8 Conclusion

We have introduced a methodology for interpreting query reformulation behavior based around the three term actions *retention*, *removal* and *addition*. We directly applied our technique in an empirical analysis over TREC Session Track Data where we analyzed the origin of terms used in query reformulations. We identified the preceding query as the main source but also found that terms located in the impression itself were an additional source. We found that adjacent queries in session tended to be very similar but that there often isn't a set of core teams that are used throughout, instead the core teams change in the session as the information need changes.

We tested our methodology on well understood findings in click model research and found evidence of rank bias affecting reformulation behavior. We identified three user interaction based sources of terms (and discarded another based on dwell time) that are found in each impression and we tested from which sources users were able to locate terms to add to query reformulations. By matching query and impression terms in the term sources we defined a number of possible user behavior scenarios that a term could belong to.

We measured the effectiveness of the term actions per scenario to evaluate how good they were at not just predicting query reformulations, but effective ones. By interpreting the behavior of the user for given scenarios and their corresponding effective actions, we are able to understand a user's motivations for retaining, removing or adding terms. As future work, we can make inferences and predictions of evolving queries in session search leading to better query suggestion agents, user behavior models and more accurate click log mining.

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