Review on "The best privacy defense is a good privacy offense: obfuscating a search engine user's profile"

Joshua Fenech *, **and Omar Elsabrout** *

*Jean Monnet University

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Since the growth rate of the Internet is almost exponential, it has a drastic effect on people's lives even the ones who do not use it. Such effect is accompanied with many issues such as user privacy. It is not settled until now how service providers are allowed to use stored information of the users and compromise their privacy. Jörg Wicker and Stefan Kramer introduce a tool that utilizes machine learning and data mining to confuse search engines to protect the user's privacy by obfuscating exploited personal information. Not only methods are introduced for such technique, but also an experiment to evaluate its results indicating whether this approach should be investigated further.

Introduction

The motivation behind providing this approach is that the current privacy protection have major flaws. On one hand, users rely on service providers to process their data, on the other hand, providers do not have any advantage in user privacy preserving technologies as the analysis of this data and sharing it with advertisers is the basis of their business model. No doubt that providers such as search engines must store information on users. Nevertheless, these data can be used to generate detailed profiles on a large scale and identify unidentified users. As mentioned, Jörg Wicker and Stefan Kramer target privacy from another perspective. Hence, they suggest a user tools to defend her or his privacy so the user does not have to rely on the other uncontrollable side for this issue. Data is conventionally stored in large scales and analyzed automatically using data mining technologies. As a result, the intuitive approach to protect the users private information would be to flood the data storage with random data and hope the users interest or identity would be obfuscated. On the contrary, data mining algorithms are designed to distinguish a signal from random noise. Consequently, this approach will fail in most settings where the data is analyzed with sophisticated data mining algorithms. The paper tackles this issue in a more highly developed manner as it gives a brief discussion of the user and search engine model in addition to the proposed method. Moreover, it shows the details of the experimental set-up and results. Taking into account, the paper should be considered as proof-of-concept and not a final product ready for the market.[3].

$$\frac{D\theta}{Dt} = \frac{\partial\theta}{\partial t} + u \cdot \nabla\theta = 0 \qquad [1]$$

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Method

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Experiment

Simulations.

Simulation 1

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Discussion

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Materials and Methods

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Definition 1. *A bounded function θ is a weak solution of QG if for any $\phi \,\epsilon\, C_0^\infty(\mathbb{R}/_{\mathbb{Z}} \times \mathbb{R} \times [0,\varepsilon])$ we have*

$$\begin{aligned} &\int_{\mathbb{R}^+ \times \mathbb{R}/_{\mathbb{Z}} \times \mathbb{R}} \theta(x,y,t)\, \partial_t \phi\,(x,y,t) dydxdt + \\ + &\int_{\mathbb{R}^+ \times \mathbb{R}/_{\mathbb{Z}} \times \mathbb{R}} \theta\,(x,y,t) u(x,y,t) \cdot \nabla\phi\,(x,y,t) dydxdt = 0 \end{aligned} \qquad [2]$$

where u is determined previously.

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Theorem 1. *If the active scalar θ satisfies the equation* **[2]**, *then φ satisfies the equation*

$$\begin{aligned} \frac{\partial\varphi}{\partial t}(x,t) \;=\; &\int_{\mathbb{R}/_{\mathbb{Z}}} \frac{\frac{\partial\varphi}{\partial x}(x,t) - \frac{\partial\varphi}{\partial u}(u,t)}{\left[(x-u)^2 + (\varphi(x,t)-\varphi(u,t))^2\right]^{\frac{1}{2}}} \\ &\chi(x-u, \varphi(x,t)-\varphi(u,t))du \;+ \\ + &\int_{\mathbb{R}/_{\mathbb{Z}}} \left[\frac{\partial\varphi}{\partial x}(x,t) - \frac{\partial\varphi}{\partial u}(u,t)\right] \\ &\eta(x-u, \varphi(x,t)-\varphi(u,t))du + Error \end{aligned} \qquad [3]$$

with $|Error| \le C\,\delta|log\delta|$ where C depends only on $\|\theta\|_{L^\infty}$ and $\|\nabla\varphi\|_{L^\infty}$.

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Appendix

An appendix without a title.

Appendix: Appendix title

An appendix with a title.

ACKNOWLEDGMENTS. This work was partially supported by a grant from the Spanish Ministry of Science and Technology.

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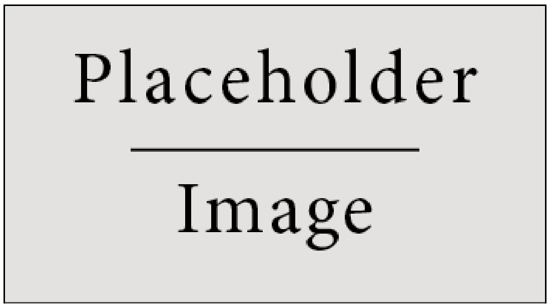

Fig. 1. Figure caption

Table 1. Table caption

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296