

Mining Logs to Support HCI (Re)Design

Felipe Cordeiro de Paula, Simone D.J. Barbosa
Departamento de Informática, PUC-Rio
Rua Marques de Sao Vicente, 225
Gavea, Rio de Janeiro, RJ, Brazil, 22451-900
{fpaula, simone}@inf.puc-rio.br

Abstract. This position paper proposes to investigate the use of logs as a resource to (re)design interactive systems. By understanding what information should be captured in application logs and using mining techniques to identify the users' behavior patterns, we hope to extract valuable information to inform HCI (re)design decisions.

1 Introduction and Motivation

There are many languages, technologies, and services available for designers and developers to create interactive systems. Choosing from among these requires knowledge to find a suitable, contextualized solution and to avoid producing inconsistent artifacts or a system with poor interaction design.

A good systems designer should care about the interaction between users and computers, based on the principles of efficiency, effectiveness and satisfaction [3]. In this context, the area of Human-Computer Interaction (HCI) investigates the "project (design), evaluation and implementation of interactive computing systems for human use, and the phenomena related to this use" [1].

Having in mind these three principles, the motivation of this proposal stems from the potential to analyze the interaction process recorded in log files, using data mining techniques, in order to identify usage patterns, inconsistencies or requirements not adequately met by the system, to promote HCI (re)design.

In general, our challenge involves addressing the following questions: (i) What information must exist in log files structures so that designers can apply data mining techniques to discover gaps and opportunities for building systems that adhere to sound HCI principles and guidelines? (ii) How to analyze that info to investigate the user behavior, including user choices of interaction and their frequencies, in order to make transparent the habits, vices, and even system options that are set aside and left unused?

2 Justification

A great variety and amount of events can be observed on a system through its log files, but most systems record only critical events and access control. In these traditional logs, we already find information about the operation of programs, data errors, or routine checks. Taking as an example the Microsoft Internet Information Server — in W3C format —, we see it provides the following log info: date, time, client IP address, method, source URI, URI query, the number of bytes sent, the HTTP status and the protocol version. All these data are important, but they do not directly assist us when thinking about interface redesign.

We would therefore like to explore how these logs could record different aspects of user behavior, going beyond security or critical operations. Log files should allow for continuous monitoring, allowing designers to reflect on the navigation choices, bypasses and habits, assisting them to identify what are the events that occur more frequently, the underutilized steps and resources [4][5][6]. Enhancing the use of log files beyond current practices is at the heart of our proposal.

Researchers on game design and development have successfully defined and used analytics approaches to better understand gamers' behavior and adapt game applications, both at design and run-time [1].

This proposal thus tackles the use of log files from an HCI perspective, where a new vision for log creation and interpretation is needed, allowing us to improve software quality by examining various kinds of events (e.g., events that trigger the execution of a task and detailed steps that comprise a task or process).

3 Preliminary Solution Approach

We propose to build a log file template to record additional info to support HCI (re)design activities and help improve the human-computer interaction, using data mining techniques. To achieve this, we first need to define desirable characteristics of a log file, with the ability to adapt to different domains, and then follow these steps:

- Register the different interaction paths followed by users to perform their activities;
- Analyze the user's behavior and use of the system;
- Develop a prototype or modify an existing system to use the proposed log format;
- Analyze the results obtained from the use of this prototype;
- Compare the design processes followed by those who used the prototype (with the enhanced log) with a control group that did not use it.

4 References

- [1] EL-NASR, M.G., DRACHEN, A. CANOSSA, A. Game Analytics: Maximizing the Value of Player Data. Springer, 2013.
- [2] HEWETT, Thomas T. et al. ACM SIGCHI curricula for human-computer interaction. ACM, 1992.
- [3] ISO 9241-210 - Available at: <https://www.iso.org/obp/ui/#iso:std:iso:9241:-210:ed-1:v1:en> – Accessed on 8 June 2015
- [4] VAN DER AALST, W. M. P., WEIJTERS, A. J. M. M., (2004), "Process mining: a research agenda", Computers in Industry, v. 53, n. 3 (Apr.), p. 231-244.
- [5] VAN DER AALST, W. M. P., WEIJTERS, A. J. M. M., MARUSTER, L., (2004), "Workflow Mining: Discovering process models from event logs", IEEE Transactions on Knowledge and Data Engineering, v. 16, n. 9, p. 1128-1142.
- [6] VAN DER AALST, W. M. P.; GÜNTHER, C. W. (2007) "Finding structure in unstructured processes: The case for process mining". In: Application of Concurrency to System Design. ACSD 2007. Seventh International Conference on. IEEE, 2007. p. 3-12.