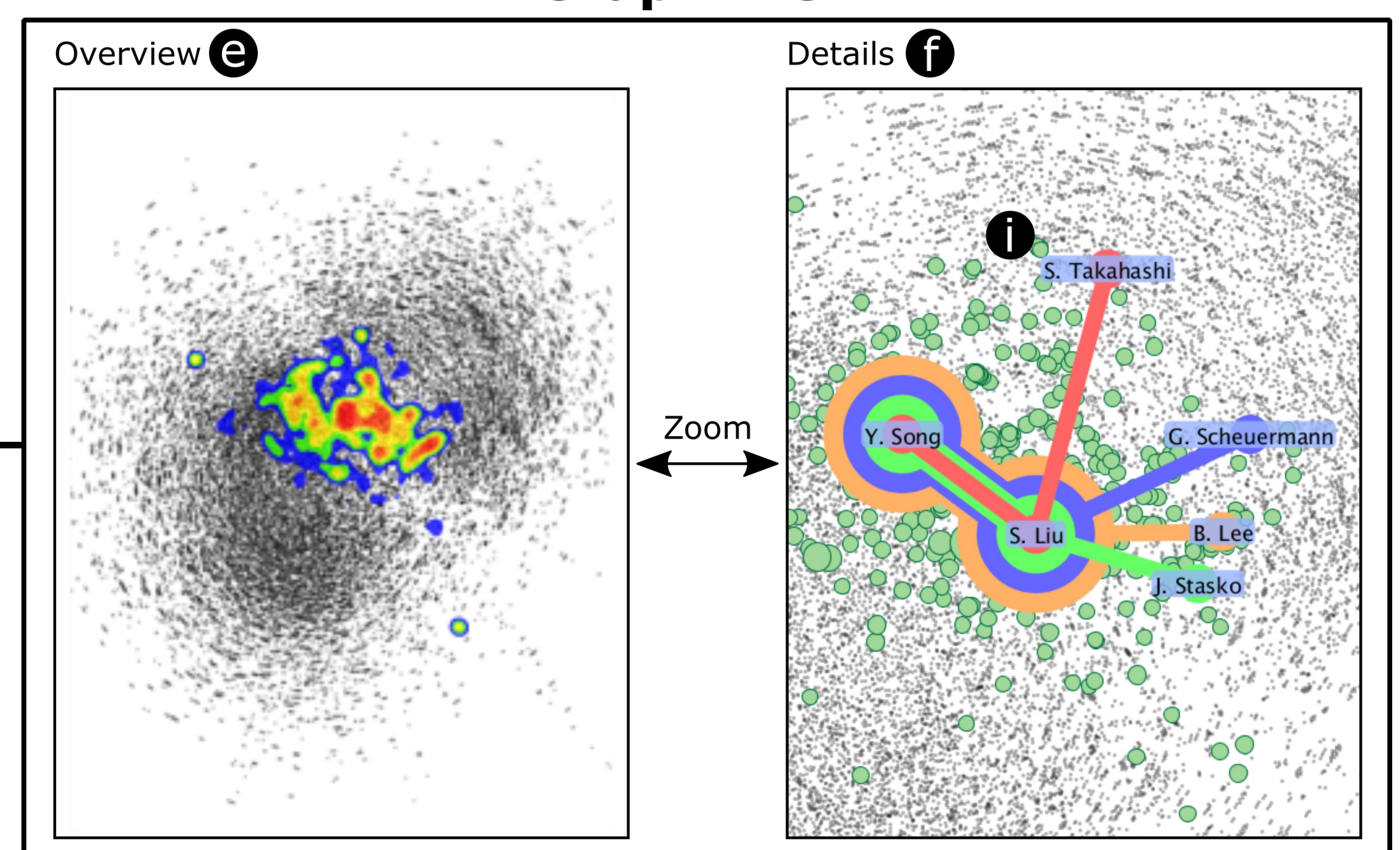


## Visualization and Exploration of Results

The **Graph View** shows the graph and allows navigate/explore results at different levels of detail:

- **Overview (e):** show the results locations using a heatmap representation.
- **Details (f):** allow the user to inspect particular nodes involved in the results (**g**).

The **Embeddings View** allows the user to visualize the list of results (**h**) for a set of selected nodes (**g**) (e.g. results involving *S.Liu* and *Y.Song*). From this list, the user can select up to five results that will be visualized on the *Graph View* by using a kelp-based approach (**i**).



1. E. Cuenca, A. Sallaberry, D. Ienco, and P. Poncelet. Visual Querying of Large Multilayer Graphs. In *Proceedings of the International Conference on Scientific and Statistical Database Management (SSDBM)*, pp. 32–34. ACM, 2018.
2. V. Ingalalli, D. Ienco, and P. Poncelet. SuMGra: Querying Multigraphs via Efficient Indexing. In *Proceedings of the International Conference on Database and Expert Systems Applications (DEXA)*, pp. 1–15. Springer, 2016.

