

VIIQ: Auto-Suggestion Enabled Visual Interface for Interactive Graph Query Formulation

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Motivation

Graphical query interfaces are widely recognized to be important for improving the usability of data management systems.

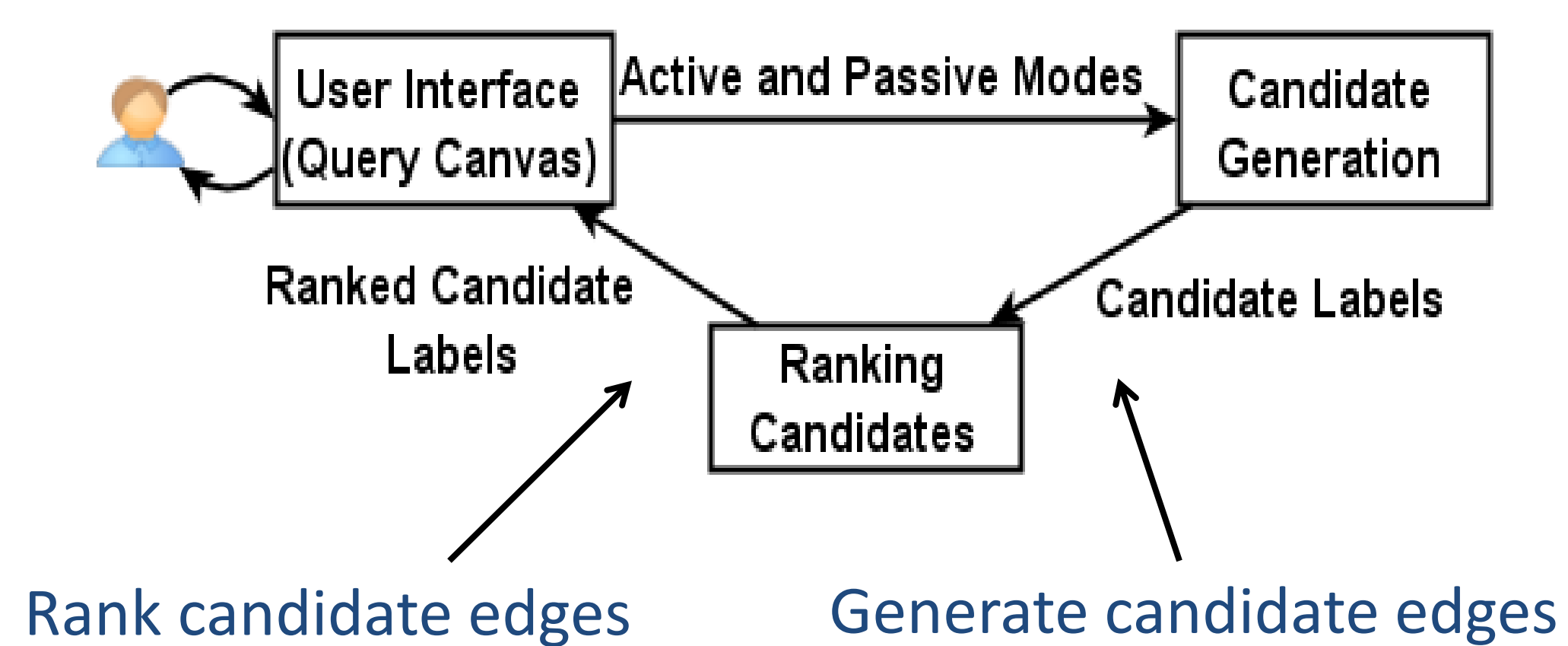
Limitations of Existing Visual Query Systems

- They allow users to draw nodes and edges of query graphs, but do not rank relevant suggestions regarding what to add.
- Difficult for schema-agnostic users to sift through and search for the exact option.

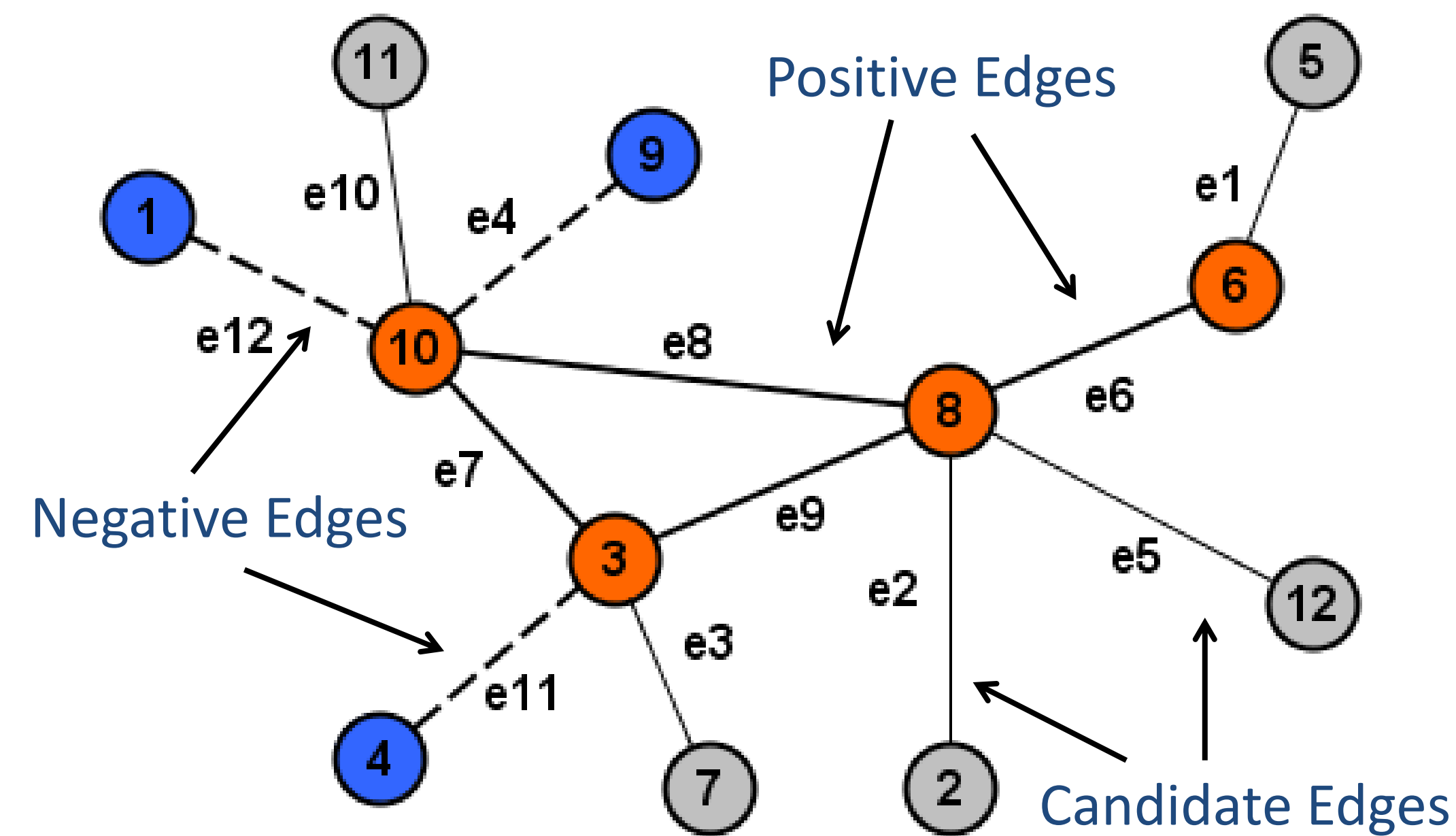
Challenges

- An interactive query interface that seamlessly integrates automatic edge recommendation with query formulation.
- Large ultra-heterogeneous graphs contain thousands of node/edge types, and millions of node/edge instances as candidates.
- Ranking must reflect the relevance to user's query intent.

Orion Architecture



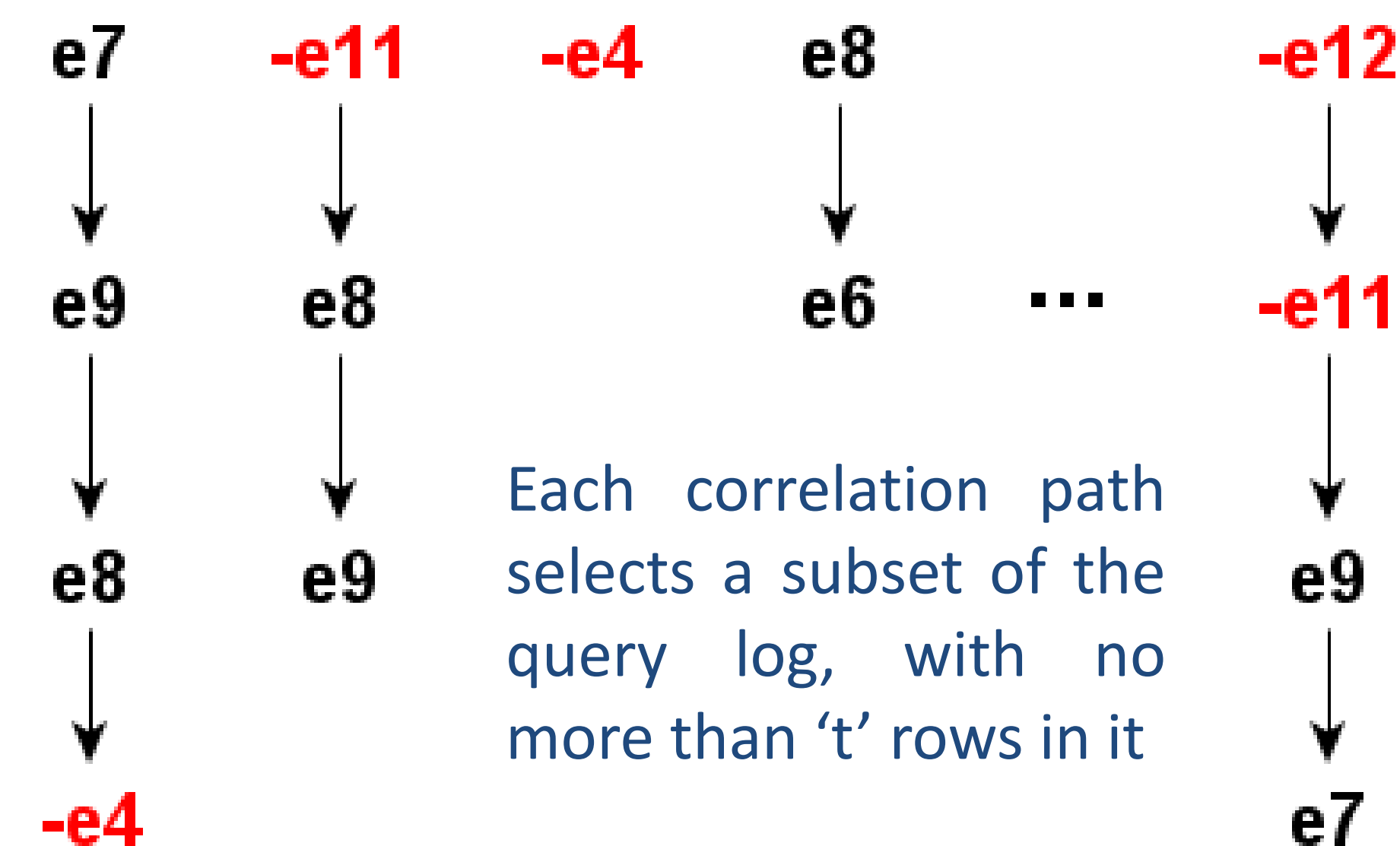
Ranking Candidates



- New Candidate Edges: $\langle e1, e2, e3, e5, e10 \rangle$
- Positive Edges: $\langle e6, e7, e8, e9 \rangle$
- Negative Edges: $\langle e4, e11, e12 \rangle$
- Query Session: $\langle e6, e7, e8, e9, -e4, -e11, -e12 \rangle$
- Query Log: A collection of other query sessions

Random Correlation Paths (RCP)

- RCP: A sequence of randomly chosen edges from the query session, grown incrementally, until its support drops below a threshold (t).



Each correlation path selects a subset of the query log, with no more than 't' rows in it. Compute support for each candidate, in \rightarrow Find average score over all RCPs for each candidate edge

Orion User Interface

The screenshot shows the Orion User Interface. The Query Canvas displays a graph with nodes and edges. Some nodes and edges are grey (newly suggested), while others are orange (already selected). The Information Panel on the right provides help and actions:

- Edge Examples / Reverse Role:** Click on an edge to view its source type, object type and example instances.
- Possible Actions:** Click on other grey nodes to be included in the query graph; Click on the grey edge to select it; Click on a grey edge to display the other occurrences of the grey edge; Click on the empty canvas to add the selected nodes and edges to the query graph while ignoring the unselected grey nodes, and display new suggestions; Click on selected nodes (in blue) to unselect them.
- Useful Tips:** To add a new node, click on empty space in the canvas; To add a new edge between two nodes, click on one node and drag to the other node; To re-position a node, hold down the shift key, then click and drag the node around; To remove a node, select the node by clicking on it and press the Delete button; To remove an edge, select the edge by clicking on it and press the Delete button.

This screenshot shows the Orion User Interface in Passive Mode. A grey node is highlighted, and a tooltip indicates it is an 'Already selected newly suggested node'. A grey edge is also highlighted, and a tooltip indicates it is an 'automatically suggested grey edge' that can be clicked to view other instances of that edge.

This screenshot shows the Orion User Interface in Active Mode. A dialog box titled 'Adding a new node manually' is open, allowing the user to select a node label from a domain (e.g., EDUCATION) and search for a specific type (e.g., College/University).

This screenshot shows the Orion User Interface in Active Mode. A dialog box titled 'Adding a new edge manually' is open, allowing the user to select an edge label from a list of available edges (e.g., students_graduates-education).

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