Exploring the Effects of Pokémon Go Vandalism on OpenStreetMap

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Outline

● Introduction
● Methodology
● Results
● Summary and future work
Outline

● Introduction
  ○ Pokémon Go (PGO)
  ○ PGO-related mapping and vandalism in OSM
  ○ Our goal

● Methodology

● Results

● Summary and future work
About Pokémon

- PGO is an augmented reality mobile game
- Goal: locate and capture virtual creatures
- Different ways of interacting with other players
About Pokémon

- PGO has insane popularity!
About Pokémon

- PGO has insane popularity!
About Pokémon

- Outdoor activity is promoted
- Increased foot traffic reflects on local business
- Is inspiring Citizen Science projects

Gotta name them all: how Pokémon can transform taxonomy

*Sciences are urging Pokémon Go fanatics to keep an eye out for new species.*
Pokémon-related mapping

- OSM is the background map from PGO
- OSM data influences “spawn points” within the game
- Players are motivated to map in order to get PGO benefits
Pokémon-related mapping

Tips for new (Pokémon Go) mappers

Pokémon Go?
This hugely popular mobile game uses OpenStreetMap data to generate the in-game map. However, there has also been speculation among some players that OpenStreetMap data is used to influence spawn points.

Tips for new mappers coming from Pokémon Go

Tips for new mappers coming from Pokémon Go

Pokémon Go players often use the game to uncover hidden gems in their area. They might use the game’s map to find new places to visit or to get a sense of the layout of their town. Some players even use the game to plan their day, finding places to eat or things to do based on the Pokémon they can catch in the area.

Some tips for new mappers coming from Pokémon Go:

- Do improve the map!
- Do map things that exist on the ground. The map is used by pedestrians, people with disabilities, cyclists, bikers, car owners, drivers and others. Do not add things such as footways that do not exist.
- Do add things you see (e.g. benches, cafes, fire hydrants, bicycle parking spots) or things you know (if your favorite cafe offers free wifi, the type of cuisine of the nearby diner, accessibility, opening hours, official websites, wikipedia links)
- Want to add footways? Check what is considered as a footway: highway/footway tag docs. Want to add other features? Have a look at map features and search the wiki.
- Do connect your footways with the road network.
Pokémon-related vandalism

- Some PGO users tend to vandalize OSM to gain benefits in the game
- Footpaths influences PGO spawns
- Land-use affects Pokémon biome
Vandalism in OSM

- Large user base applications (e.g. Snapchat, ORS) put OSM on the spotlight
- OSM reputation is undermined if vandalism is visible to these wider audiences

How an anti-Semitic slur made its way onto maps across the internet
Vandalism in OSM

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- OSM reputation is undermined if vandalism is visible to these wider audiences

Vandalism detection methods are needed!

- According to Linus’s law, vandalism will be discovered and corrected, but it is...
- Unlikely that all harmful edits will be detected by the community
Vandalism in OSM - Related works

In the OSM community (wiki):

- Tools for reverting and guidelines for managing vandalism
- Rule-based approaches for detecting suspicious tags, users, and changesets.

In academic literature:

- Analysis of the motivations behind carto-vandalism [Coleman et al., 2009]
- Categorization and characterization of carto-vandalism [Ballatore, 2014]
- Analysis and automatic detection of carto-vandalism [Neis et al., 2012]
Goal

To undertake first exploratory analyses on the nature and life-cycle of PGO-related harmful edits with an emphasis on the OSM community’s response.
Overview

1. Introduction
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4. Summary and future work
Identification of vandalism

- **Full text search**: (pokemon | pokémon | poké) AND (revert | remove | delete)
  
  a. Regular expressions to extract vandalism

  - Vandalism
    - CS 45539374
  
  - Vandalism
    - CS 45567138

  - FIX changeset

  Comment: Reverted CS 45539374 and parts of CS 45567138 because of Pokemon vandalism

- **Through feature history**

  - Vandalism
    - changeset

  - FIX changeset

  Comment: Revert due to Pokemon vandalism

  - Way 1234 (version 6)
  
  - Way 2345 (version 1)
  
  - Node 5555 (version 1)
Our database

- **Changeset data:**
  - Categorized into ‘Fix’ and ‘Vandalism’
  - Metadata, i.e. timestamps, user id, tags, number of changes, etc.

- **Links between ‘Fix’ - ‘Vandalism’:**
  - Allows to calculate time difference, identify users, etc.

- **Users’ data:**
  - Categorized into ‘vandals’ and ‘fixers’
  - “Age”, num. of changesets and edits, etc.

- **Edits’ data:**
  - Create, modify, delete
  - What type of feature was edited (JOSM presets)
  - Allows to assess WHAT has changed
Data cleaning

- A few users were found to both vandalize and revert vandalism
  - Remove users if no way of telling which one is correct (i.e. 1 vandalism, 1 fix)

**VANDALISM**

Description confirms
Pokemon content

**FIX**

Not a complete beginner
Overview

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Results - Cycles of vandalism

Monthly number of changesets identified

Monthly number of users engaged in vandalism/fix

Cumulative number of users engaging in vandalism/fix
Results - Time to fix vandalism

- Median: 8.5 hrs, Mean: ~19 days, Max: ~2 years
- 2 out of 3 fixed within a day
Results - Time to fix vandalism

- Inverse relationship between time taken to fix bad changesets and number of vandalism
Results - Time to fix vandalism

- Community gets faster on discovering and fixing vandalism on average
Results - User group analysis

Users engaged in vandalism

Users engaged in fixing vandalism

Cumulative # of users

First time user
Returning user
Results - User group analysis

<table>
<thead>
<tr>
<th>Type</th>
<th># of users</th>
<th>Median “age”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixer</td>
<td>148</td>
<td>4.8 years</td>
</tr>
<tr>
<td>Vandal</td>
<td>676</td>
<td>35 minutes</td>
</tr>
</tbody>
</table>
Results - Editor software used

Software used to fix vandalism

reverter_plugin/JOSM

Software used in vandalism

iD
Results - Transforming users

- 45% of vandalism changesets commented on (12% with conversation)
- “Vandals” contacted via comment: 166
- Responded: 46

Discussion

Comment from code elusive 12 months ago

Hi there :) Please do not mark pokemon gyms on OpenStreetMap. Names of features (roads, etc) should be their name only. See https://wiki.openstreetmap.org/wiki/Names#Name_is_the_name_only You might be also interested in reading out tips for Pokemon GO mappers: https://blog.openstreetmap.org/2016/12/30/tips-pokemon-go/ and https://blog.openstreetmap.org/2018/04/01/tips-pokemon-go-2/ Thank you and happy mapping!

Comment from grouper about 2 years ago

Hey - welcome to OSM! I've got a hunch that meadow was for pokemon. Am I right? - please only map real stuff - if it matches up for pokemon fine, otherwise keep it out of OSM.

Comment from Jpw03 about 2 years ago

I am using it for that, but the area really does have a ton of small flowers, is that not a meadow? I could just be mistaken on what is considered a meadow. Either way sorry if I marked it incorrectly, wasn't my intention at all!

Comment from grouper about 2 years ago

OK, no problem - thanks for responding so quickly. There's a lot of fake pokemon mapping going on in OSM these days, so some of us old timers are a little sensitive about it and most people don't respond back. So thanks for being conscientious. Here's a link to the meadow tag - http://wiki.openstreetmap.org/wiki/Tag:landuse%3Dmeadow

Discussion

Comment from naoliv about 3 years ago

Is this https://www.openstreetmap.org/node/4401863894 a real place or it's related with the Pokemon Go game only?

Comment from AkuAnakTimur about 3 years ago

I guess it's a Pokestop according to this blog post, "Masjid Lebuh Achen Poketstop" http://www.mystuff.my/play-pokemongo-penang/

Comment from naoliv about 3 years ago

Can you fix it, AkuAnakTimur, please?

Comment from AkuAnakTimur about 3 years ago

Done! I deleted the node "pokemon" 4401863894, please see https://www.openstreetmap.org/changeset/42306611

Comment from naoliv about 3 years ago

Thanks!
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Summary

- OSM community seems to get better at discovering and fixing vandalism
- “Vandalism” is not sustained by the same users
- Fixes are sustained by a small and dedicated community
- Communication is helpful in turning potential “vandals” constructive mappers
- Patterns revealed may be used to create detection systems
Future work

- Look into changesets to see what features were changed
- Extract and explore more metrics, i.e. about...
  - Users (“age”, trust, connections, prior experience)
  - Edits (what, how many, how?)
  - Behavior (editor software, language, geography)
- Formalize a binary classifier to detect Pokemon related vandalism in real time
- Extend findings to more general cases of vandalism.
Questions? Suggestions?

Thank You!

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Pokémon-related mapping

“Niantic is in the process of adjusting their algorithms so that areas with good map edits get more spawn points, while areas where players try to game the system get penalised”