Fast recognition and application of Web users’ behavioral patterns

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**Abstract.** Understanding of website user behavior is a crucial assumption for improving the website and user experience with it. Typical and repeating features of behavior during user’s visit of website can be represented through behavioral patterns. In this work we represent behavioral patterns as frequent itemsets of actions frequently performed by users in their browsing sessions. Behavioral patterns have wide usage. They can be used to create recommendations, predict user’s intentions (which can be subsequently used to cache predicted pages), improve website design, structure to complex understanding of users’ behavior. This work responds to actual trend of Web personalization, focusing on needs of individual users and also to trend of data streams usage enabling processing of high number of data incoming in large volumes. In this paper we propose a method for behavioral patterns recognition combining global patterns with patterns specific to groups of similar users. Proposed method was evaluated indirectly through recommendation task. We performed several experiments over data from e-learning and news domains. Our results clearly show that combination of common global patterns and specific group patterns reaches higher prediction precision than its components used individually. Inclusion of group patterns also brings only constant computational load, which supports its maintenance in production usage.

# Introduction

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Table example: The meaning of specific elements of the strategy vector s(a) for different cases is described in Table 1, where the last column shows interaction types.

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Figure 1. Sample output of a fractal tree drawing algorithm.

Table 1. Specification of the strategy vector s(a).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Penalty for agent *a* | Penalty for  agent *b* | Movement of agent *a* |
| 1 | *p*(*a*)=0 | *p*(*b*)=0 | *S*1(*a*) |
| 2 | *p*(*a*)=0 | *p*(*b*)>0 | *S*2(*a*) |
| 3 | *p*(*a*)>0 | *p*(*b*)=0 | *S*3(*a*) |
| 4 | *p*(*a*)>0 | *p*(*b*)>0 | *S*4(*a*) |

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Table 2. Please use full-page tables only if necessary.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Penalty for agent *a* | Penalty for  agent *b* | Movement of agent *a* |
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| 3 | *p*(*a*)>0 | *p*(*b*)=0 | *S*3(*a*) |
| 4 | *p*(*a*)>0 | *p*(*b*)>0 | *S*4(*a*) |

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