**DATASETS:**
- Freebase (28 M nodes, 47 M edges, 5400 relationships)
- DBpedia (759 K nodes, 2.6 M edges, 9100 relationships)

**QUERIES:**
- 20 Queries on Freebase
- 8 Queries on DBpedia

**Related Work**
- Query-by-example in relational databases [Zloof'75].
- Keyword search and keyword-based query formulation [Chang et al.'11].
- Set expansion [Wang et al.'07]. XML query relaxation [Amer-Yahia et al.'05].
- Exemplar queries [Mottin et al., 2014].

**Query Graph Discovery**
- Weight edges using heuristics and use a greedy approach to obtain a smaller connected MQG.
- Obtain neighborhood graph.

**Answer Space Modeling**
- Nodes (F) and (HL) are two minimal query trees.
- Node (F) corresponds to the sub-graph that connects Jerry Yang and Yahoo through edge founded.
- Node (FGHLP) is the MQG, and it corresponds to the entire query graph on the left.

**Query Interface**
- Modified lattice with recomputed upper boundary
- All the super-graphs of a null node are pruned.

**Query Processing**
- Initial Lattice
- Upper Bound (UB): score of the highest-scored super-graph in the lattice.
- Lower Bound (LB): edge matching score of the corresponding graph.
- (GHL), a node that does not have any answers, is a null node.

**Query Graph**
- Initial graph.

**GQBE Architecture**
- Input: an example of what the user wants to find.
- Ranking Top-k Answer Tuples

**Querying Knowledge Graphs by Example Entity Tuples**

**Experiments**
- Ground truth based accuracy comparison of GQBE and NESS. Comparison of GQBE, NESS and Exemplar Queries. The measured parameters are precision-at-k, Mean Average Precision and normalized Discounted Cumulative Gain.

**Technical Details and Demo**
- Demo URL: hXp://idir.uta.edu/gqbe

**Querying Knowledge Graphs by Example**
- Connected MQG.
- Multiple MQGs are merged based on edge labels and vertex label matches.

**Answer Space Evaluation**
- Number of edges vs MQG.
- Number of nodes vs MQG.

**Accuracy of GQBE on multi-tuple queries, k = 25.**

**Querying Knowledge Graphs by Example**
- Query Interface
- Knowledge Graphs
- Usability Challenges
- Related Work

**Environment**
- Partially funded by:

**Knowledge Graphs**
- Big and complex data: Lack of schema, challenging to users and developers.
- How to query the graph, and understand the results.

**Usability Challenges**
- Query-by-example in relational databases [Zloof'75].
- Keyword search and keyword-based query formulation [Chang et al.'11].
- Set expansion [Wang et al.'07]. XML query relaxation [Amer-Yahia et al.'05].
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