

# User Model Specialized for Session Exit Intent Prediction Task

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Nowadays, there can be seen increasing number of web sites, with the dynamically created web pages, which are up to date only for short time periods after which they become uninteresting for users. While pages are active, their content is continuously updated.

When modelling user behaviour on these sites, the biggest challenge is to capture the user interests and be able to react to frequent changes. An example of such changes is the news domain, where it is typical that hundreds of pages are updated in every minute. This however opens questions as how to deal with dynamically changing user behaviour, how to model drift of his/her interests, its weakening, forgetting, etc.

The user behaviour on the web site is influenced by multiple noisy factors. User have some actual informational intent (e.g., learn some topic, read today news, find concrete information), external context conditions (e.g., time available, upcoming test, actual trendy topics) and personal characteristic (e.g., previous knowledge, preferences). Together, these factors form user short-term behaviour. It is, however, typically noisy and offer only limited possibilities for user modelling.

To be able to model user typical behaviour or preferences, it is needed to model his behaviour also for longer time period. This way it is possible to eliminate short-term noise and to mine user's long-term behaviour. Both of mentioned views on user behaviour, however, offer valuable information and together help to estimate user future behaviour.

The two level modelling variant is nowadays generally used [2] [3]. These authors identically divide used model into long- and short-term components. In addition, there exist more complex solutions. Zhou et al. added third level of medium-term preferences [4], which is used to soften the transition between long- and short term components.

Mentioned approaches model user actions based on a time window [2] or a forgetting curve approach [1]. The time window consider actions based only on time in

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which they were performed, which despite of its simplicity, reaches quite satisfying results [2]. The forgetting curve typically considers multiple behaviour aspects as a time spend on pages, measure of scrolling, clicking etc, which are based on time considered with decreasing importance.

As we mentioned, the common part of the user preferences modelling on the dynamic web sites is the division on multiple time levels. Approaches, however, differ in the attributes, which are actually modelled. The selection depends on the task, the model will be used for. In case of personalized recommendation, there are modelled user preferences in topics or concepts, there is watched similarity between user preferences or between items content. In case of customer loss task or learning course fail, there is watched intensity and regularity of user visits, fulfilment of his tasks, etc. Based on this, we can conclude that a user model has to be specialized for the task it will be used for.

In our actual research, we focus on the task of prediction of the user's exit intent from sessions. To be able to predict in advance that user has intent to leave from the session and leave the web site in next action or actions, it is needed to be able to model his preferences, typical behaviour etc.

Our idea is to enrich user actions by information about actual user session (short-term behaviour) and its comparison with previous user sessions (long-term behaviour). We propose multilayer user model describing user actual behaviour in comparison with his previous behaviour performed for several different time periods (e.g., day, week, month). This way we will be able to predict user future behaviour (concretely exit intent) and also dynamically react to changes and drifts in user's behaviour.

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