

Identification of the User Skill on the Web based on Patterns in Eye Tracking Data

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Motivation

New users can be disoriented on their first visit of a web page. Those people could use a help. However, they need to be automatically identified first. We use eye tracking information to do so. Skill identification using eye tracking has not been examined in the domain of web yet.

Goals

- ❖ Find out if methods of user skill identification in visualizations are transferable to the domain of web.
- ❖ Find out if metrics derived from common scanpaths have a positive effect on automatic user skill distinction.

Common Scanpath Attributes

Training:

1. For each participant calculate scanpaths (more algorithms).
2. Calculate common scanpath for group of experts and group of novices.
3. For each scanpath calculate similarity to both common scanpaths.
4. Use calculated similarities as attributes.

Testing:

1. For each participant calculate scanpaths (more algorithms).
2. For each scanpath calculate similarity to common scanpaths identified in training phase.
3. Use calculated similarities as attributes.

Features

- ❖ Gaze related
- ❖ Pupil related
- ❖ Head distance related
- ❖ RQA
- ❖ Common scanpath related

Experiments

First experiment:

- ❖ **Purpose:** pilot experiment.
- ❖ **Participants:** 15.
- ❖ **Lessons learned:**
 - need for more complex interface,
 - need for better known interface,
 - need for better definition of user skill.

Second experiment:

- ❖ **Num. of participants:** 57.
- ❖ **Num. of tasks:** 3 distinguishing and 5 common.
- ❖ **Definition of skill user:** Linear combination of questionnaire score and distinguishing tasks score.

Correlations

The most correlated features	Correlation value
min. head distance from screen	0.58
end head distance from screen	0.50
mean head distance from screen	0.49
start head distance from screen	0.41
reoccurrence	-0.36
min. saccade speed	0.35
STA similarity to expert	0.31

Model Results

Models	Accuracy	Precision	Recall
BAM	0.72	0.73	0.71
BAM+ RQA att.	0.69	0.73	0.66
BAM + common scanpath att.	0.77	0.69	0.75
BAM + RQA att + common scanpath att.	0.69	0.70	0.68

*BAM = Basic Attribute Model (Gaze, pupil and head distance attributes).

Conclusions

- ❖ Identification of high distinguishing ability of pupil and head distance related attributes in the domain of web between novices and experts.
- ❖ Introduction of common scanpath attributes, which make possible using scanpath information in classification model.
- ❖ Identification of distinguishing ability of common scanpath attributes in the domain of web between novices and experts.