# Chapter 56
# From Citizens to Decision-Makers:
## A Natural Language Processing Approach in Citizens' Participation

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## ABSTRACT

*Citizens' participation is a form of democracy in which citizens are part of the decision-making process with regard to the development of their society. In today's emergence of Information and Communication Technologies, citizens can participate in these processes by submitting inputs through digital media such as social media platforms or dedicated websites. From these different means, a high quantity of data, of different forms (text, image, video), can be generated. This data needs to be processed in order to extract valuable data that can be used by a city's decision-makers. This paper presents natural language processing techniques to extract valuable information from comments posted by citizens. It applies the Latent Semantic Analysis on a corpus of citizens' comments to automatically identify the subjects that were raised by citizens.*

## INTRODUCTION

In the new era of democracy, governments are encouraged to align with the open government principles that refer, among others, to the involvement of citizens in governments' decision-making processes in order to help increase trust, acceptability, and legitimacy of the decisions. This involvement is referred to as Citizens' participation (Woddford, 2013). In the age of technology, the concept of electronic par-

ticipation (e-participation) emerged as a mean for citizens to express their opinions by using for example forums, dedicated platforms, or social media platforms.

Citizens' participation is a form of democracy in which citizens are part of the decision-making process with regard to the development of their society (Fischer, 2000; Kleinman, 2000; Goven, 2003). It can be defined as an interactive process between citizens themselves and between citizens and government officials in order to significantly contribute in public policy decisions in a transparent and responsible manner (Phillips et al., 2002). The term government refers to the three governmental levels: Federal, Provincial, or Municipal. In today's emergence of ICTs that are being adopted in all life spheres, citizens can participate in these processes by submitting inputs through digital media such as social media platforms or dedicated websites for example. These sources generate a new input that should be considered by decision-makers along with any other source of information that they use, in order to take decisions. The participation of citizens by using ICTs is called electronic participation or e-participation. As stated in (UN/DESA, 2013), the use of ICT in an e-participation process can increase the supply of useful information, enhance consultation, and support decision-making. The citizens' inputs will guarantee transparency of the taken decisions, and will reflect the values of good governance (Fung, 2015).

As stated, there are different platforms that citizens can use to express their opinions that can be for example social media platforms, discussion forums, or dedicated participation platforms. From these different means, a high quantity of data, of different forms (text, image, video), can be generated. This data needs to be processed in order to extract valuable data that can be used by a city's decision-makers. Hence, it becomes necessary to have tools to analyze this data and to provide it, in a graphical user interface, to these decision-makers. This paper will be used in the context of municipal government. Citizens' participation is a core element for the development of cities where each citizen has the opportunity to express his opinion on subjects that may affect him in his daily life.

This paper focuses on textual data. In this context, these opinions are expressed in natural language. Hence, the objective of this paper is to develop a tool to process and analyze the opinions of citizens published on a platform of citizen participation. This tool will be based on natural language processing techniques. The tool will be tested on a particular platform Votepour.ca, that is a Quebec based platform for citizens' participation, on a particular public consultation related to the achievement of a public place in the district of Limoilou in Quebec City. The valuable data in this consultation is the subjects that are raised by citizens. These subjects can be for example safety, culture, or urbanism. The results show that the proposed tool can achieve 82% of good identification of the subjects raised in the different processed opinions.

This paper is structured as follows: Section 2 is a literature review about smart cities and citizens' participation. Section 3 describes the natural language processing technique that was adopted in this paper. Section 4 presents the results of the application of the natural language processing technique. Finally, Section 5 concludes this paper.

## LITERATURE REVIEW

### Smart Cities

Nowadays, people are more and more connected and are widely using new technologies. Local governments and cities are providing new services to their citizens based on these technologies in order to improve their quality of life. This tendency will be maintained for at least the next twenty years. As a consequence, the

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