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A role-based mobile-agent approach to support e-democracy

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Abstract

Information technology can fruitfully support the participation of citizens in the public life. E-democracy is the set of infrastructures, applications, and devices that make such participation easier and let people better approach to the political actions, for instance attending conventions and voting for a candidate. This paper proposes an approach based on mobile agents playing roles to simplify the task of the developers of e-democracy applications, making them more flexible and adaptable. An application example is exploited to show the concrete advantages of our approach.
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1. Introduction

Today a lot of people can rely on technology-enabled devices that support them in a variety of activities. Powerful microprocessors are embedded in several kinds of specific devices, such as PDAs or cellular phones, and even in other every-day objects such as electrical household appliances and cars [23]. Thanks to the connection capabilities of such devices and to the network infrastructure that is more and more pervasive [15], users can easily exploit their computational capabilities to perform several tasks, the most trivial of which is surfing the Internet and the WWW.

This leads, of course, to an increase of connected users, implying directly the increasing availability of traditional services in the digital world. Besides the most known services – such as e-commerce – other new ones are gaining ground. Among them, one of the most challenging (at least for the large number of involved people) is e-government. E-government is a quite new concept, thanks to which citizens can interact with their institutions through smart devices. This grants high user autonomy, and also fast government procedures. Furthermore, an infrastructure active 24 h a day, 7 days a week, will grant user accesses from everywhere and at any time [1].

Even if the main aim of e-government is to connect citizens to public infrastructures, also other scenarios are possible. In fact, even connections among other government institutions (foreign governments) or between government and business enterprises can

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produce benefits, resulting in time and costs saving. Furthermore, the e-government can help foreign people, which can be directly connected to the hosting country institutions. In the U.S.A., the creation of the New National Infrastructure has emphasized how the e-government can really promote democracy, since every citizen can be in touch with institutions. Another meaningful effort is the Web Digital Government [29], promoted by the Virginia Tech Lab.

The development of a range of applications able to deal with this new scenario is increasing. Nevertheless, a lot of work must still be done to find out suitable development paradigms for such applications, which involve different issues, in particular security, adaptability and usability.

Inside the e-government scenario, e-democracy is an interesting issue that is recently taken into consideration by researchers. Some definitions of e-democracy can be found in the literature [1,8]: in this paper, we intend the e-democracy as that part of e-government that promotes the participation of citizens in the public life. This means all those devices, infrastructures and applications, which can simplify the performing of public-life actions such as attending political conventions, voting, and so on. This should help common people to better approach the public life.

This paper proposes an approach based on the use of mobile agents playing roles to build applications, focusing in particular on the advantages that such kind of components grant to an e-democracy scenario. Mobile agents are autonomous software entities that carry out tasks on behalf of users; they can move from host to host in order to find the needed resources or to execute in specific contexts [30]. Roles represent a useful concept that can be exploited in different phases of the agent-application development. A role can be considered as a stereotype of behaviour common to different classes of agents. Role-based approaches can give several advantages, such as the separation of concerns and the reuse of solutions and software [21].

The paper is organized as follows: Section 2 details the e-democracy scenario, existing approaches and e-democracy application requirements; Section 3 gives a background about mobile agents focussing on the role-based approach; Section 4 uses an application example to show the advantages of our approach; finally Section 5 gives conclusions and future work.

2. E-democracy scenario

2.1. Background

Thanks mainly to the incentive of e-commerce and of the Internet, our world is turning into an e-World [20], where several actions can be done each day through electronic devices. This leads to a new way of interactions among people, who can exploit this digital world to communicate. This revolution does not apply only to the e-commerce field, but a lot of institutions are currently providing new kinds of services, promoting the electronic-government (e-government). E-government is the capability, for government institutions, to provide access to their services and information 24 h a day, 7 days a week, transforming the relations with citizens, business and other governments. This can be done, for example, putting e-government services on-line, so that they can be accessed from citizens through the Internet, as happens for New Zealand [14] or Minnesota [13]. E-government represents a new way of thinking, a shift in the culture of the institutions themselves, and not simply a new technological way to provide services [9].

Since e-government is an important innovation for institutions, it is important to understand that it is not only a Web site or a collection of documents. There is a complex structure behind e-government, and a lot of specific sectors: one of most important is e-democracy. E-democracy can be thought as the use of information and communication technologies by democratic entities in the political processes of local communities, states, regions and nations [8]. Inspired by the principle of "no law without the right to vote on it" [20], e-democracy is still a challenge, and its main aim is to improve citizen participation in political processes. The most of the studies about e-democracy focus on three main aspects [18]: (i) access to public life information, (ii) public discussions about political themes and (iii) support to electronic vote (e-vote).

E-democracy proposes a democratic process easier than the standard one, where everyone is motivated to participate, and this is true especially in these days, since an increasing number of electronic devices allow users to access on-line services everywhere [2]. In fact, not only PCs, but also hand-held devices (e.g., PDAs, cellular phones) and home devices