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STiki: An Anti-Vandalism Tool for Wikipedia Using Spatio-Temporal Analysis of Revision Metadata

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Abstract
STiki is an anti-vandalism tool for Wikipedia. Unlike similar tools, STiki does not rely on natural language processing (NLP) over the article or diff text to locate vandalism. Instead, STiki leverages spatio-temporal properties of revision metadata. The feasibility of utilizing such properties was demonstrated in our prior work, which found they perform comparably to NLP-efforts while being more efficient, robust to evasion, and language independent.

STiki is a real-time, on-Wikipedia implementation based on these properties. It consists of, (1) a server-side processing engine that examines revisions, scoring the likelihood each is vandalism, and, (2) a client-side GUI that presents likely vandalism to end-users for definitive classiffcation (and if necessary, reversion on Wikipedia). Our demonstration will provide an introduction to spatio-temporal properties, demonstrate the STiki software, and discuss alternative research uses for the open-source code.

Keywords
Wikipedia, collaborative applications, information security, intelligent routing, spatio-temporal processing

Disciplines
Computer Sciences | Physical Sciences and Mathematics

Comments
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Categories and Subject Descriptors

H.5.3 [**Group and Organization Interfaces**]: *collaborative computing, computer-supported cooperative work*; K.6.5 [**Management of Computing and Information Systems**]: Security and Protection

General Terms

Design, Management, Human Factors, Security

1. VANDALISM DETECTION & STIKI

We informally define Wikipedia *vandalism* to be any revision that is non-value adding, offensive, or destructive in its removal of content. The detrimental impact of vandalism is large, with one source [1] estimating the number of damaged page-views to be in the hundreds of millions. Detecting vandalism is difficult; it has many varied and subtle forms.

To this end, our prior research [4] investigated the spatio-temporal properties of edit metadata as an alternative means of detection, complementing techniques based on natural language processing. The *metadata* of an edit includes: the (1) edit time-stamp, (2) article being edited, (3) user-name or IP of the editor, and (4) the revision comment. Meanwhile, *temporal* properties are a function of the time at which an event occurs and *spatial* properties are appropriate wherever a distance or membership function can be defined.

Our prior work [4] identifies ten spatio-temporal properties (see Tab. 1) that are effective in locating malicious edits. *Simple features* include the edit time-of-day, revision comment length, *etc.*. *Aggregate features* combine time-decayed behavioral observations (feedback) to create reputations [3] for single entities and spatial groupings thereof.

STiki [2] exploits these features, processing edits in real-time and enabling on-Wikipedia reversion. It consists of:

- Server-Side Engine: Listens on an IRC channel for Wikipedia edits. When one is made, the associated metadata is fetched. Combined with auxiliary data (*e.g.,* geolocation), this is sufficient to compute the feature-set. A machine-learning technique called Support Vector Regression (SVR) assigns the edit a real-value *vandalism score*. SVR is trained over older edits labeled via, (1) automatic parsing of administrative reverts called *rollbacks*, and, (2) user-provided feedback from STiki clients.
- Client-Side GUI: Presents likely vandalism to users, displaying intuitively-colored edit `diffs` (see Fig. 1). Edits identified as vandalism are reverted on Wikipedia. In either case, feedback improves future server-side scoring.

A detailed STiki system workflow diagram is provided in Fig. 2. STiki is platform-independent (Java). Both the GUI executable and full source-code are available at [2].

2. PRESENTER & AUDIENCE BENEFIT

The *presenter*(s) wish to solicit feedback from casual users and vandalism experts regarding STiki's ease-of-use and methodology. Further, exposure will result in a larger user-base – critical given the nature of the feedback loop.

Meanwhile, the *audience* will be introduced to an innovative line of Wiki-relevant research. They will be invited not only to become STiki users, but to become contributors by extending the feature-set, improving GUI functionality, or interfacing with our tool. Lastly, we will discuss how STiki code can be modified to support alternative research goals.

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†This demonstration complements a *WikiSym '10* poster of similar focus, it (this demo) concentrates on the software tool aspect.

WikiSym '10, July 7–9, 2010, Gdańsk, Poland

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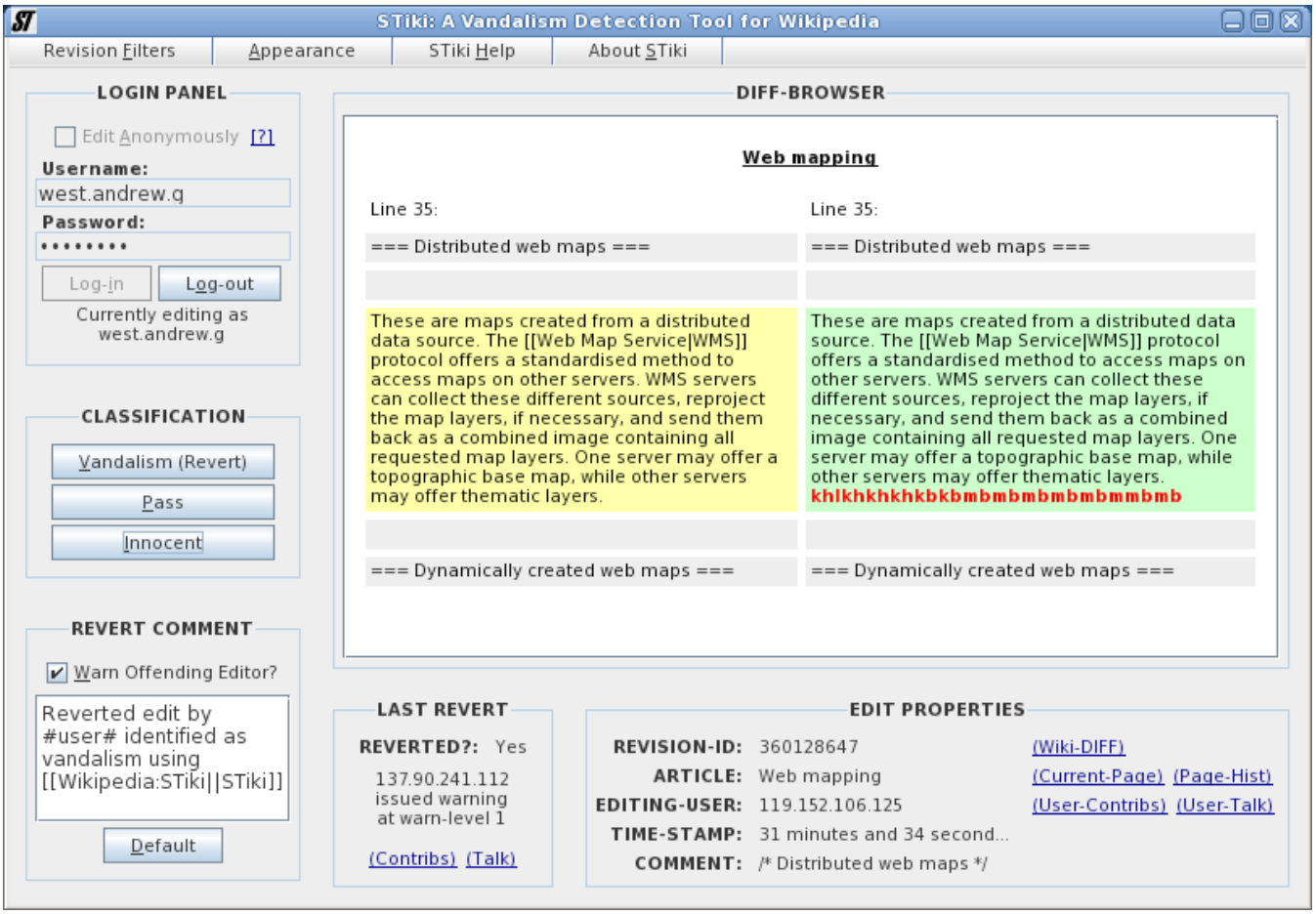

Figure 1: STiki GUI displaying a revision exhibiting vandalism (nonsense).

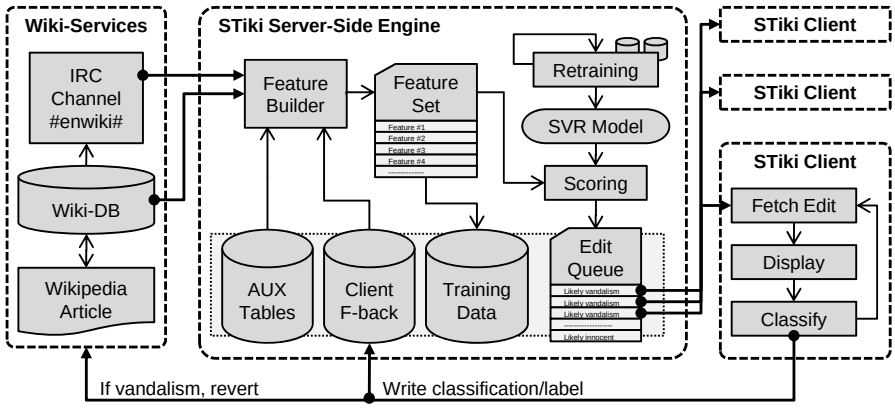

Figure 2: Simplified STiki workflow diagram.

#	FEATURE
1	Edit time-of-day
2	Edit day-of-week
3	Time-since (TS) editor registration (first-edit)
4	TS article last edited
5	TS editor last vandalized
6	Rev. comment length
7	Article reputation
8	Categorical reputation (grouping over articles)
9	Editor reputation
10	Geographical reputation (grouping over editors)

Table 1: STiki features [4].