WebSee: A Tool for Debugging HTML Presentation Failures

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Web Applications

It takes users only 50 ms to form opinion about your website (Google research - 2012)

Online shopping service
Motivation

• Presentation of a website
  – Crucial to make first impression

**End user – no penalty to move to another website**
**Business – loses out on valuable customers**

• Impact of presentation failures
  – Gives negative impression of your business
    • Affects branding efforts
  – Reduces usability and trustworthiness
WebSee

• Underlying technique [ICST ‘15]

• **Goal** – Automatically detect and localize presentation failures

• **Detection** – Computer vision

• **Localization** – Rendering maps
Process Overview (1. Detection)

A

B

C

Test web page/Apps and sharing (DBS/AND)
Process Overview (2. Localization)

```
<table>
<thead>
<tr>
<th>tr[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>td</td>
</tr>
<tr>
<td>Login:</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>table</td>
</tr>
<tr>
<td>tr</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>tr[3]</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
```
Process Overview (2. Localization)

Sub-tree of R-tree
Process Overview (2. Localization)

Result Set:

/html/body/…/tr[2]
/html/body/…/tr[2]/td[1]
/html/body/…/tr[2]/td[1]/table[1]
/html/body/…/tr[2]/td[1]/table[1]/tr[1]
/html/body/…/tr[2]/td[1]/table[1]/td[1]

Map pixel visual differences to HTML elements
Process Overview (3. Result Set Processing)

Cluster A
- /html/body/table/…/img
- /html/body
- /html/body/table

Cluster B

Cluster C

Report

This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news! This is indeed a big news!
Empirical Evaluation

Detection accuracy = 100%
Localization accuracy = 93%

Localization accuracy

Time = 87 sec

Running time

Result set size = 23 (10%)

Result Set Size

Rank = 4.8 (2%)

Rank of faulty element
Demo

1. Regression Debugging
   - Current version of the web app is modified
     • Refactor HTML (e.g. convert `<table>` to `<div>` layout)
   - Seed two presentation failures

2. Mockup Driven Development
   - Front-end developers convert high-fidelity mockups to HTML pages
   - Use real-world mockup
Thank you

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https://github.com/sonalmahajan/websee

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