# Facilitating Learning on the Web

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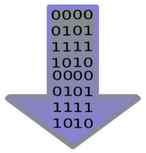
## Open challenges:

- inaccuracy of user knowledge modeling
- **no eye-tracker**
- **no advanced implicit feedback evaluation**
- no read-wear patterns
- no tools supporting implicit feedback collection

## Method principle:

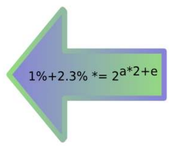
## Method details:

- original implicit feedback
  - clicks
  - moves
  - text selections
  - y-positions
  - time of visibility
- **our contribution**
  - **number of enters** to AoI (generic)
  - **translation of term** (specific)
  - **term observation** (specific)




## User knowledge model:

- evidence layer **(term model):**
  - clicks
  - moves
  - selects
  - entries
  - y_positions
  - translation
  - activity_time
  - no_activity_time
  - visibility_time
- inferred layer **(word model):**
  - term
  - knowledge




## Evaluation

**H1:** Imptlicit indicator number of entries to document areas improves the accuracy of prediction of read level of area.

**Experiment:**

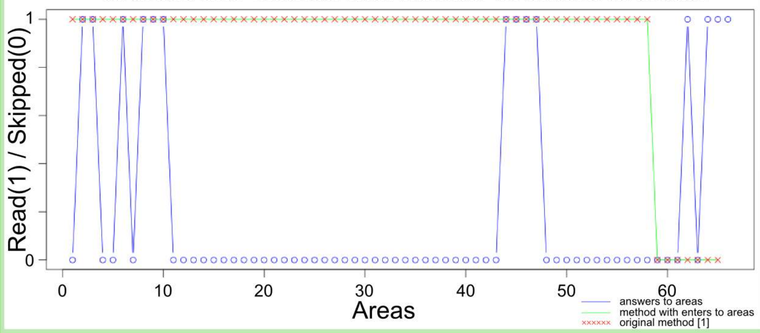
- usability study in UX lab
- 6 participants,
- 10 web documents,
- eyetracker,
- 20 minutes,
- question for each area of document.

**Table 1.Precision of read level prediction.**

| | Method [1] | with enters |
|---|---|---|
| answers | 21,5% | 21,5% |
| eye-tracker | 73,2% | 73,2% |

**Results:**

**Figure 1. Comparison of original method [1] with answers to areas and method with number of enters to areas.**

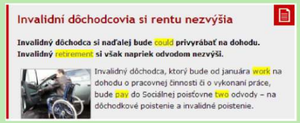



Number of enters to areas **does not improve read level**. **See Table 1.**

**H2:** Proposed implicit indicators at the level of terms help to improve the accuracy of term knowledge modeling of the user.

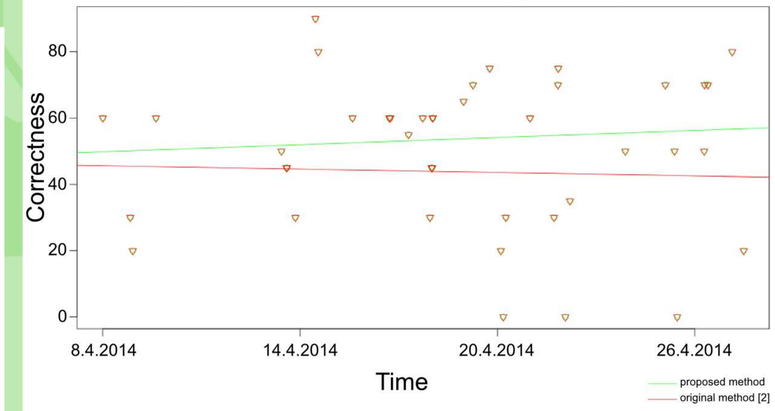
**Experiment:**

- open, uncontrolled, in progress,
- vocabulary learning browser extension,
- 19 participants,
- have read 2967 articles,
- have passed 74 vocabulary tests.




**Results:**

**Figure 2. Comparison of original method [2] and propsed method.**




Proposed implicit indicators and read level prediction at the level of term **improve the accuracy** of user knowledge modeling. **See Figure 2.**

[1] Hauger, D., Paramythis, A. and Weibelzahl, S. (2011). Using browser interaction data to determine page reading behavior. In Konstan, J.,Conejo, R., Marzo, J. and Oliver, N., editors, User Modeling, Adapti-on and Personalization, number 6787 in Lecture Notes in ComputerScience, pages 147-158. Springer Berlin Heidelberg.
[2] Horváth, R., Simko, M.: Enriching the Web for Vocabulary Learning. In: EC-TEL, 2013, pp. 609-610.