Web Not For All

A Large Scale Study of Web Accessibility

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Context

- The Web is the biggest information source for Mankind. Decentralised architecture made it blossom.
- Humans (and computers!) contribute to information production and consumption, leading to ~45B Web pages.

Context

- Growth of users contributing and interacting with the Web leads to significant diversity of users, including *people with disabilities*.
- The openness and decentralisation of the Web leads to an uncontrolled quality check of Websites' *usability* (and *accessibility*).

What is the state of accessibility on the Web?

- It is known that Web accessibility adequacy is often **far worse** than desired.
- Studies tend to focus on a *restricted* (small) set of Web sites.

- Do *macroscopic properties* of Web accessibility emerge from analysing at a large scale?

Experiment

background

- The *Portuguese Web Archive* initiative periodically crawls contents from the Portuguese Web (.pt and others) for future preservation.
- Services are built on top of crawled collections: search (end users) & analysis framework (researchers).

Methodology

data acquisition - obtaining the document collection

- Collect a sufficiently large portion of the Web, yet representative (e.g., *national Webs*)
- Spider traps handled gracefully
- Boostraped with 200,000 Website addresses from the *.pt* TLD
- Collected March/May 2008

Methodology

data acquisition - evaluation process

- Implementation of 39 WCAG 1.0 checkpoints yield *pass*, *fail*, *warn*.
  (collection previous to WCAG 2.0 TR)
- Overcome computational effort with Hadoop cluster, streams, caching, etc.

Methodology

data analysis

- Failure rate, 3 criteria:

$$rate_{conservative} = \frac{passed}{applicable}$$

$$rate_{optimistic} = \frac{passed + warned}{applicable}$$

$$rate_{strict} = \frac{passed}{applicable - warned}$$

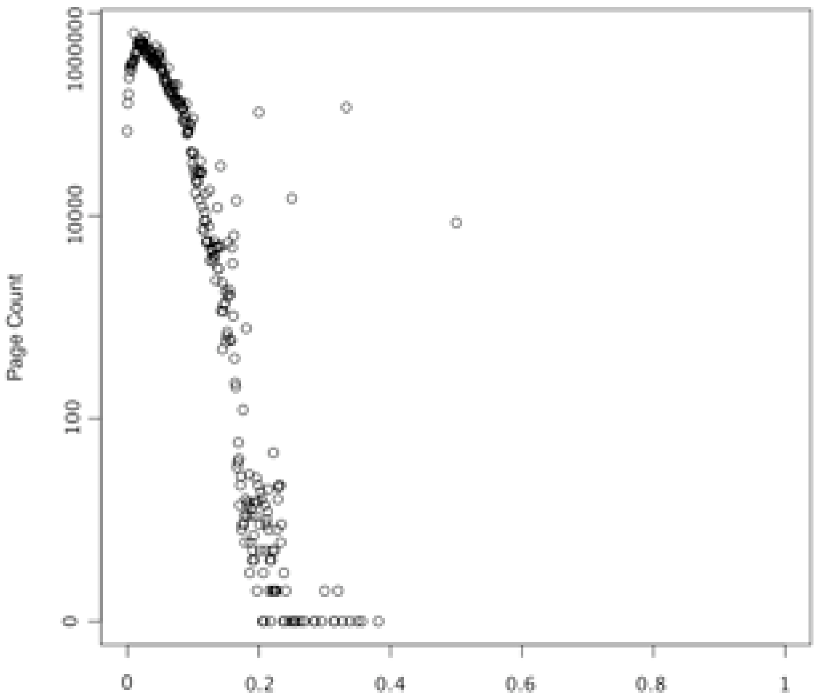
Results

general

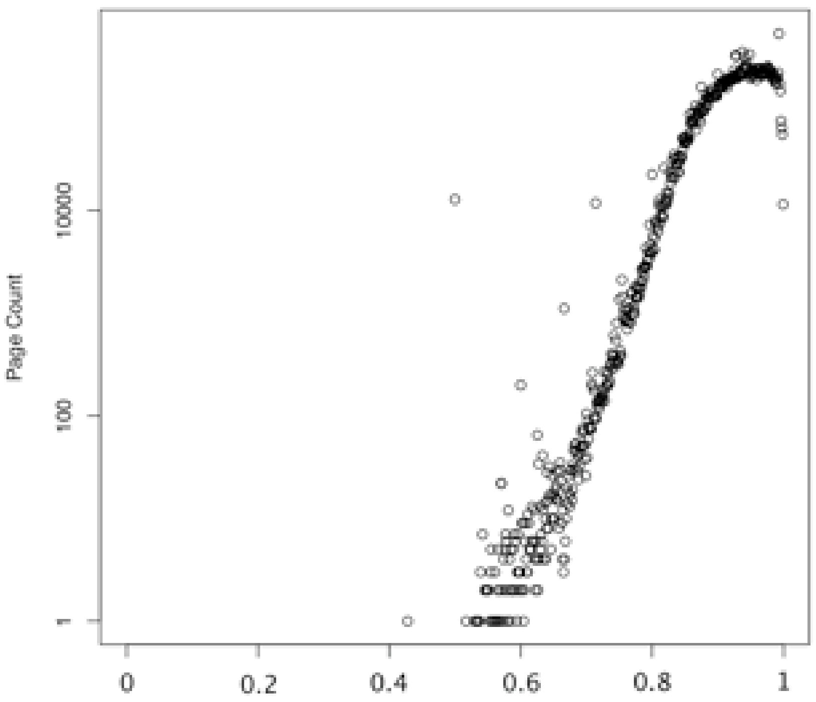
- 28M Web pages were evaluated. *(58%)*
- 21GB evaluation data collected for analysis.
- 40B HTML elements evaluated. *(~1500/page)*
    - 1.5B elements *passed*. *(56/page, 3.89%)*
    - 2.9B elements *failed*. *(103/page, 7.15%)*
    - 36B elements *warned*. (1291/page, 89%)

Results

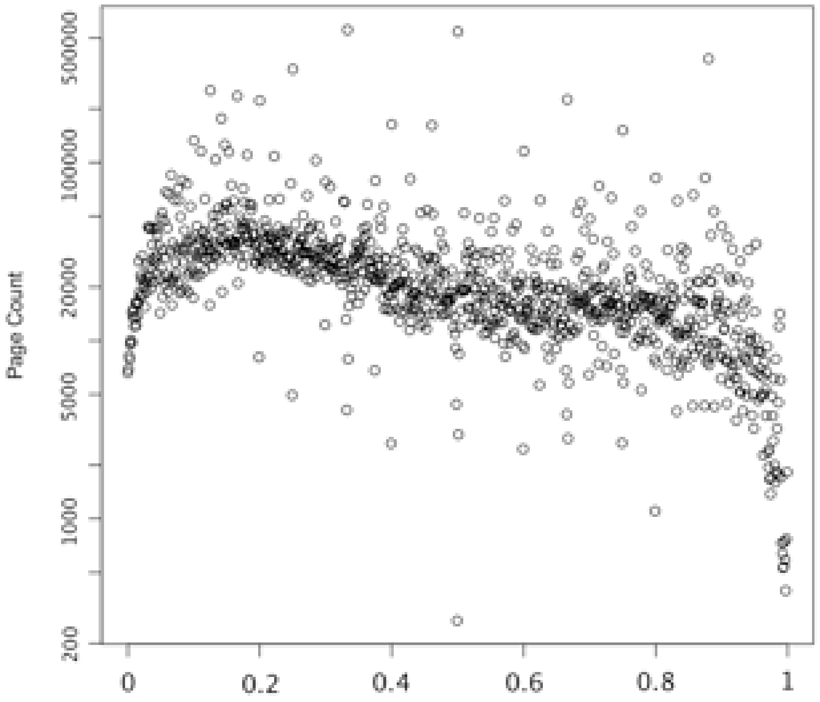
rates versus page count distribution



conservative



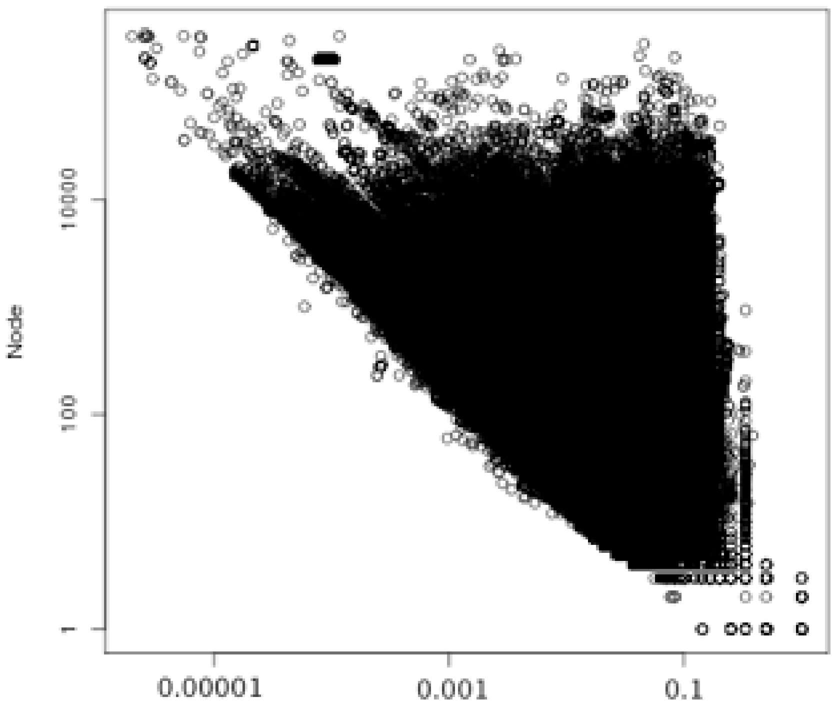
optimistic



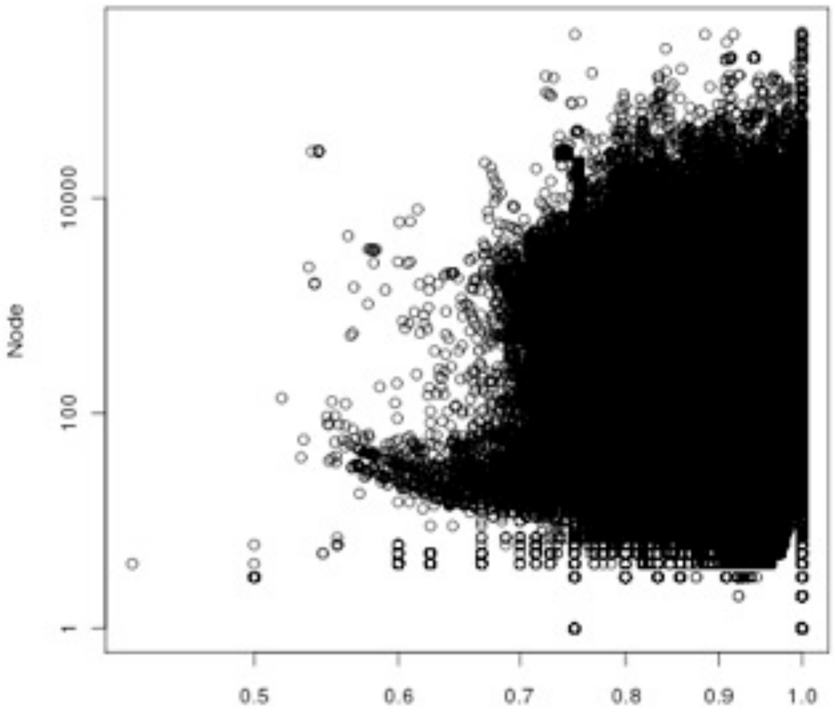
strict

Results

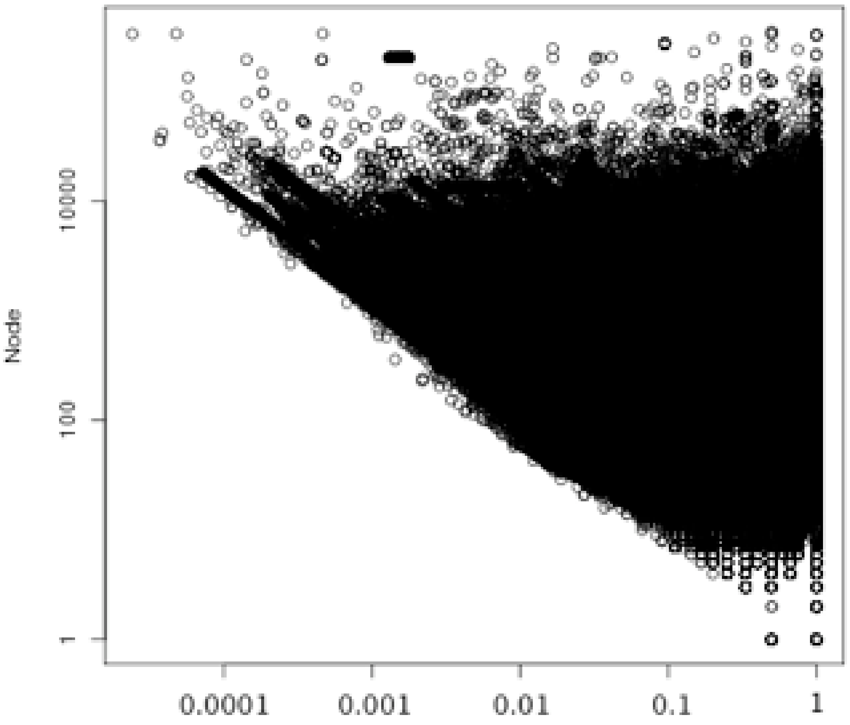
rates versus page complexity (# HTML elements)



conservative



optimistic



strict

Discussion

on the results

- Large scale confirms predictions of small scale studies - *the Web is still not for all*.
- Smaller Web pages tend to have greater accessibility quality.
- Nature of *warnings* is more striking than expected, completely different interpretations.
- Automated evaluation is just the beginning.

Discussion

on the limitations of the experiment

- HTML structure vs. content rhetorics.
  (CSS & Javascript can change it all)
- Collecting the Web is hard.
  (deep Web - AJAX & forms -, infinite generation, robots.txt, etc.)
- Scaling evaluation & analysis processes is hard.
  (evaluation streamability, resource inter-dependencies, billion node graphs, etc.)

Conclusions

- Large scale accessibility evaluation of the Portuguese Web.
- Re-confirmed studies at the large.
- Educating developers & designers about warnings is crucial for accessibility success!
- Automated evaluation is just the start. Always need for expert & users evaluations.

Ongoing Work

we’re still at the tip of the iceberg

- Linking properties (ranking vs. accessibility)
- Evolution of accessibility compliance in time (different document collections)
- Cross-cuts: gov, e-com, personalisation, etc.
- Developing countries (Portuguese speaking African countries)

Ongoing Work

help wanted from community!

- Making available evaluation datasets (e.g., *Linked Data*). **Ours and yours!**
- Larger document collections.
- Transforming *warnings* into *failures* with machine learning.

Thank you!

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