Visual Query Representations for Supporting SQL Learners

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Database Research Group
Introduction

Databases are powerful tools.

Use of a dedicated query language is required.

Structured Query Language

```sql
SELECT cName
FROM customer
WHERE EXISTS ( 
  SELECT *
  FROM purchase
  WHERE customer.cID = purchase.cID
  AND price > 10
)
```
Problem Statement

Writing queries in SQL is hard for various reasons:

- lack of knowledge
- difficulties remembering the database schema
- interference of previous knowledge
- losing track while writing long queries
- high cognitive load

Our solution: a visual graph query representation.
Visualization Design

customer

customer c

purchase.clID = customer.clID

purchase pur

tID clID sID pID date quantity price
<20 >10

product p

inventory.piID = product.piID

inventory i

store.siID = inventory.siID

store s
Visualization Design

SELECT MAX(quantity) FROM purchase AS pur, product AS p
WHERE p.pID = pur.pID
AND p.pID < 50
AND pur.price > 10;
Qualitative evaluation

What do users think of the visual representation?

Findings:
- Good for keeping track
- Good for identifying mistakes
- Representation was underutilized
Quantitative evaluation

How do students perform with and without the visual representation?

<table>
<thead>
<tr>
<th></th>
<th>Plain</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>Total interactions</td>
<td>3377</td>
<td>2624</td>
</tr>
<tr>
<td>Unique queries</td>
<td>74%</td>
<td>86%</td>
</tr>
<tr>
<td>Number of correct answers</td>
<td>174</td>
<td>327</td>
</tr>
<tr>
<td>Correct answers</td>
<td>5.2%</td>
<td>12.5%</td>
</tr>
</tbody>
</table>
Quantitative evaluation

How do students perform with and without the visual representation?

<table>
<thead>
<tr>
<th>Visual notebook</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td>1358</td>
</tr>
<tr>
<td>Execute</td>
<td>1085</td>
</tr>
<tr>
<td>Visualize</td>
<td>778</td>
</tr>
</tbody>
</table>
Conclusions

We introduce visual query representations.

Our experiments demonstrate the promise of visual representations for efficient querying.
Que
ries?

purchase pur

product.pID =
purchase.pID

product p

inventory

store

store.sID =
inventory.sID

inventory.pID =
product.pID

price

quantity

MAX >10

pID date sID cID tID

pName

suffix

<50

pID

TU/e