Exploring the Effects of Pokémon Go Vandalism on OpenStreetMap

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The utilization of OpenStreetMap (OSM) data by mainstream tech companies has been on the rise in recent years. Two prominent examples are Snapchat and Pokémon Go that became OSM data consumers in 2017. Snapchat reports 190 million daily active users in 2019 [1]. Pokémon Go was used by 28.5 million users daily during its peak popularity in 2016 and it still managed to engage more than 10 million users monthly in 2018 [2]. The large user base of these applications puts OSM in an unprecedented spotlight which can be considered a huge success for the project. On the other hand, increased attention comes with undesirable side effects. Acts of vandalism [3] manifested in the data no longer stay within the OSM community but will be visible to a worldwide audience. This increased visibility of errors caused by malicious actions (e.g. fake place names, fictive data) can potentially undermine the reputation of the OSM project. In August 2018, a case of anti-semitic vandalism surfaced on Snapchat's online maps [4] and also made it to various mainstream media outlets, such as the BBC, Time or The New York Times. Another type of vandalism can be observed in connection with Pokémon Go, where users modify the underlying OSM data by adding fictional map features (e.g. parks, footpaths and lakes) to gain benefits in the game [5].

OSM's vulnerability to vandalism is often considered one of its drawbacks directly related to data quality. Despite this and other negative effects on the OSM project, carto-vandalism [6] has only been addressed sporadically in the literature. One study identified motivations behind such actions [7], while some other studies characterized different types of vandalism based on investigations of community forums and mailing lists [6] and documented cases of vandalism [8]. According to Linus's law, the collaborative nature of OSM ensures that vandalism will be discovered and corrected [9]. However, it is unreasonable to expect that all harmful contributions will be found by community [10], therefore, automatic detection of vandalism with rule-based methods is of interest [8, 11]. The OSM community also developed a set of tools to battle vandalism.

Using Pokémon Go as an example, this study focuses on the nature and life-cycle of harmful edits with an emphasis on the OSM community's response. Based on OSM changeset comments and discussions, the study first identifies Pokémon Go related

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vandalism together with changesets that fixed them or reverted them. This duality allows to study not only the act of vandalism itself, but also the community's response. By analyzing Pokémon Go vandalism changesets this study describes in detail what fake information have been added to the map. A better understanding of this will allow to develop more targeted rules for vandalism detection systems.

It is important to note that not all Pokémon Go players vandalize OSM. It is well known that several Pokémon Go players are also valuable members of the OSM community. Apart from gaining benefits in the game, an alternative explanation for Pokémon Go vandalism might be that those users are not aware of the purpose of the OSM project, therefore they do not even realize the implications of adding fake data. Pokémon Go players can be considered a large pool of potential OSM community members if they do not vandalize the map. It was observed that instead of just fixing harmful edits several experienced members of the OSM community reach out to mappers who initially added fake data (e.g. through changeset discussions). Therefore, this study seeks empirical evidence of initial "vandals" converted to be constructive OSM contributors due to the interactions with other mappers. A better understanding of what communication techniques worked would help utilizing OSM's increased visibility to engage and retain more contributors.

Vandalism directly affects data quality, therefore this study aims to provide a first description of the life-cycle of carto-vandalism analyzing a large pool of events and considering both spatial and temporal constraints. Our initial data analysis identified more than 1,500 changesets that reverted harmful Pokémon Go edits. These revert changesets fixed more than 4,000 changesets that can be considered vandalism.

References

[1] Snap, Inc. (2019). First Quarter 2019 Financial Results. Retrieved from https://bit.ly/2YAzv70
[2] Statista (2019). Most popular mobile gaming related apps in the United States as of March 2019. Retrieved from https://bit.ly/2VJS3EO
[3] OpenStreetMap Wiki (2019). Vandalism. Retrieved from https://wiki.openstreetmap.org/wiki/Vandalism
[4] OSM Foundation (2018). OSM condemns recent anti-semitic vandalism. Retrieved from https://bit.ly/2HHPRno
[5] Huffington Post (2018). The Strange Story Of How Pokemon Go Put Lakes And Parks In People's Homes. Retrieved from https://bit.ly/2EjFSnD
[6] Ballatore, A. (2014). Defacing the map: Cartographic vandalism in the digital commons. *The Cartographic Journal, 51*(3), 214-224.
[7] Coleman, D., Georgiadou, Y., & Labonte, J. (2009). Volunteered geographic information: The nature and motivation of produsers. *International Journal of Spatial Data Infrastructures Research, 4*(1), 332-358.
[8] Neis, P., Goetz, M., & Zipf, A. (2012). Towards automatic vandalism detection in OpenStreetMap. *ISPRS International Journal of Geo-Information, 1*(3), 315-332.
[9] Haklay, M. (2010). How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets. *Environment and planning B: Planning and design, 37*(4), 682-703.
[10] Goodchild, M. F., & Li, L. (2012). Assuring the quality of volunteered geographic information. *Spatial statistics, 1*, 110-120.
[11] Truong, Q. T., Touya, G., & De Runz, C. (2018). Towards Vandalism Detection in OpenStreetMap Through a Data Driven Approach. In *Proceedings of the 10th International Conference on Geographic Information Science (GIScience 2018)*, 61:1-61:7.