# THE IMPORTANCE OF SOCIAL MEDIA IN SMART CITIES

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***Abstract***
*Social Media platforms are becoming a big part of our life and are used frequently by the citizens in the context of smart cities, from people browsing and interacting with friends, to companies promoting their products and services. Considering that the most of world's population lives today in urban zones, and Social Media could be a source of valuable data, urban planners must think about analyzing users' opinions and their data in the process of managing cities. This paper presents the importance of using Social Media data in developing a Smart City. Urban planners have the task of accommodating population growth, keeping resources available for all citizens while optimizing their consumption. For analyzing opinions and transforming them into valuable data for city planners, data mining and sentiment analysis tools can be used. Also, tracking check-ins at various locations help to better understand concentration zones, making resource allocation much easier.*
***Key words.*** *social media, smart city.*

## *1. Context*

Considering the large number of inhabitants of a city, everything becomes more complex. A recent study shows that in the US, two-thirds of the population do not feel listened to by the governors who make decisions about local and national society (Congressional Institute, 2017). When that happens, cities lose an important resource for the positive social impact.

Social media is a group of tools, such as websites and software applications, that work on a computer, laptop, tablet, smartphone, etc. These tools have been built to facilitate the communication of Internet users and the creation, distribution and sharing of content among members of social groups (Enescu, 2013).

There are several types of social media:

- Social networks: general (Facebook, MySpace), specialized (Linkedin), blogs (Wordpress, Blogger), media sharing (Youtube, Vimeo, Instagram, Pinterest), microblogging (Twitter, Tumblr, Reddit).
- Apps installed on different devices: instant messaging (Yahoo! Messenger, Skype), online games, social networking based on location (Foursquare).

All these social environments facilitate the access to information and, at the same time, contribute in creating an image and perception of reality.

Social networks can be used in many ways:

- **Social media for companies**

Social networks are used by Romanian companies for communication, marketing, sales, recruitment, cleansing relationships, competitive research, and analysis.

In this case, Social Media marketing can be used for creating social media profiles and managing them, promoting and optimizing profiles to get more people interested in services / products, selecting and reporting customers feedback.

With social media, a company receives direct feedback from the consumers or potential consumers.

- **Social media for entertainment**

With the help of social networks, people interact with each other by spreading

certain information or collecting them. It can be a nice way to relax or to spend time.

- **Social media as a development tool in a smart city**

Using the social networking information, a city can be improved. Besides common uses of Social Media sites, where users are interacting with each other and are sharing their opinions, Location Based Social Networks can also be used to pinpoint the crowded urban zones and allocate the city's resources accordingly.

The concept of smart cities is based on urban development by integrating technologies and systems to efficiently and securely administrate the city resources, with the aim of improving citizen's quality of life, community development and protecting the environment. The goal of a Smart City project is to make the public life better, to promote technical innovation and to improve the efficiency of urban management (Suciu *et al.*, 2018). A smart city implies the existence of an information system made of a multitude of cloud computing subsystems, Internet of Things, Open Data, Big Data and mobile applications, connected to internet through secure networks. These allow the local administration to interact directly with the citizens and the city infrastructure. The city administration can monitor all the events in the city, how it evolves and what possibilities are there to ensure a better quality of life. With the help ofThe rest of the paper is organized as follow multiple sensors integrated in real-time monitoring systems, data is collected from them and other connected devices, is processed and analyzed.

Section 2 analyzes related work while Section 3 presents how Social Media data can be used in developing Smart Cities. Finally, Section 4 concludes the paper and envisions future work.

## *2. Related Work*

In the field of Smart Cities, the lack of standardization brings problems in reusing models from real life projects and can create an entire market filled with incompatible devices. Therefore, standardization efforts have been made, some of the most important are done by ISO/TC 268 Sustainable cities and communities:

- ISO 37100:2016 Sustainable Cities and Communities – Vocabulary;
- ISO 37106:2018 Sustainable Cities and Communities – Guidance on establishing Smart City operating models for sustainable communities;
- ISO 37120:2018 Sustainable Cities and Communities – Indicators for city services and quality of life.

In the field of urban planning and how the modern life (from sensors and other IoT devices that are now part of a city - to the fact that smartphones are used everywhere and Social Media created virtual communities and places to meet) changed how people are interacting in cities, there are multiple research papers, some of them presented below.

Regarding urbanism and locative media (McCullough and Malcolm, 2006), describes how the world is being layered with digital systems that change how people are interacting, making the older top-down cultural models not enough . The paper focuses on the fact that planners should look more at the virtual environment because "there is urbanism in how citizens obtain, layer and manage their connections".

Furthemore, Social Media and mobile communication technologies can foster engagement and self-organization in participatory urban planning and neighbourhood Governance Governance (Kleinhans *et al.*, 2015). The authors explore

the possibilities of engaging citizens to participate in urban planning, considering that trends created in Social Media can be materialized and have direct impact in the real life .

Moreover, sensors are gathering huge amounts of data in cities, which can be used for the digitalization of cities, creating smart urbanism based on infrastructures that produce Big Data (Kitchin, 2014). This enables real-time analysis of city life and provides the raw material for envisioning and enacting more efficient, sustainable, productive and transparent cities.

Social Media can be viewed as a source of knowledge for urban planning and management (Ciuccarelli *et al.*, 2015). In the past years people changed how they use the technology available and urban planners can make use of data that users are sharing on networking platforms.

Moreover, modern cities are subject to periodic or unexpected critical events, which may bring economic losses or even put people in danger (Costa *et al.,* 2018). In Smart Cities, several people post information in Social Media about some event that is being observed and such information can be mined and processed to detect and classify critical events.

Increasing mobile use and location based Social Networks are providing a huge social data source containing data about people's behaviour, mobility and feelings about places (Nummi, 2019). This may provide urban planners with local knowledge about citizen's opinions, experiences, feelings and behaviour.

The information flow found on Social Media has also influenced both government and corporate operations (Pandey and Purohit, 2018). However, the challenge is to effectively extract and analyze information from the big social data in order to improve city's resources.

## *3. Developing Smart Cities based on Social Media data*

In the next sections is presented how Social Media data is useful in developing Smart Cities and how it can be mined and analyzed. Over time, the world and our lives have constantly changed and improved. One of the big shift in the human way of socializing is Social Media platforms. These are providing a cheap and easy environment to communicate, promote products and services and create trends, making them valuable places of data that can be analyzed in multiple domains.

Mining and classifying users' opinions from Social Media platforms, as well as tracking their check-ins help to better understand how people are moving in the city, their interactions and views about different urban zones. City planners can take advantage of these data for designing and improving cities and also, for better allocating the resources across the city.

### *3.1. Smart Cities improvements using Social Media users opinions*

People are sharing their social occupations on networking platforms as Facebook, Instagram, FourSquare, Twitter, LinkedIn, personal blogs and more. A New York University study shows that people are much more honest when it comes to telling their opinions, rather than communicating directly. These demonstrates that Social Media can be used to figure out what citizens really think and want.

Considering how much social media evolves, there are more relevant updated data about the dynamics of social platforms and their use. Thinking about the large number of Social Media users (Fig. 1), it is clear that data can be used to develop a city. According to the statistics made in December 2018 by Zelist Monitor for Romania, Facebook is the most

used social media platform, having almost 11 million users. The last place in the top 10 most used applications is occupied by Foursquare, the application based on location, being the least used in Romania (Manafu, 2019).

With the help of data obtained from networking platforms, relevant information can be mined, filtered, cataloged and analyzed in the benefit of a smart city. For filtering and classifying users' opinions from Social Media platforms sentiment analytics (SA) services as Stanford NLP, Google Cloud Natural Language API and Microsoft Azure NLP can be used.

By using a sentiment analysis service, part of the natural language processing field, user emotions and moods can be determined from text regardless of the topic. One of the best known measures of sentiment is the polarity and the simplest form of the polarity is to have only two degrees, either positive or negative (Suh and Anthony, 2017). Therefore, most of these services are scoring the results from 0 to 1. The source of data can vary, but in this case, information can be collected from Social Networks, through their own APIs, as JSON data which in most cases is more compact. The data is also filtered by keywords to determine what text is mined according to subject of interest. Sentiment analysis techniques can be used, in this case, for finding the exact opinions of residents, regarding certain things, city zones and local places, to further improve them according to positive and negative scores.

### *3.2. Smart Cities improvements using Location Based Social Media*

Location Based Social Networks can be used to extract position and frequency data. The formation of location data, for example from Foursquare, Facebook, Instagram and Twitter is widely explored, while different types of tags can create trends between multiple users for purposes such as entertainment, advertising and occupations related to daily work.

Data collection can be used to understand and manage cities. If the areas where the daily activities of different groups of people take place could be analyzed, with the help of geostrategic data from Facebook, Instagram, Twitter and the exactly interests might be known, this information could help for a future development of the city. These data can help to pinpoint the city's most attractive urban zones, the most visited places and the time of day when are frequented and represents valuable information for city resource planning.

Smart cities are generally crammed with certain sensors and "intelligent" technologies to monitor various processes in the city like traffic circulation and air pollution. These collected data are used to make improvements without human intervention (de Waal, 2014). In the same way, smartphones have their own sensors that can be used to get data from people in the city. Ethically, all users should consent before their data can be mined and analyzed, but this is very common in the field of geotagging where multiple LBSN platforms use this as a main feature in communicate with other users.

The geolocation of users can be extracted from Social Media through their respective APIs and the data depends on how restrictive the platform is in providing information about its users. The aim is to have enough data to statistically group citizens according to needed criteria, to understand how people move in the city, where communities form, how these communities interact with each other and when, in order to better allocate resources.

## ***4. Conclusions***

Social media tools are used by people around the world. A large number of social network

users exist in Romania too. New Media completely changes the urban life and the lifestyle of citizens. If data collected through Social Media were used, it could monitor different processes in a city and this would be much easier if data from check-ins were used to efficiently and quickly allocate the necessary resources.

Using technology and data to develop a Smart City could be a solution to solve real problems and improve the lives of residents. With these improvements, the city can become safer and more efficient. Collecting Social Media data using the Sentiment Analysis tools are effective for developing a Smart City, especially because there are countless resources that can help.

Combining the ideals of a smart city with the social ideals of the citizens, can be useful in building and developing an attractive and modern environment where technology is the main instrument used. As future work we envision to develop a smartphone application that makes use of the multiple sensors placed in the city, in combination with data extracted from Social Media to help urban planners and enable them to allocate resources easier and faster, according to city's needs.

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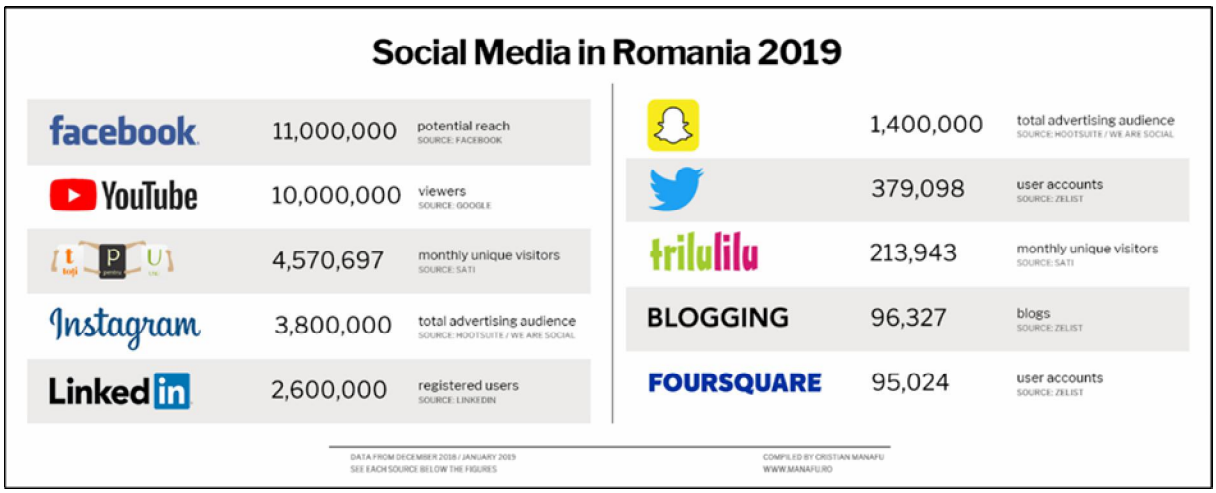


***Fig. 1.*** *Number of Social Media users in Romania (https://www.manafu.ro/2019/02/social-media-in-romania-2019/).*