An Expressive Event-based Language for Representing User Behavior Patterns

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Abstract In-depth analysis of user interactions with applications in large systems is widely adopted as a means to understand user's behavior for strategic purposes such as fraud detection, system security, weblog analysis, social networking, and customer relationship management. Overall, the user behavior presents characteristics, relationships, structures, and effects of a sequence of actions in a specific application domain. Formal modelling and representation of complex patterns of user actions using expressive languages are critical aspects of behavior analysis. We present a model to describe the behavior elements and their relationships. The model also provides a systematic mechanism for describing and presenting events, sequence of events, and complex behavior patterns. A behavior pattern can be defined as a sequence of typed events that occur during specific time intervals, An event consists of a tuple of attributes whose values represent an observation of the behavior. In this paper, first we present a semantic model of the user behavior to address the issues around the user behavior representation, and then we define a generic Behavior Pattern Language (BPL), which enables the analysts to define a variety of complex behavior patterns in a declarative manner. We present the feasibility of the approach through several examples of complex behavior patterns expressed using the proposed language.

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