

# Beyond Actions: Exploring the Discovery of Tactics from User Logs

Jiyin He  
CWI  
The Netherlands  
jiyinhe@acm.org

Pernilla Qvarfordt  
FX Palo Alto  
Laboratory, Inc.  
Palo Alto, CA, USA  
pernilla@fxpal.com

Martin Halvey  
University of Strathclyde  
Glasgow, Scotland, UK  
martin.halvey@strath.ac.uk

Gene Golovchinsky  
FX Palo Alto  
Laboratory, Inc.  
Palo Alto, CA, USA

## ABSTRACT

This is an extended abstract of [3]. This research proposed a novel log analysis methodology that makes observations from search logs in context; and enables comparisons across systems of different designs. It addresses key issues in understanding user search behaviours and IR evaluation, hence highly relevant to DIR.

## Keywords

Search behaviour, search tactics, log analysis

## 1. SUMMARY OF THE RESEARCH

Search log analysis has become a common practice to gain insights into user search behaviour; it helps gain an understanding of user needs and preferences, as well as how well a system supports such needs. Currently, log analysis is typically focused on low-level user actions, i.e. logged events such as issued queries and clicked results, and often only a selection of such events are logged and analysed. However, types of logged events may differ widely from interface to interface, making comparison between systems difficult. Further, the interpretation of and subsequent analysis of a selection of events may lead to conclusions out of context—e.g. the statistics of observed query reformulations may be influenced by the existence of a relevance feedback component. Alternatively, in lab studies user activities can be analysed at a higher level, such as search tactics and strategies, abstracted away from detailed interface implementation. Unfortunately, until now the required manual codings that map logged events to higher-level interpretations have prevented large-scale use of this type of analysis.

To overcome these drawbacks, we believe that what is needed is a method that (i) makes observations from search logs in context; and (ii) enables comparisons across systems of different designs and implementations. We proposed a method to abstract away from the low-level logged events and to analyse user activities in terms of a higher-level representation, i.e. search tactics. This method combines heuristic rules with manual correction enabling efficient human annotation of log data, and a CRF-based statistical method that learns to effectively predict user tactics from search logs.

Empirical results on logs of two exploratory search systems of

different designs (Querium [4] and ViGOR [2]) shows that a relatively small amount of training data (20%) can be used to provide reasonable labelling performance, with very little benefit to adding additional training data. This finding coupled with heuristic rule-based annotation and the use of manual correction with our online annotation tool means that a scalable solution can be achieved by quickly annotating a small amount of data, which can then be used to provide an accurate classifier that identifies search tactics.

Beyond proposing a new methodology we also demonstrated how possible analyses can be performed with the identified search tactics, providing insights and perspectives into user search behaviours that have not been investigated or indeed possible previously. One of the main benefits of our approach is demonstrated by allowing us to compare Querium and ViGOR directly in terms of tactics although they have very different interfaces and functionality. For instance, we observed that users have more diverse preferences in employing search tactics with Querium compared to ViGOR; the additional functionality provided by Querium in the experimental condition allows users to develop more predictable tactic transition patterns, while the opposite was observed for ViGOR. This type of comparison has the potential to allow a comparison of many types of interfaces at a higher tactical level. Normally when we need to compare two interfaces a new user study would have to be designed and conducted, which is costly in terms of time and resource. With our method logs from different user studies or systems can be used to directly compare search systems.

Further, our method can provide a new lens with which to view user behaviour encoded in log files. For example, when analysing ViGOR we saw that results from a tactical level investigation yield a different explanation of user behaviour in comparison to examining interaction at the action level. In the original experiment [1], we were unable to untangle expertise on a collection level and a system level. Insights gained through new analysis on a tactical level allow us to decouple these, which would not be possible otherwise.

## 2. REFERENCES

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