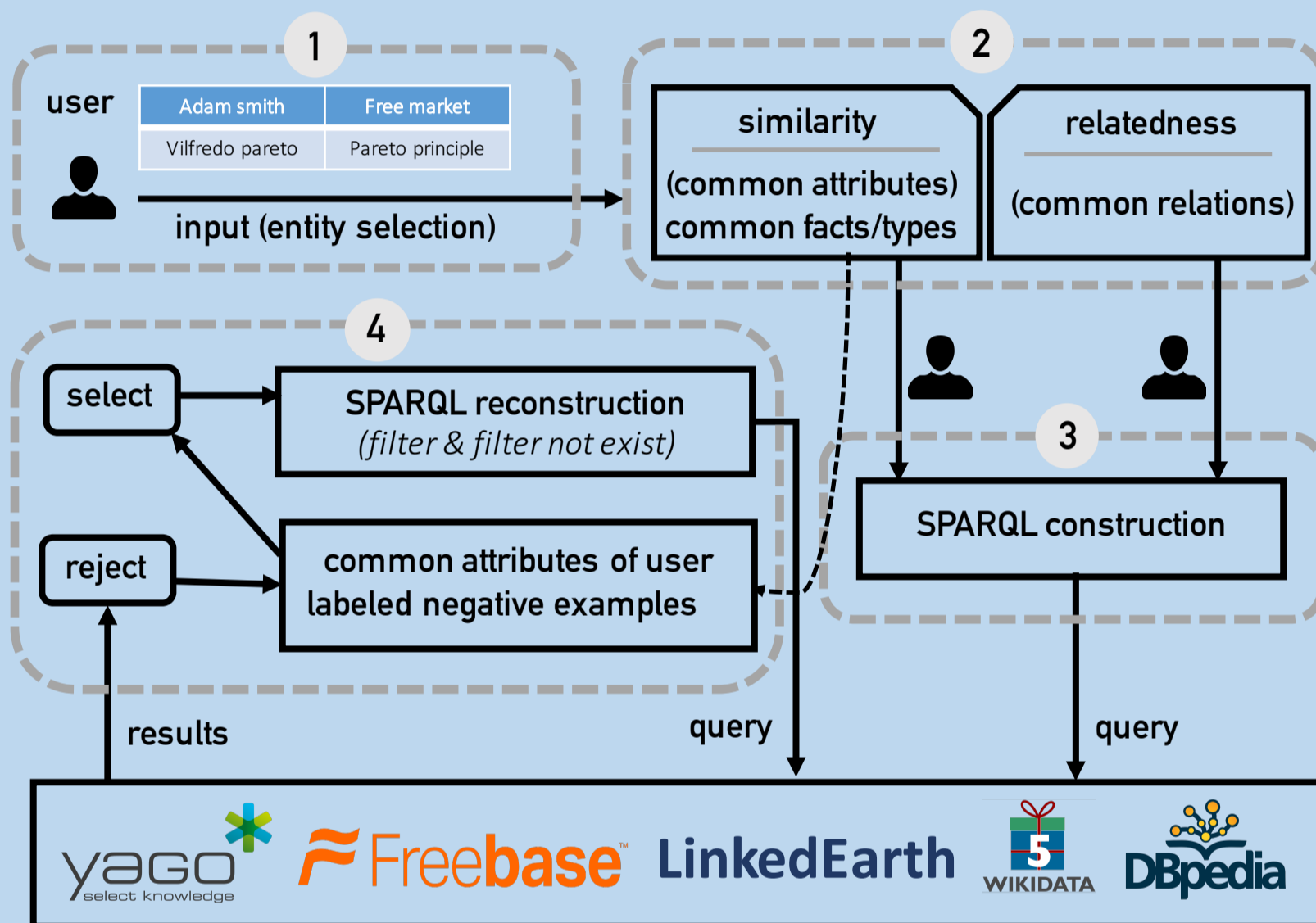


## Motivation

- To explore large knowledge graphs, it's difficult to write a correct and well-expressed query
- Query-by-example: previous work focuses on inputting a single or a pair of entities as examples
- CUTE: query knowledge graphs in complex scenarios by tabular examples and improve results with users labeling negative ones

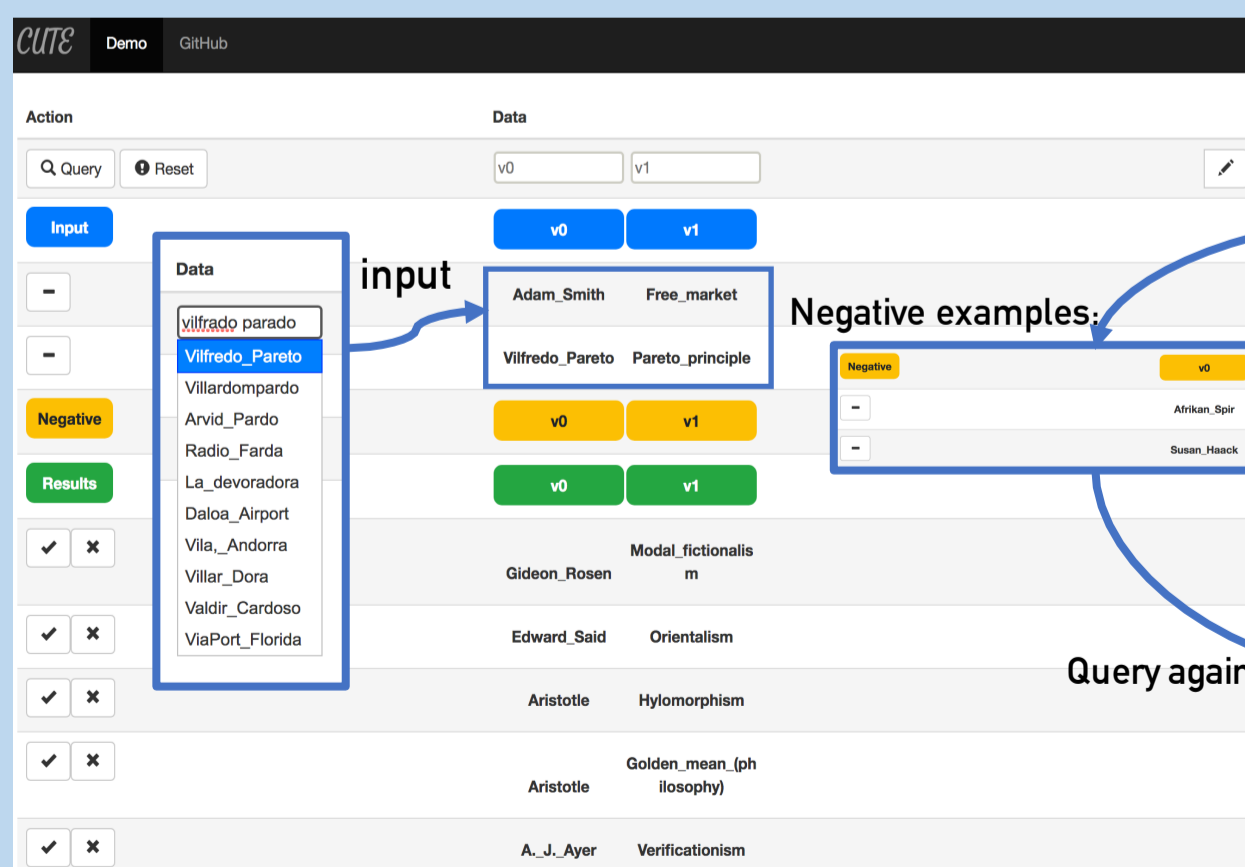
- Input:**  
A tabular example  $E$  with  $m$  rows and  $n$  columns
- Output:**  
A SPARQL query  $Q$ , and results  $R$  ( $E \subseteq R$ )

## Techniques



- Select the exact entities from the drop-down menus (string based sim. measure)
- Common types:**  
Infer from the dataset ontology  
**Common facts:**  
At each column,  
a) Detect the same  $(sub, ?pred, ?obj)/(?sub, ?pred, obj)$  shared by all entities in the column;  
b) Rank those common attributes and let users choose from top-k  
**Common relations:**  
a) For each row, find shortest paths between any two entities and merge all paths to form a graph  
b) Find the maximal common subgraph of  $m$  graphs as the common relations
- Replace entities with variables
- This process will not be terminated until the user is satisfied.

## Scenarios



The screenshot shows the CUTE web interface. The 'Data' table contains the following rows:

Adam_Smith	Free_market
Vilfredo_Pareto	Pareto_principle
Gideon_Rosen	Modal_fictionalis m
Edward_Said	Orientalism
Aristotle	Hylomorphism
Aristotle	Golden_mean_(philosophy)
A._J._Ayer	Verificationism

The 'Negative examples' section shows a table with columns for 'Negative', 'v0', and 'v1':

-	African_Spir	Foundationalism
-	Susan_Haack	Foundherentism

### SPARQL:

```
BASE <http://yago-knowledge.org/resource/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
SELECT DISTINCT ?v0 ?v1
WHERE {
  ?v0 <isKnownFor> ?v1 .

  ?v0 rdf:type <wikicat_Scholars> .
  ?v0 rdf:type <wordnet_physical_entity_100001930> .
  ?v1 rdf:type <wordnet_theory_105989479> .
  ?v1 rdf:type <wordnet_abstraction_100002137> .
```

```
FILTER ( isURI(?v0) && isURI(?v1) )
}
LIMIT 50
OFFSET 0
```

```
BASE <http://yago-knowledge.org/resource/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
SELECT DISTINCT ?v0 ?v1
WHERE {
  ?v0 <isKnownFor> ?v1 .

  ?v0 rdf:type <wikicat_Scholars> .
  ?v0 rdf:type <wordnet_physical_entity_100001930> .
  ?v1 rdf:type <wordnet_theory_105989479> .
  ?v1 rdf:type <wordnet_abstraction_100002137> .
```

```
FILTER ( isURI(?v0) && isURI(?v1) )
FILTER NOT EXISTS {
  ?v0 rdf:type ?t0 .
  ?v1 rdf:type ?t1 .
  FILTER ( regex(?t0, "(wikicat_European_philosophers|wikicat_Philosophers)$", "-i") )
  FILTER ( regex(?t1, "(wikicat_Epistemological_theories)$", "-i") )
}
}
LIMIT 50
OFFSET 0
```

Find out the code at:

<https://github.com/Zichen-Wang/CUTE>

