

Bots vs. Wikipedians, Anons vs. Logged-Ins

Thomas Steiner^{*}
Google Germany GmbH
ABC-Str. 19, 20354 Hamburg, Germany
tomac@google.com

ABSTRACT

Wikipedia is a global crowdsourced encyclopedia that at time of writing is available in 287 languages. Wikidata is a likewise global crowdsourced knowledge base that provides shared facts to be used by Wikipedias. In the context of this research, we have developed an application and an underlying Application Programming Interface (API) capable of monitoring realtime edit activity of all language versions of Wikipedia and Wikidata. This application allows us to easily analyze edits in order to answer questions such as “Bots vs. Wikipedians, who edits more?”, “Which is the most anonymously edited Wikipedia?”, or “Who are the bots and what do they edit?”. To the best of our knowledge, this is the first time such an analysis could be done in realtime for Wikidata *and* for really *all* Wikipedias—large and small. Our application is available publicly online at the URL <http://wikipedia-edits.herokuapp.com/>, its code has been open-sourced under the Apache 2.0 license.

Categories and Subject Descriptors

H.3.5 [Online Information Services]: Web-based services

General Terms

Human Factors, Languages, Measurement, Experimentation

Keywords

Wikipedia, Wikidata, realtime monitoring, study, Web app

1. INTRODUCTION

The free online encyclopedia Wikipedia¹ was formally launched on January 15, 2001 by Jimmy Wales and Larry Sanger, albeit the fundamental wiki technology and the underlying concepts are older. Wikipedia’s initial role was to serve as

^{*}Thomas Steiner’s second affiliation is *Université de Lyon, CNRS Université Lyon 1, LIRIS, UMR5205, F-69622*

¹Wikipedia: <http://www.wikipedia.org/>

a collaborative platform for draft articles for Nupedia, an earlier, also free online encyclopedia that was exclusively edited by experts. What happened in practice was that Wikipedia rapidly overtook Nupedia as there was no peer-review burden and it is now a globally successful Web encyclopedia available in 287 languages² with overall more than 30 million articles.³

The First Wikipedia Bots.

Wikipedia bots are computer programs with the purpose of automatically editing Wikipedia. After occasional smaller-scale tests, the first large-scale bot operation was started in October 2002 by Derek Ramsey,⁴ who created a bot to add a large number of articles about United States towns. The generated articles used a uniform text template, so that all articles followed the same writing style. Today, bots are not only used to generate articles, but also to fight vandalism and spam, and many more automatable tasks.⁵

The Knowledge Base Wikidata.

As Wikipedia is a truly global effort, sharing non-language-dependent facts like population figures centrally in a knowledge base makes a lot of sense to facilitate international article expansion. Wikidata⁶ [3] is a free knowledge base that can be read and edited by both humans and bots. The knowledge base centralizes access to and management of structured data, such as references between Wikipedias and statistical information that can be used in articles. Controversial facts such as borders in conflict regions can be added with multiple values and sources, so that Wikipedia articles can, dependent on their standpoint, choose preferred values.

Contributions.

The contributions of this paper are twofold. First, we have developed an application and released its source code as open-source that allows for realtime monitoring of all 287 Wikipedias and Wikidata. Second, we have permanently made available a publicly useable Application Programming Interface (API) that our application is based upon and that we invite other interested parties to use.

²List of Wikipedias by size: http://meta.wikimedia.org/wiki/List_of_Wikipedias

³Wikipedia statistics: <http://stats.wikimedia.org/>

⁴History of Wikipedia bots: http://bit.ly/History_Bots

⁵Wikipedia bots by purpose: http://en.wikipedia.org/wiki/Category:Wikipedia_bots_by_purpose

⁶Wikidata: <http://www.wikidata.org/>

2. METHODOLOGY AND TOOLS

Wikipedia Recent Changes.

Whenever a human or bot changes an article of any of the 287 Wikipedias, a change event gets communicated by a chat bot over the Wikimedia IRC server (irc.wikimedia.org),⁷ so that parties interested in the data can listen to the changes as they happen [2]. For each language version, there is a specific chat room following the pattern "# + language + ".wikipedia". An exception from this pattern is the room #wikidata.wikipedia for the language-independent knowledge base Wikidata [3]. A sample original chat message with the components separated by the asterisk character '*' announcing a change to an article can be seen in the following. "[[Keep Calm and Carry On]] <http://en.wikipedia.org/w/index.php?diff=585806152&oldid=585805943> * 74.197.171.148 * (+14) /* Parodies */". The components are (i) article name, (ii) revision URL, (iii) editor handle, (iv) change size and description.

Server-Sent Events.

Server-Sent Events [1] defines an API for using an HTTP connection to receive push notifications from a server in the form of DOM events. Therefore, on the server side, a script generates messages of the MIME type `text/event-stream` in an event stream format that can be seen in Listing 1. The required event payload is in the `data:` field, events can optionally be typed via a preceding `event:` field. Consecutive events are separated by two line breaks. The `EventSource` interface enables Web applications to listen to pushed events from a server over the HTTP protocol. On the client side, using this API consists of creating an `EventSource` object and registering event listeners, as can be seen in Listing 2.

Implementation Details.

Our application is based on a Server-Sent Events API that we have implemented in Node.js, a server side JavaScript software system designed for writing scalable Internet applications. Using Martyn Smith's Node.js IRC library,⁸ we listen for Wikipedia and Wikidata edit events and send Server-Sent Events whenever we detect one. Our API is available publicly online at the URL <http://wikipedia-edits.herokuapp.com/sse> and open for third parties to use. On the client side, we have registered generic event handlers for events pushed by the API and keep track of edit statistics over time. A screenshot can be seen in Figure 1.

3. PRELIMINARY RESULTS

In a first iteration, we have observed all 287 Wikipedias and Wikidata during the observation period November 4 to 6, 2013. Already during this short period, overall exactly 3,805,185 edit events occurred. Our application updates in realtime, which allows us to detect when relative figures, i.e., percentages of bots *vs.* Wikipedians and anonymous *vs.* logged-in humans start to converge. This was the case after about half of the observation period. At the end of the observation, from all 287 Wikipedias and Wikidata, exactly 260 (~90.3%) were edited. Our toolset being publicly available, interested parties can run longer analyses at will.

⁷Raw IRC feeds of recent changes: http://meta.wikimedia.org/wiki/IRC/Channels#Raw_feeds

⁸Node IRC: <https://github.com/martynsmith/node-irc>

```
event: enedit
data: {
  "article": "Golden_Globe_Award_for_Best_
    Actress_-_Motion_Picture_Musical_or_Comedy",
  "editor": "en:86.150.237.133",
  "isBot": false,
  "language": "en",
  "diffUrl": "http://en.wikipedia.org/w/api.php?
    action=compare&torev=585820379&fromrev=
    585776128&format=json"
}
```

Listing 1: Server-Sent Event of type “enedit” (formatted for legibility, `data:` allows no line breaks)

```
// connect to SSE stream and attach listener
var source = new EventSource('/sse');
source.addEventListener('enedit', function(e) {
  console.log((JSON.parse(e.data)).article);
}, false);
```

Listing 2: `EventSource` object with event listener

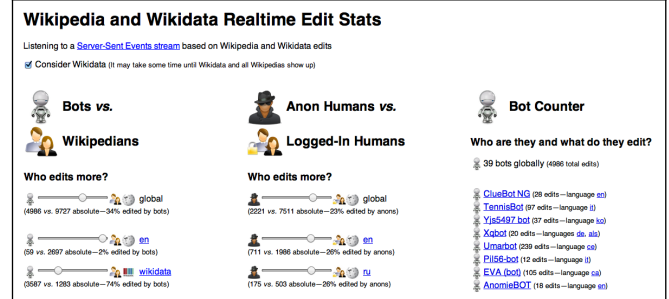


Figure 1: Screenshot of the application (cropped)

4. CONCLUSIONS

We have introduced an open-source application and underlying API for the realtime monitoring of all 287 Wikipedias including Wikidata and have analyzed more than 3.8 million edit events to get a better understanding of the relations of logged-in *vs.* anonymous edits and edits made by bots *vs.* edits made by humans. Concluding, we have contributed a useful toolset and performed a preliminary global study with interesting insights that is the first in a series of future studies and applications by us and others.

5. REFERENCES

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