Pokémon Go: Impact on Yelp Restaurant Reviews

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ABSTRACT
Pokémon Go, the popular Augmented Reality based mobile application, launched in July of 2016. The game’s meteoric rise in usage since that time has had an impact on not just the mobile gaming industry, but also the physical activity of players, where they travel, where they spend their money, and possibly how they interact with other social media applications. In this paper, we studied the impact of Pokémon Go on Yelp reviews. For restaurants near PokéStops, we found a slight drop in the number of online reviews.

KEYWORDS
Pokémon Go; PokéStops; Augmented Reality Games; Yelp; Local Businesses; Restaurants; Reviews; Social Media.

1 INTRODUCTION AND RELATED WORK
Augmented reality games allow users to play in a mediated reality produced by imposing the graphics from the game onto a real-world environment. This technology is having an impact on the world in social, cultural, and economic ways. Pokémon Go is one such popular augmented reality game that was built around the famous Pokémon, or “Pocket Monsters”, series in which a player catches the titular creatures using PokeBalls. Yelp a popular website that provides crowdsourced reviews of local businesses in various countries, added an option whereby its users can identify whether a business has a PokéStop nearby, which allows users to filter the search results of businesses, including restaurants. We studied the impact of PokéStops on local restaurant reviews that have a PokéStop nearby. We compared the most recent three years of review trends for these restaurants to analyze the impact of common factors during the period following Pokémon Go’s release date.

As the augmented reality industry matures, researchers have studied its socioeconomic impact as well as its impact on users’ physical and mental health. Studies to date on Pokémon Go have tried to quantify the socioeconomic effect of the game using survey information. Zach and Tussyadiah [17] analyzed the results from players responding to their survey on likelihood to travel, spend money, and visit restaurants while playing. Overall, the results indicated playing the game encouraged traveling. However, they found players that spent one hour or more playing were less likely to spend money on traveling for the game. Colley et al. [3] combined national field surveys with a geo-statistical analysis of the distribution of PokéStops throughout the U.S. They found that urban areas and areas with large (non-hispanic) white populations were heavily favored in Pokémon Go. Further, they found that 46% of players had purchased goods at places near where they traveled to play Pokémon Go.

A study done at Microsoft Research by Althoff et al. [1] focused on determining the physical activity involved in playing Pokémon Go by combining signals from large-scale corpora of wearable sensor data and search engine logs for 32,000 users over a period of three months. Pokémon Go players, identified through search engine queries and with activity measured by accelerometer, were found to have a significant increase in physical activity. Based on data collected from the iOS Health app, Howe et al. [5] observed a similar increase in physical activity among both children and adults. Nigg et al. [10] conducted a pre-post study and found among survey recipients that Pokémon Go increased physical activity of various intensity levels by 50 minutes per week and reduced sedentary activity by 30 minutes each day.

Williamson [16] provided anecdotal evidence that suggests numerous users are logging many kilometers in an effort to catch and hatch elusive Pokémon. In addition to referencing claims that Pokémon Go helps its users to fight depression, McCartney [9] reported that the game is playing a positive role in fighting obesity in the U.S. Quinn [13] described how, by remembering the monsters’ names and capabilities, children improved their memory capabilities through playing Pokémon Go.

Wang [15] looked at Pokémon Go as an opportunity to examine the effect of crowdsourced information on the real world. Mansilla and Perkis [8] suggested that augmented reality games such as Pokémon Go can contribute to setting up multi-use public spaces called “Adressaparken,” that are designed to increase social interaction between community members. Dzodom and Shipman [4] studied how fantasy games play an important role in increasing the social interaction. Some studies have found Pokémon Go to be a dangerous distraction for drivers, passengers, and pedestrians in some instances [6][7]. Pourmand et al. [11] found, by reviewing the PubMed, Medline, and PsycInfo databases, that there was an increase in fractures and dislocations compared to previous video game related injuries. In a study focused on addressing the safety of players engaged in augmented reality games, Pyae and Potter [12] presented four engagement models designed to capture engagement in the games. The researchers discussed each model based on the individual user scenario and used Pokémon Go as their focal case study. Although there are some reports that Pokémon Go has increased the number of visits made to museums and national parks and also increased sales [2], it is not clear whether the game has had an effect on online reviews of local businesses and restaurants, which is the focus of our analysis.
2 METHODS AND RESULTS

For the present study, all the data pertaining to restaurant reviews were collected from Yelp, which has provided a search filter so that its users can search for restaurants with a PokéStop nearby. We used the Selenium [14] browser automation framework to navigate the Yelp website and to collect restaurant reviews. We collected 592,120 reviews from 3,719 distinct local restaurants in 26 U.S. and U.K. cities. We collected the data by running four individual threads: two collected the data for restaurants with a PokéStop nearby, and two for restaurants without a PokéStop in the vicinity.

From our two sets of restaurants, those with PokéStops and those without, we narrowed our initial selection by excluding any restaurant that did not have at least five reviews in each month since 2014. From this selection, we took 50 restaurants with the most reviews for each category as our final sample. Thus, we ended with 50 restaurants that were known to have PokéStops nearby and 50 restaurants without, for a total sample of 100 restaurants across both categories. To determine whether the proximity of a PokéStop had any impact on the restaurant reviews, we used the Pearson correlation and Paired T-Test. We split our data points, i.e., the number of reviews year-wise for our two 50 restaurant samples.

We applied the Paired T-Test over another random data samples with 95% confidence. We selected 20 random sample sets (10 samples for restaurants with a PokéStop and 10 samples for those without). Each set consists of 10 randomly selected restaurants from each of the 26 cities, where each city has at least 25 restaurants and each of the restaurants has at least 10 reviews. By applying the previous approach, we eliminated effects of other factors such as weather, special events, etc. We compared the reviews in the months of August to November to see if Pokémon Go affected reviews during that period. August to November were chosen because Yelp added the PokéStop filter in mid-July and our final dataset was collected in the second week of December. As seen in Table 1, we applied tests to compare the previous year, ‘Before’ period, to the subsequent years ‘After’ period to measure the change in restaurant reviews.

| Test # | Before | After |
|-------|--------|-------|
| 1     | August-November 2015 | August-November 2016 |
| 2     | August-November 2014 | August-November 2015 |

We studied the impact of Pokémon Go on the restaurants with and without PokéStops for the years 2014 to 2016. We analyzed the reviews from the same period for the previous years, i.e., 2014 and 2015, and found an increase in the number of reviews from 2014 to 2015. To verify these results, we applied the Pearson correlation on data within the stated periods. Table 2 shows the results of the Pearson correlation coefficients after performing the correlation analysis. Restaurants with PokéStops nearby had lower correlation compared to that of the restaurants without PokéStops nearby.

We then applied the Paired T-Test for test period #1, as indicated in Table 3, which shows that there is no significant difference between the Before and After periods in the case of restaurants with a PokéStop, indicating no statistically significant difference in the number of restaurant reviews. However, the test on restaurants without a PokéStop for the same period indicate a significant difference in restaurant reviews for that group. We applied the Paired T-Test for test period #2. The tests show significant differences between the two data sets for the periods of test #2, indicating an increase in the number of reviews from 2014 to 2015.

Table 2: Pearson correlation coefficients for restaurants with and without PokéStops compared to previous years.

|       | August-November | 2016-2015 | Without PokéStops |
|-------|-----------------|-----------|-------------------|
|       | 0.746           | 0.934     | 0.921             |
| 52015-2014 | 0.967     | 0.0067    | 0.3282            |

Table 3: P-values for tests #1 and #2.

| Test # | Without PokéStops | With PokéStops |
|-------|-------------------|---------------|
| 1     | 0.0067            | 0.3282        |
| 2     | 0.0154            | 0.0031        |

From the previous results, it can be concluded that restaurants with a PokéStop nearby have experienced a slight decrease in the number of reviews on Yelp after the release of Pokémon Go in July 2016, especially in October and November.

REFERENCES

[1] Tim Althoff, Ryon W. White, and Eric Horvitz. 2016. Influence of Pokémon Go on Physical Activity: Study and Implications. JMI 18, 12 (dec 2016), e315.
[2] Walter Chen. 2016. How Pokémon Go Is Driving Insane Amounts of Sales at Small, Local Businesses. (2016). https://goo.gl/M5q8BY
[3] Ashley Colley, Jacob Thebau-Spieker, Allen Ylum Lin, Donald Degaen, Benjamin Fischman, Donna Hakkila, Kate Ruehl, Valentina Neri, Nuno Jardim Nunes, Nina Wenig, and Others. 2017. The Geography of Pokémon GO: Beneficial and Problematic Effects on Places and Movement. In Proceedings of CHI 2017.
[4] Gabriel S Dzidom and Frank M Shipman. 2014. Data-driven Web Entertainment: The Data Collection and Analysis Practices of Fantasy Sports Players. In Proceedings of the 2014 ACM Conference on Web Science. 293–294.
[5] Katherine B Howe, Christian Susaril, Peter Ueda, Daniel Howe, Ichiro Kawachi, and Eric B Rimm. 2016. Gotta catch’em all! Pokémon GO and physical activity among young adults: difference in differences study. BMJ 355 (2016).
[6] John W. Ayers, Eric C Lee, Mark Dredze, Jon-Patrick Allern, Jurijek G Grabsowski, and Linda Hill. 2016. Pokémon GO—A New Distraction for Drivers and Pedestrians. JAMA Internal Medicine 176, 12 (2016), 1865–1866.
[7] Bellaf Joseph and David G Armstrong. 2016. Potential perils of peri-Pokemon perambulation: the dark reality of augmented reality? Oxford Medical Case Reports 2016, 10 (2016), 255–256.
[8] Wendy Ann Mansilla and Andrew Perkins. 2016. Technology and Art in Stimulating Creative Placemaking in Public-Use Spaces. In Proceedings of IWM 2016.
[9] Margaret McCartney. 2016. Margaret McCartney: Game on for Pokémon Go. BMJ 354 (2016). https://doi.org/10.1136/bmj.i4306
[10] Claudio R Nigg, Destrie Joi Mateo, and Jiyoung An. 2017. Pokémon GO May Increase Physical Activity and Decrease Sedentary Behaviors. American Journal of Public Health 107, 1 (Jan 2017), 37–38. https://doi.org/10.2105/AJPH.2016.305552
[11] Ali Pourmand, Kevin Lombardi, Evan Kuhl, and Francis O’Connell. 2017. Videogame-Related Illness and Injury: A Review of the Literature and Predictions for Pokémon GO! Games for Health Journal 6, 1 (Feb 2017), 9–18.
[12] Aung Pyae and Leigh Ellen Potter. 2016. A Player Engagement Model for an Augmented Reality Game: A Case of Pokémon GO. In Proceedings of the 28th Australian Conference on Computer-Human Interaction (OzCHI ‘16). 11–15.
[13] Jasmine Quinn. 2016. Identity of Pokemon Go Players: How Social Gaming Affects Behavior. Advanced Writing: Pop Culture Intersections 19 (2016).
[14] Selenium. 2017. Selenium (2017). http://www.seleniumhq.org/
[15] Mingzong Wang. 2017. FollowMe if you can: a study of mobile crowd sensing with Pokémon go. In Proceedings of ACSW 2017.
[16] Jon W Williamson. 2016. Will the ‘Pokémon’ be Heroes in the Battle Against Physical Inactivity? Sports and Exercise Medicine 2, 1 (2016), 13–14.
[17] Florian J. Zach and Iis P Tussyadiah. 2017. To Catch Them All—The (Un)intended Consequences of Pokémon GO on Mobility, Consumption, and Wellbeing. Information and Communication Technologies in Tourism (2017), 217–227.