

# Use of the automated quality evaluation system for the comparison of health care web pages

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## Objectives

Internet health care information can be divided in four groups: health care providers (hospitals), education (medical schools), health care companies, and public pages. The quality of presentation, information contents and the extent of link popularity differ substantially.

Aim of the project is a comparison of web pages of different health related institutions based on a quality of information presentation. 20 criteria were chosen from the official standards, guidelines and technical rules for publication of electronic information. The mentioned aspects may be used in systems for quality evaluation of health care web sites. In this conception particular values connected with a quality of webpages are retrieved automatically and the system displays them on the Internet in up-to-date mode.

## Study design and methods

54 health care websites were evaluated totally (17 hospitals, 13 public, 8 medical schools, 16 companies). For the evaluation we used methodology according to international criteria presented in Adla et al. [1]. In addition, we compared the link popularity according to the method described in Janda et al.[2].

### **Comparison:**

Found out parameters of sites were compared among the four groups to find the weak and strong aspects of sites. Statistical evaluation was used to confirm really existing differences: For quantitative parameters Kruskal-Wallis test was used to state those which are not equal in all groups – discriminatory parameters. Nemenyi procedure was used for comparison of all possible pairs of groups. Contingency tables and Chi square test were provided for alternative signs. The follow up the discriminatory parameters were used in procedures of Answer Tree Programme. Procedure CHAID - Chi-squared Automatic Interaction Detection - uses chi-squared statistics to identify optimum splits, which distinguish one type of sites from the others. The result is a Decision tree chart. It begins with one root node that contains all of the observations (all websites). As you drop down the tree, the data branches are divided into mutually exclusive subsets with dominance of one type.

## Conclusions

The principles of algorithms were proposed by authors for automated web pages evaluation, and used for comparison of international quality criteria (Adla et al in press):

**Speed of loading** - measured speed of loading of the homepage, median value of five consequent measurements.

**Number of inner links** - number of links from the homepage, with exclusion of multiplicity.

**Covering of the screen** - overlapping of the content of the page out of the screen is a negative feature. The homepage is automatically evaluated with loading with core of Mozilla, and appearance of scrollbar is identified as overlapping of content (resolution of standard screen is 800x600).

**Uniformity of appearance** - evaluation whether the pages of the particular site have the same

structure and appearance. Comparison of layout of webpages and localization of pictures. (not reliable results).

**Faults of graphics** - character size and contrast of the text and background were evaluated. Algorithm for evaluation of contrast between text and background was taken from document of Web Accessibility initiative of W3C - W3C Checkpoint 2.2 (<http://www.w3.org/WAI/ER/IG/ert/#color-contrast>).

**Number of steps** - number of "clicks" needed to reach defined information. Standards keywords are localized in the structure of website.

**Back links** - presence of back links to the homepage from other pages of website.

**Site map** - presence of site map. Automatic detection of presence of sitemap with searching of key words as a "site map", "structure of web".

**Marking of new** - clear identification of new information. Automated detection of presence of key words as a "new", "news" and "recent events".

**Highlighting of links** - evaluation whether the links are clearly distinguishable from other text.

**Foreign language version** - presence and extent of foreign language version of presented information. Algorithm for automated detection is based on spell-check and foreign language version is identified as a page with more than 30% unknown words.

**Internal search engine** - presence and reliability of internal search engine. Algorithm is based on finding searched words on page with result of searching.

**Metadata** - presence of metadata (metatags) in the HTML source code (author, keywords, description). Finding of metatags "author", "description", and "keywords" at source code of pages.

**Alternative captions** - presence of alternative text at images, representation of accessibility.

**Availability** - availability of the homepage during a long period of time.

**Authorship** - clear authorship of presented information. Automatic detection of presence of key words as an "author", "authors" and others at webpages.

**Date of publication** - presence of date of publication, also based on detection of keywords

**Date of the last updating** - presence of date of the last updating.

**Dead links** - low number of deadlinks. Links tested to the level 3 from homepage.

**Faultless of HTML code** - purity of source code of pages. Using webpage checker Dr. Watson (<http://watson.addy.com>), tested first 5 pages of web site.

Health care web pages groups – the results of comparison:

	Positives	Negatives
Faculties	100% of Foreign language version	Most Dead links, no Metatags, no Alternative captions, most mistakes in Uniformity of appearance (Insufficiencies in building up of HTML and in maintenance)
Hospitals	100% of Uniformity of appearance Date and authors better then in faculties and firms	17% of Foreign language version only Surprising lower level of searching

Portals	Most inner links (Inner links > 60 optimal splits portals from others) Least dead links Most presence of matatags Date and authors better than in faculties and firms	Most inner links causes lowest speed of loading and most overlapping of the screen  0% of Foreign language version!
Firms	Most presence of Site map	Expected lowest Authorship

The comparison demonstrates not only characteristics of different types of websites, but also the meaningful value of formally measured website parameters.

### References

- [1] T. Adla, P. Kasal, A. Janda, M. Hladikova, J.P. Naidr, J. Feberová, Weights of criteria for evaluation of health resources on the web, *Technol Health Care* 11 (2003) 367-368.
- [2] A. Janda, P. Kasal, T. Adla et al., CITMED - system for searching and presenting health care related web resources based on quality criteria. *Technol Health Care* 11 (2003) 378-379.