Relaxed Selection Techniques for Querying Time-Series Graphs

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time-series graphs
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rubber-band selection
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relaxed selection techniques
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related work
rubber-band selection
rubber-band selection
rubber-band selection
Hochheiser and Shneiderman, *Discovery Science*’01.
Keogh et al., *FQAS*’02.
Hochheiser et al. *ICME*’03.
Hochheiser and Shneiderman, *Information Visualization*’04
Buono et al., *VDA*’05.
Buono and Simeone, *AVI*’08.
QuerySketch

To search for stocks, draw on the graph above.

Wattenberg, CHI’01

QuerySketch
Wattenberg, CHI’01

QuerySketch
QueryLines

Relevance Feedback

Patterns

VizTree

Line Graph Explorer
relaxed selection techniques
1. selection
1. selection
1. selection
2. level of similarity
1. selection
2. level of similarity
1. selection
2. level of similarity
3. noise level
1. selection
2. level of similarity
3. noise level
how does it work?
filtering
pairing
pairing
two methods to derive the query

spatially relaxed selection
temporally relaxed selection
spatially relaxed selection
spatially relaxed selection
spatially relaxed selection
end points

spatially relaxed selection
end points

tolerance

spatially relaxed selection
spatially relaxed selection
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spatially relaxed selection
temporally relaxed selection
temporally relaxed selection
temporarily relaxed selection
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temporally relaxed selection
matching
user query

matching input 1
time-series graph

matching input 2
time-series graph

matching input 2
matching step 1
matching step 1
matching step 1
matching step 2
matching step 2
matching step 2
matching step 2
matching step 3
matching step 4
user study
spatially relaxed selection

temporally relaxed selection

rubber-band selection

query-by-example

SRS

TRS

RB

QE

techniques
user study

18 subjects
age: 18-38
18 subjects
age: 18-38

method

user study
user study

18 subjects
age: 18-38

select

method
18 subjects
age: 18-38

user study

select

method

find
user study

18 subjects
age: 18-38

advance select method

find
each participant:

4 techniques
× 9 datasets
× 15 interactions

= 540 trials
H1. TRS fastest for specification.

... 

H5. SRS finds most relevant matches.
results: exact matches
results: exact matches
results: intersecting matches
results: intersecting matches
results: exact matches

first interaction

precision:
- SRS: 50%
- TRS: 30%
- RB: 20%
- QE: 10%

recall:
- SRS: 70%
- TRS: 50%
- RB: 30%
- QE: 20%
results: exact matches
results: intersecting matches

<table>
<thead>
<tr>
<th>SRS</th>
<th>TRS</th>
<th>RB</th>
<th>QE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision</td>
<td>50%</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>Recall</td>
<td>40%</td>
<td>30%</td>
<td>20%</td>
</tr>
</tbody>
</table>

first interaction
results: intersecting matches
results: time

selection

adjustment
results: time
results: time
2 new techniques

SRS: spatially relaxed selection

TRS: temporally relaxed selection

study:

TRS fastest for selection.

SRS found the most relevant matches.