

# Augmenting the Web for Facilitating Learning

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We spend large amount of time browsing the Web and we come across a lot of documents. We believe that this amount of time can be spent more effectively due to integrating text augmentation methods into web browsing. Providing user with additional information can help in education process such as foreign language learning.

Our main goal is to create a method for web augmentation for facilitating foreign language learning. We enrich web content by replacing appropriate words during web browsing, maintain user knowledge and preferences, while considering specifics of learning process like forgetting. The method brings together process of web browsing and vocabulary learning. Potential for this approach is supported by advances in technology-enhanced learning and computer assisted language learning. It was shown that learning occurs even unintentionally and with minimal mental processing [1].

Existing approaches to enhancing webpages to help user with learning foreign language unintentionally are mostly implemented as web browsers extensions. Analysis shows they avoid user knowledge modelling. It leads to random presentation of foreign vocabulary [2, 3]. In contrast to them, Duolingo provides learning platform based on user model and approach which considers specifics of learning process. Studies show that its effect on language learning is comparable to school classes [4].

Our method provides user with opportunities for vocabulary learning without intention of studying. Our aim is to find appropriate terms for learning in webpage content user is going to read and replace them with their translations the way user is still able to understand meaning of content and remember the vocabulary. Our method consists of three main steps executed for every visited webpage (see Figure 1):

1. *Text analysis and pre-processing* – Removal of unnecessary information, webpage translation and identification of learning candidates.
2. *Personalized text augmentation* – We replace and highlight words on webpage to present new vocabulary, while preserving original meaning.
3. *User model update based on user activity monitoring* – User activity is monitored and based on his/her behavior user knowledge model is updated.

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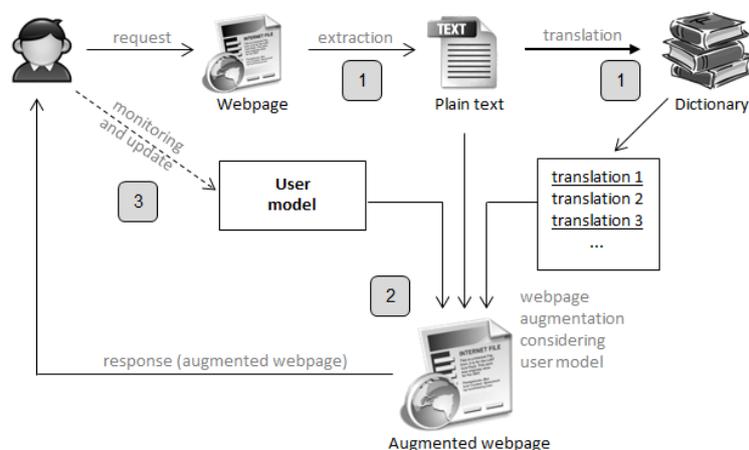


Figure 1. Process of personalized webpage augmentation.

In order to evaluate our method we have created web browser extension for Google Chrome that augments Slovak webpages with English vocabulary, which is derived from user knowledge model. For evaluation purposes extension gather both implicit feedback from monitoring user activity and explicit feedback from regular vocabulary tests. To find the effect on the learning process we propose two main hypotheses:

1. Augmentation improves foreign language vocabulary size.
2. Time spent with reading augmented webpages will increase insignificantly.

We have already conducted small supervised experiment to evaluate effect of text augmentation of reading speed. The results show that augmented webpage slows reading speed down on average by approximately 7%. We find these results very reasonable with a great potential to support the second hypothesis. However, we need to conduct further experiments using larger data set to obtain more significant results.

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