Analysis of Usability of Various Geosocial Network POI in Tourism

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Abstract. The paper deals with an analysis of information usability of Points of Interest across different geosocial networks in tourism. The analysis contains a comparison of data retrieved from Facebook API, Foursquare API and Google Places API. The data was obtained for tourist areas from the smallest towns up to metropolitan cities. This article tries to verify the hypothesis whether or not geosocial networks provide relevant local information to participants in tourism, at least at the equivalent level currently available from traditional information resources used in tourism. In which case, geosocial networks have a potential to be used as a primary information resources in the commercial sector, specifically in local tourism.

Keywords: Geosocial networks · LBS · POI · Tourism · Facebook · Google places · Foursquare · API

1 Introduction

Geosocial networks are a very important segment of Location Based Services (LBS), providing to their users local information in many areas like social services, transport and navigation, tourist attractions, etc. LBS, including geosocial networks, are key milestones in e-tourism, which can significantly change the shape of tourism thanks to quick availability and complete information provided. As a result, they enable a better supply of tourism products for its participants. For geosocial networks, according to the source (GILL, 2008), the exponential growth of information in their databases is typical. This is because very large numbers of participants, who interact with the building of a common information base with high structure flexibility and target-oriented contributions, are characteristic of virtual communities. As published in the source (BUHALIS and WEBER, 2013), the innovative concept of gamification, which applies gaming principles in the tourism environment, also supports the high level of participant interaction. This paper therefore deals with the quality of the information from the POI in the LBS, specifically geosocial networks, which serve as an information resource for local tourism participants, who in turn, expands these geosocial network databases.

The main goal is realized in the Sect. 3 analysis, which maps the availability and quality of these information sources by analyzing the level of completeness of the POI. The related information is provided by the three most widely-used geosocial networks

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and their Application Programming Interface, that is Facebook API, Foursquare API and Google+/Google Places API. This analysis will try to find the answer to the main research question: "*Do geosocial networks provide relevant local information to tourism participants at least at the equivalent level currently available from traditional tourist information resources?*". In the positive case, geosocial networks have a potential to be used as a primary information resource in local tourism. The relevance and redundancy of data provided by these API will be taken into account. For the analysis, the categories of restaurants and bars were chosen as points of interest covering the area of hospitality facilities (restaurants and bars) according to the EU statistical methodology (CESTOVNI-RUCH.cz 2009). In the text, the data will be obtained by retrieving data from API of individual geosocial networks and further by field research in the defined area. The outlined circular area (with a diameter of 300 m) was used to select tourist centers of 12 selected towns and cities (see Sect. 2). The benefit of this realized anal-y-sis is to determine the level of completeness of information on tourism subjects provided by geosocial networks. In addition, the hypothesis that the geosocial networks can be used as the primary source of information for tourism participants can be confirmed, due to the higher information completeness of social networks compared with traditional information sources.

2 Methodology with Definition of Examined Areas and Field Research

The evaluation of the quality of tourist information about the POI from geosocial networks was realized on the basis of data obtained within the defined areas, in the historical centers of the below mentioned towns and metropolitan cities. In all these towns and metropolitan cities, the level of completeness of information from the POI of geosocial networks was examined in comparison with other information sources (traditional information resources used in tourism). Moreover the level of completeness of information of the POI of geosocial networks was compared with the current real number of subjects that was empirically found by field research.

In the following towns and cities, the level of completeness of information in the POI of geosocial networks on existing subjects in tourism was analyzed in Sect. 3. The choice of the towns and cities is not random. The first two largest metropolitan cities have a similar population and are neighbouring cities. All the others were selected within two comparable regions, namely Královéhradecký and Pardubický (whose largest cities are the regional cities of Pardubice and Hradec Králové, each with approximately 90,000 inhabitants). These towns and cities were chosen from each region, if possible, corresponding to the number of inhabitants (according to (CZECH STATISTICAL OFFICE, 2017; STATISTICAL OFFICE OF THE SLOVAK REPUBLIC, 2016)).

- Bratislava (approx. 425 900 inhabitants)
  - WGS84 coordinates N 48.143368, E 17.108105,
- Brno (approx. 378 000 inhabitants)
  - N 49.195281, E 16.607797,

- Hradec Králové (approx. 92 900 inhabitants, region of Hradec Králové)
  - N 50.2092658, E 15.8328122,
- Pardubice (approx. 90 000 inhabitants, region of Pardubice)
  - N 50.0385283, E 15.7789706,
- Jičín (approx. 16 400 inhabitants, region of Hradec Králové)
  - N 50.436798, E 15.351683,
- Ústí nad Orlicí (approx. 14 200 inhabitants, region of Pardubice)
  - N 49.973672, E 16.394211,
- Hořice (approx. 8 600 inhabitants, region of Hradec Králové)
  - N 50.368195, E 15.632314,
- Choceň (approx. 8 700 inhabitants, region of Pardubice)
  - N 50.001131, E 16.223798,
- Opočno (approx. 3 100, region of Hradec Králové)
  - N 50.267805, E 16.114996,
- Jablonné nad Orlicí (approx. 3 100 inhabitants, region of Pardubice)
  - N 50.029914, E 16.600118,
- Železnice (approx. 1 300 inhabitants, region of Hradec Králové)
  - N 50.473177, E 15.384998,
- Brandýs nad Orlicí (approx. 1 300 inhabitants, region of Pardubice)
  - N 50.000686, E 16.286851

Author's own methodology for the examined area under investigation determines that the defined areas have a circular shape with a diameter of 300 meters, which includes the central square in the historic city center and the adjacent streets. The center of this circular shape area is always the plague column, which is the unifying reference element in the vast majority of Czech squares. The central square is always identified in accordance with the established methodology. It determines it as a square, captured on historical maps, which are available on Mapy.cz or oldmaps.geolab.cz (maps originating from military mapping in the 19th century, see Fig. 1). The reason for choosing this location is, as the source states (RICHTROVÁ, 2014), that most of the Czech towns were founded with a central square in the middle of the city and the source added: "*A city always has a square where the best and most important events are concentrated - what the city has or needs for its life*" (Fig. 2).

Within these defined circular shape areas, information on all restaurants and bars was obtained, according to the EU statistical methodology (CESTOVNI-RUCH.cz 2009). For the sake of objective comparison, this analysis used data obtained by two independent methods. The first method was field research in all areas studied to obtain primary data by personal identification of objects by the author. In the second method, secondary data was obtained from selected information sources using data mining.

Due to publicly unavailable information about the amount and quality of POI of geosocial networks (in the Czech Republic and in the world), it was necessary to obtain a different way that would provide reliable official results about these POI of geosocial networks. For this reason, the necessary information was obtained by using own data mining from selected API of geosocial networks Facebook, Foursquare and Google+/ Places. In the case of the Google Places API, it has been found to provide different results from Google Maps in the number of POI.

Fig. 1. Historical map of analyzed area-Hradec Králové (Königgrätz in German) (Source: [8])

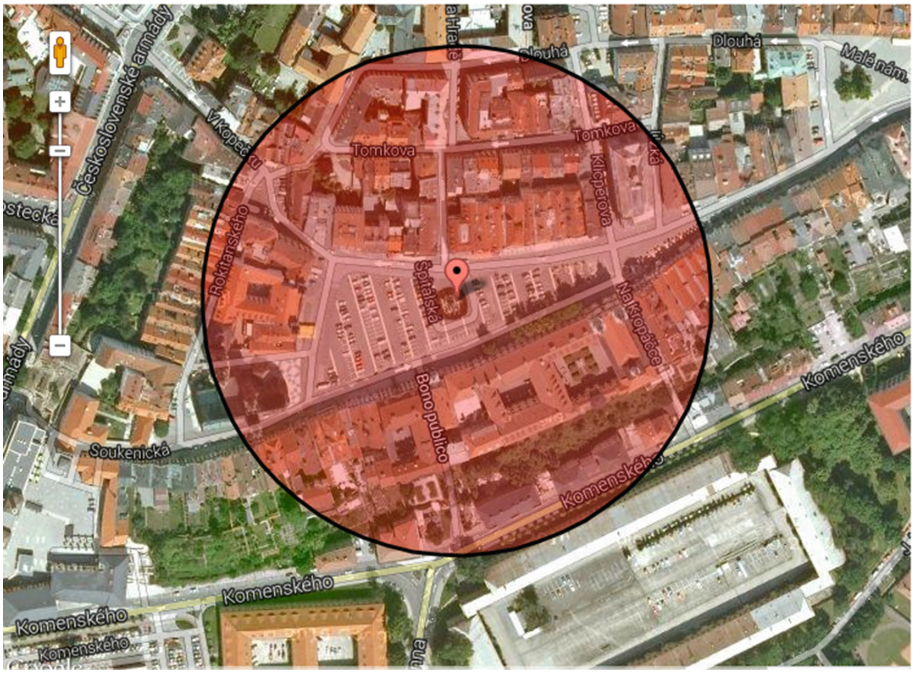

Fig. 2. Actual map of analyzed area – Hradec Králové (Source: [8])

The information was also obtained from the two largest electronic tourism information sources available in Czech Republic. The first was the Czech commercial information source Mapy.cz, belonging to the media house Seznam.cz, owning the largest Czech catalog and search engine. The second was the information source of Google Maps. Because API require coordinates in long WGS84 numeric format, a converter has been used [12].

3 An Analysis of Level of Completeness (Coverage) of POI in Geosocial Networks

Based on an analysis that compares the data obtained from the API (Table 1) of selected geosocial networks (Foursquare, Google+/Places and Facebook) with field research in defined areas (city centers Bratislava, Brno, Hradec Králové, Pardubice, Jičín, Ústí nad Orlicí, Hořice, Choceň, Opočno, Jablonné nad Orlicí, Železnice and Brandýs nad Orlicí), the following information resulted (Table 2).

This information about the coverage of the POI of the geosocial networks (Foursquare, Google+/Places, Facebook) and moreover, the levels of completeness of information of commercial information sources (Mapy.cz, Google Maps) are shown in the following table (Table 2).

As shown in the table (Table 2) and graphs (Figs. 3, 4, 5, 6, 7 and 8), in the defined areas, the Foursquare geosocial network reaches an average of 70% of POI coverage, Google+/Places 62% and Facebook 52%. Data from the commercial information source Mapy.cz, which runs Seznam.cz and Google Maps from Google, were also obtained and included in the comparison. All these geosocial networks offer higher POI coverage compared to Mapy.cz, even up to 24% higher for Foursquare. When compared to the Google Maps, two of the three geosocial networks also achieved higher POI coverage, by up to 9% for Foursquare.

Thus, the research question which was asked: "*Do geosocial networks provide relevant local information to tourism participants at least on the level of completeness of information available to the largest available information sources?*" has a positive result. It should be noted, however, that for example, in the towns of Hořice and Ústí nad Orlicí, geosocial networks did not contain information about several sports bar establishments (i.e. devices primarily with slot machines and a bar), which is certainly not the category of hospitality facilities that tourists would search for on their trips (for this reason, it is also ignored by geospatial users). So, if these sport bars would be subtracted from this study, the average POI coverage would reach higher value.

Table 1. Parameters for data mining through the API Foursquare, Google+/Places and Facebook (Source: [9–11] and author)

Foursquare API	HTTPS GET request: https://api.foursquare.com/v2/venues/search?categoryId=P1&ll=P2&radius= P3&limit=P4&client_id=P5&client_secret=P6&v=P7 P1=venue category (4d4b7105d754a06376d81259=coffee, drinks 4d4b7105d754a06374d81259=food, etc. For details, see https://developer.foursquare.com/docs/resources/categories.) P2=WGS84 coordinates P3=radius in meters P4=number of results P5=user's ID P6=user's secret ID P7=actual date
Google+/Places API	HTTPS GET request: https://maps.googleapis.com/maps/api/place/ nearbysearch/json?location= P1&radius=P2&types=P3&sensor=false&key=P4 P1=WGS84 coordinates P2=radius in meters P3=venue category (for details, see https://developers.google.com/places/supported_types) P4=user's secret key
Facebook API	HTTPS GET request: https://graph.facebook.com/search?type=place&q=P1&center= P2&distance=P3&access_token=P4 Graph API Explorer (https://developers.facebook.com/tools/explorer) request: /search?type=place&q=P1&center=P2&distance=P3 P1=venue category P2=WGS84 coordinates P3=radius in meters P4=user's OAuth access token

Table 2. Comparison results of algorithms to determine the average match of POI names of a real data set (Source: author and "R" statistical computing software)

City/town	Foursquare API	Foursquare coverage [%]	Google + API	Google+/ Places coverage [%]	Facebook API	Facebook coverage [%]	Mapy.cz	Mapy.cz coverage [%]	Google Maps	Google Maps coverage [%]	Real number of subjects
Bratislava	70	89	46	58	70	89	34	43	43	54	79
Brno	43	93	29	63	36	78	22	48	27	59	46
Hradec Králové	31	78	26	65	31	78	18	45	26	65	40
Pardubice	25	86	16	55	27	93	16	55	18	62	29
Jičín	10	71	8	57	9	64	5	36	7	50	14
Ústí nad Orlicí	10	67	6	40	8	53	6	40	7	47	15
Hořice	6	46	4	31	4	31	4	31	4	31	13
Choceň	7	70	6	60	6	60	5	50	6	60	10
Opočno	8	89	6	67	4	44	6	67	6	67	9
Jablonné nad Orlicí	3	50	4	67	2	33	4	67	4	67	6
Železnice	1	50	2	100	0	0	1	50	2	100	2
Brandýs nad Orlicí	2	50	3	75	0	0	1	25	3	75	4
Average POI Coverage		**70**		**62**		**52**		**46**		**61**	

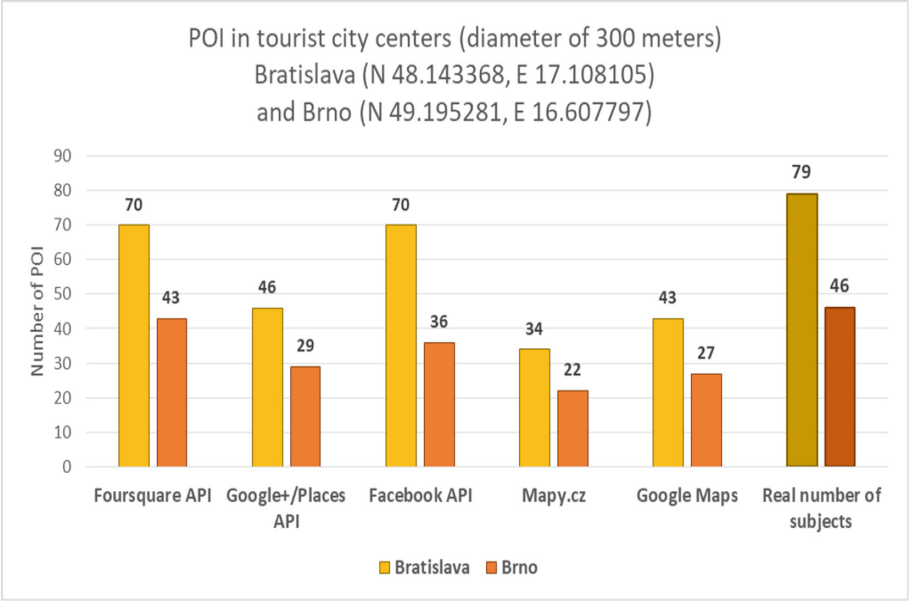

Fig. 3. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

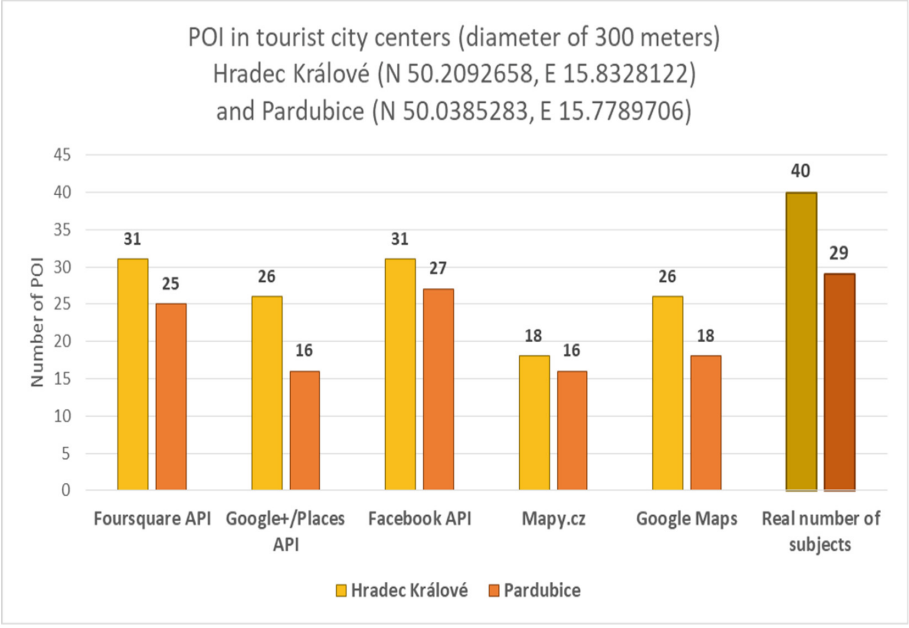

Fig. 4. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

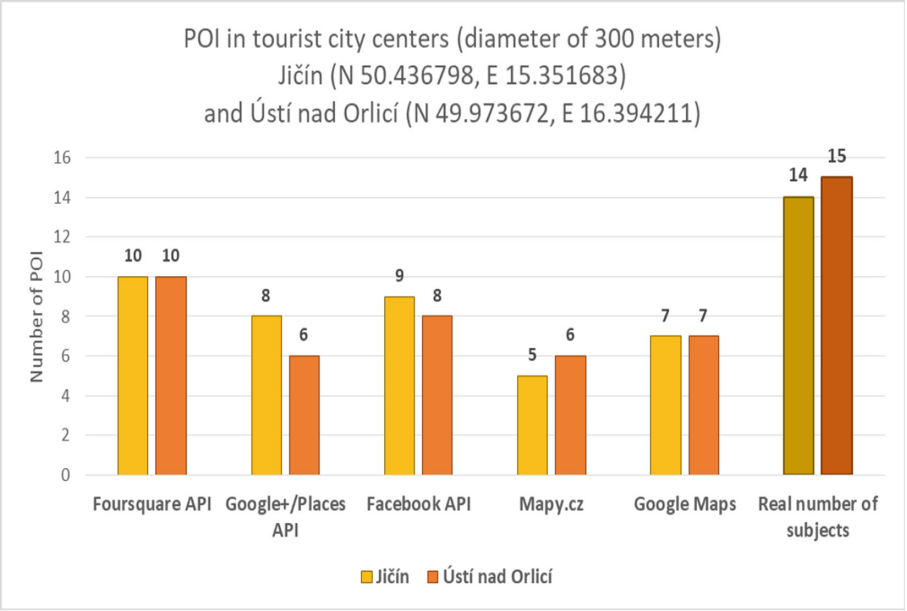

Fig. 5. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

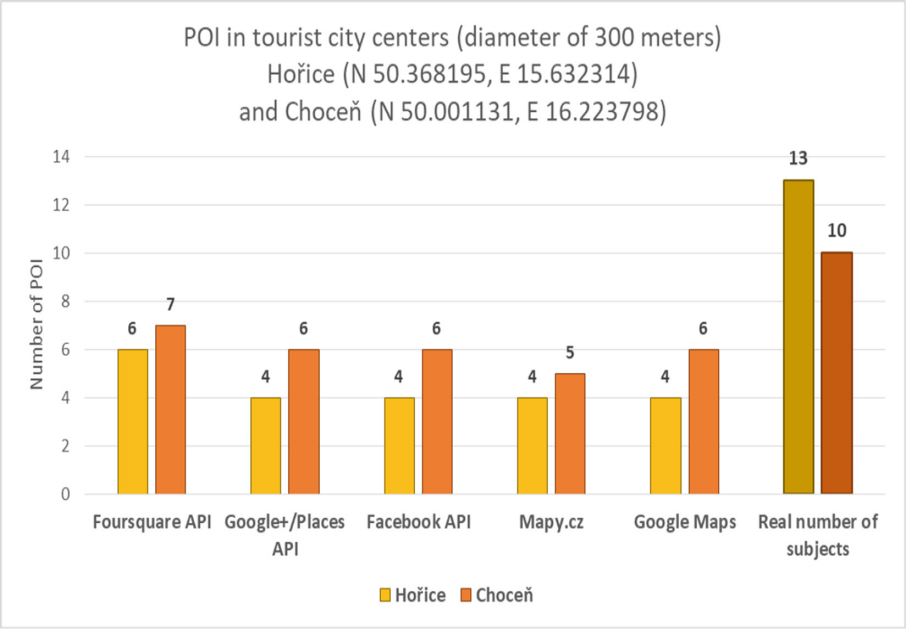

Fig. 6. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

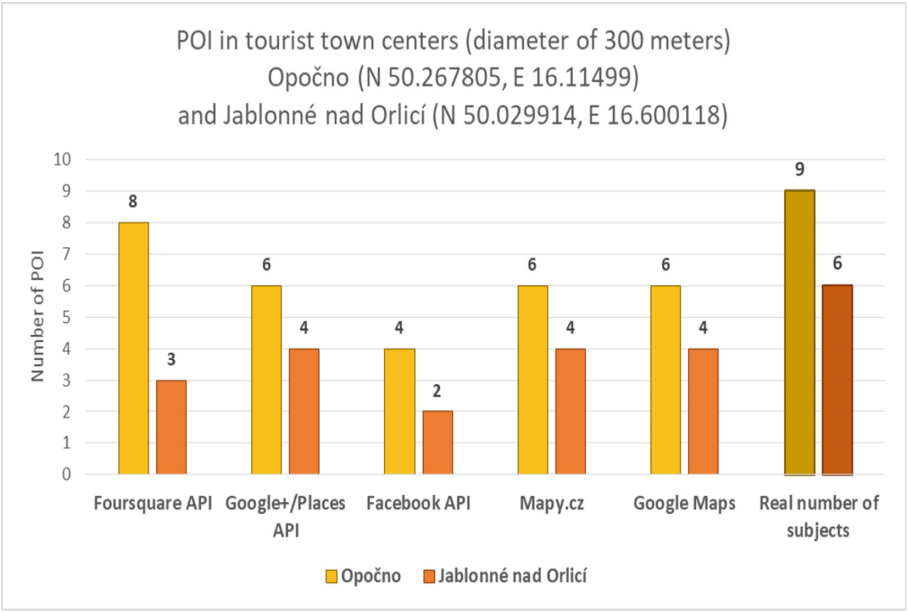

Fig. 7. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

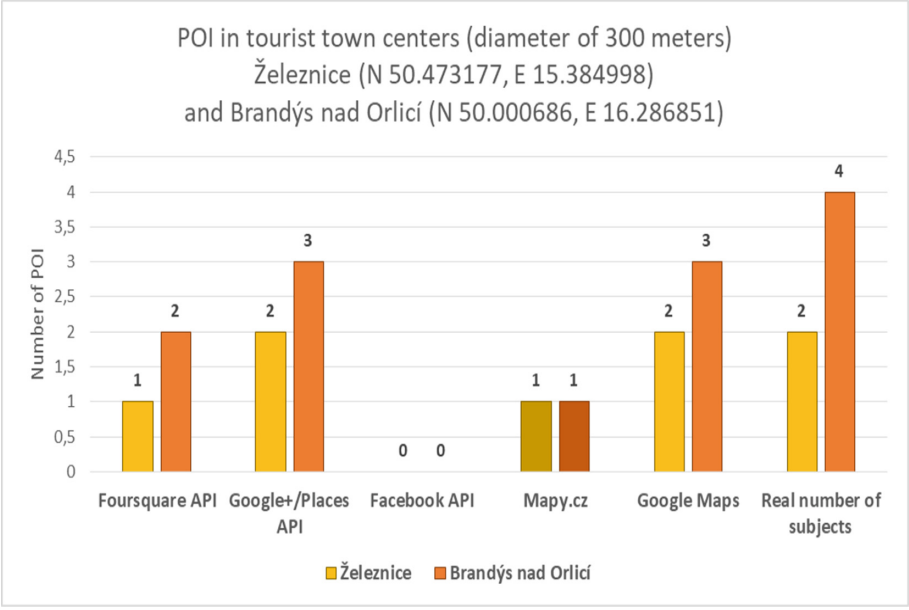

Fig. 8. Comparison of information sources in analyzed area (Source: [4] and author, 2016)

4 Conclusion

LBS, including geosocial networks, are key milestones in e-tourism, which can significantly change the shape of tourism thanks to quick availability and complete information provided. As a result, they enable a better supply of tourism products for its participants.

In this paper, an analysis of the current most important LBS map applications in the Czech Republic was carried out. These services are used as information resources by the participants in tourism. The author found out that Google Maps, on average, covered 61% of the total of 267 existing hospitality facilities, which were ascertained by field research in selected areas (historical centers of 12 cities). Mapy.cz on average covered only 46% of these existing subjects. In any case, both LBS applications do not cover more than 61% of existing subjects in these locations. Thus, neither Mapy.cz nor Google maps are currently able, with sufficient flexibility, to centrally cover dynamically changing local points of tourist interest, such as new subjects of restaurant facilities, accommodation or cultural events such as exhibitions, festivals, etc. So, by these traditional tourism resources not enough complete information about points of interest is provided to tourism participants at the place where they are.

In order to solve this research problem, it was necessary to answer the question *"Do geosocial networks provide relevant local information to tourism participants at least at the equivalent level currently available from traditional tourist information resources?*". It was therefore necessary to analyze the information quality of geosocial networks, especially their POI with potential of usability as new information resources for local tourism participants. This paper has therefore focused on mapping of the availability and quality of these resources by analyzing the completeness of POI-related information provided by the three selected Facebook, Foursquare and Google+ networks. Based on this analysis, which compared the information obtained by mining data from API of selected geosocial networks with empirical field research in demarcated areas, it was found that Foursquare has an average coverage of 70% of existing hospitality facilities for these areas, Google+ covers an average of 62% of subjects and Facebook has a 52% coverage of the total of 267 existing subjects in each of the selected 12 cities/towns. The best network, Foursquare, therefore had up to 24% higher coverage than Mapy.cz and up to 9% higher coverage than Google Maps.

Thus, the results of the analysis clearly show that geosocial networks offer, on average, a high level of coverage of points of interest in tourism while providing relevant information. They are also more suitable for use as information sources in local tourism compared to the current largest available information sources. This fact also results in a positive answer to the research question, at least on the level of completeness of information available, when compared to the largest available electronic information sources.

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References

1. Gill, S.P.: Cognition, communication and interaction: Transdisciplinary Perspectives on Interactive Technology. Springer, London (2008). https://doi.org/10.1007/978-1-84628-927-9. ISBN 978-1-84628-926-2
2. Buhalis, D., Weber, J., Xu, F.: Gamification in tourism. In: Xiang, Z., Tussyadiah, I. (eds.) Information and Communication Technologies in Tourism 2014, pp. 525–537. Springer, Cham (2013). https://doi.org/10.1007/978-3-319-03973-2_38. ISBN 978-3-319-03972-5
3. Cestovni-ruch.cz: Kategorizace a klasifikace hostinských zařízení (2009). http://cestovni-ruch.cz/kategorizace/klasrest.php
4. Kysela, J.: Aggregation of Local Information in Tourism Through Geosocial Networks. University of Hradec Králové (2016)
5. Czech Statistical Office: Population of Municipalities (2017). https://www.czso.cz/csu/czso/pocet-obyvatel-v-obcich-see2a5tx8j
6. Statistical Office of the Slovak Republic: Population and migration (2016). https://slovak.statistics.sk/wps/portal/ext/themes/demography/population/indicators/
7. Richtrová, K.: Náměstí jako základní prvek tradiční městské typologie. Czech Technical University in Prague (2014)
8. Mapy.cz: Historická mapa českých zemí z 19. století (2016). https://www.mapy.cz/19stoleti
9. Facebook: Facebook Graph Application Programming Interface. https://graph.facebook.com/
10. Foursquare: Foursquare Places Application Programming Interface. https://api.foursquare.com/v2/
11. Google: Google Places Application Programming Interface. https://maps.googleapis.com/maps/api/place/radarsearch/
12. Earth Point: Tools for Google Earth. http://www.earthpoint.us/Convert.aspx
13. Gentleman, R., Ihaka, R.: The R Project for Statistical Computing. https://www.r-project.org