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Dynamic Profiles Using Sentiment Analysis for VAA's Recommendation Design

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Abstract

In the context of elections, the Internet opens new and promising possibilities for parties and candidates looking for a better political strategy and visibility. In this way they can also organize their election campaign to gather funds, to mobilize support, and to enter into a direct dialogue with the electorate. This paper presents an ongoing research of recommender systems applied on e-government, particularly it is an extension of so-called *voting advice applications* (VAA's). VAA's are Web applications that support voters, providing relevant information on candidates and political parties by comparing their political interests with parties or candidates on different political issues. Traditional VAA's provide recommendations of political parties and candidates focusing on static profiles of users. The goal of this work is to develop a candidate profile based on different parameters, such as the perspective of voters, social network activities, and expert opinions, to construct a more accurate dynamic profile of candidates. Understanding the elements that compose a candidate profile will help citizens in the decision-making process when facing a lack of information related to the behavior and thinking of future public authorities. At the end of this work, a fuzzy-based visualization approach for a VAA design is given using as a case study the National Elections of Ecuador in 2013.

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1 Introduction

Voting advice applications (VAA's) are Web-based applications that provide information about parties or candidates running in elections. They aim to help voters find out which party or candidate is close to their political orientation. VAA's are increasingly used in election campaigns worldwide; thus, their design and methodology deserve closer attention, especially taking into consideration that the recommendations provided can affect voters' decision-making. In the Netherlands, about 10% of voters reported that they adjusted their electoral decision

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due to the recommendation received from the application [3]. In Germany, 6% of participants indicated that they changed their vote choice to another party [10], while 3% did so in Finland [11]. In Switzerland, substantial amount of participants stated that the voting recommendation affected their voting behavior. Around 70% of survey participants indicated that the voting recommendation influenced their decisions on the ballot, with most of them voting for different candidates because of the ranking list that they received from the VAA. A smaller but still substantial part of users indicated that they changed their party choice as a consequence of the VAA output [4, 6, 5, 1]. Although more studies in this field have to be done, all these previous studies reflect evidence that VAA's have a strong influence to persuade changes in voters' decisions. This paper is structured as follows: First, Section 2 describes the profile generation methods. Section 3 presents the different datasets, pre-processing and processing, and a description of the VAA design. Section 4 provides an analysis and evaluation of the methodology used for dynamic profile generation. Finally, concluding remarks and outlooks are presented in Section 5.

2 Profiling Candidates

This study considers that the pillar of the VAA's design should be based on a resistant or resilient candidate profile model that can tolerate the answer or user manipulations in order to represent the most accurate information, ideas, and political orientation of candidates or political parties. The definition of a candidate profile model is crucial during elections. It reflects the political party orientation and their goals as a whole. This section has the aim to define the different elements that can define a candidate profile and explain the criteria behind all these characteristics. The work of Terán and Kaskina [13] includes two components of a profile generation for VAA's, static and dynamic. Both types of profile components with the main difference being that the static profile is generated when the voter signs up in the VAA and includes a fixed definition of preferences, whereas the dynamic profile is generated with other sources of information such as social media. The authors include the possibility of voters and candidates to actively participating in the system by providing comments, discussion, content, etc. Based on all the elements and the context in which a candidate can have a public figure, this study considers the difference and defines two main parameter categories:

- **Static Profiles.** These are mainly used on VAA's and are generated when the voter subscribes to the system and includes a general overview of his/her preferences. Static profiles are defined by the administrators and correspond to answers on a number of questions of political issues $(I_1, ..., I_n)$. In this paper, these types of profiles are defined for a so-called VAA 1.0 (this term refers to the Web 1.0), which includes static profiles that are the only source of information from users.

- **Dynamic Profiles.** This type of profile can enhance voters' participation and improve profile generation. Unlike VAA's 1.0, dynamic profiles allow users to become content generators. The dynamic profile is created on the basis of the activity as well as the different content types created by the voters via a Web interface. These types of profiles are defined in this paper for a so-called VAA 2.0 (this term refers to the Web 2.0), which includes dynamic profiles as an additional source of information from users. The proposed dynamic profile includes a number of block modules, such as context-awareness (CA), privacy settings (PS), voter interaction (UI), and sentiment analysis (SA), among other possible modules depending on the features developed to extend the profiles and