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

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).
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\[ e_7 \rightarrow e_{-11} \rightarrow e_{-4} \rightarrow e_8 \rightarrow e_{12} \]
\[ e_9 \rightarrow e_8 \rightarrow e_6 \rightarrow \cdots \rightarrow e_{-11} \]
\[ e_8 \rightarrow e_9 \rightarrow e_7 \]

Each correlation path selects a subset of the query log, with no more than ‘t’ rows in it.

Compute support for each candidate, in finding average score over all RCPs for each candidate edge

Ranking Candidates

Negative Edges

Positive Edges

Candidate Edges

Orion User Interface

Query Canvas

Newly suggested nodes and edges in grey
Orange nodes with black edges form the partial query graph
Passive Mode of operation

Option to view the types of an edge's ends, and its example instances
Dynamic help listing possible user actions at every step
Other useful tips

Information Panel

Passive Mode of operation

Active Mode of operation

Adding a new node manually

Adding a new edge manually

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