Research Methods in computer science
Fall 2014

Lecture 4

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September 8, 2014
Agenda

Research Conference Updates
Experiment Design
Deployment Experiments
Feedback from HW2
HW3
Experiments

Hypothesis
Scenarios
Measurements
Conclusions
Types of Experiments

Model / Analysis
Simulations
Testbed (Real word \textit{lite})
“Real world”

Which one to use when?
Scenarios

Types of inputs
Types of configurations

Try to keep the number of scenarios small while covering normal and meaningful corner cases.
A new image recognition system...

What inputs should we use?

Random library from Flickr
Algorithm specific
Standard datasets
Hypothesis

Experiments: hypothesis testing
Bias in hypothesis
Examples
Metrics

Systems
- Throughput
- Latency
- Overhead
- Reliability

Classification
- Precision
- Recall
- Running time

HCI
- Accuracy
- Latency
- “Discomfort”
Conclusions from Experiments

Strict interpretation
Extrapolate
Touché: Enhancing Touch Interaction on Humans, Screens, Liquids, and Everyday Objects

[Sato ‘12]

What hypothesis, scenarios, and metrics should we expect to see in this paper?
What are the (missing) scenarios and (missing) metrics? What can we conclude?

Figure 11. Real-time, per-user classification accuracy for five example applications.

[Sato ‘12]
Fast, Accurate Detection of 100,000 Object Classes on a Single Machine

[Dean ’13]

What hypothesis, scenarios, and metrics should we expect to see in this paper?
What are the (missing) scenarios and (missing) metrics? What can we conclude?

Table 1. Comparison of the hashing-based and baseline algorithms on the PASAL VOC 2007 dataset

<table>
<thead>
<tr>
<th></th>
<th>arp</th>
<th>bike</th>
<th>bird</th>
<th>boat</th>
<th>bttl</th>
<th>bus</th>
<th>car</th>
<th>cat</th>
<th>chr</th>
<th>cow</th>
<th>tbl</th>
<th>dog</th>
<th>hrs</th>
<th>mbke</th>
<th>prsn</th>
<th>plnt</th>
<th>shp</th>
<th>sofa</th>
<th>trn</th>
<th>tv</th>
<th>Mean</th>
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</thead>
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<tr>
<td>Ours</td>
<td>0.19</td>
<td>0.48</td>
<td>0.03</td>
<td>0.10</td>
<td>0.16</td>
<td>0.41</td>
<td>0.44</td>
<td>0.09</td>
<td>0.15</td>
<td>0.19</td>
<td>0.23</td>
<td>0.10</td>
<td>0.52</td>
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<td>0.10</td>
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<td>0.28</td>
<td>0.34</td>
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<td>0.24</td>
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<td>0.55</td>
<td>0.01</td>
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<td>0.34</td>
<td>0.39</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Figure 3. Effect of hashing parameters on the accuracy, speed and memory required by the system.

[Dean ‘13]
HW3

Write one-paragraph summary of the proposed project.

Write a paragraph addressing each “Research Formulation” questions. The complete writeup should not be longer than two pages.