A Novel Mobile Interface to Register Citizen Complaints

ABSTRACT

Municipal corporation (MC) of a city is a local governing body which takes care of the functioning of the city which includes addressing the complaints that the residents of the city might have. Maintenance of a city as huge as Mumbai requires that MC be aware of any shortcomings and allow the citizens to register their complaints 24× 7. The Mumbai MC allows its citizens to place their complaints through several channels. The chief modes of complaint registration is (a) a visit to the ward office - where a person in charge listens to the complaint and asks for some personal details and put it across into an electronic form for other departments within the MC to handle the complaint, (b) through a contact center over a telephone - where the complaint is registered by an call center agent by typing the complaint into the system and more recently (c) through a web interface [6]. In this paper we propose a novel SMS based mobile interface which can be used by the citizens of Mumbai to lodge their complaints. The essential idea is to make use of the existing web based infrastructure [6] and provide the citizens of Mumbai an easy, cheap and quick mode of complaint registration around the clock. The proposed system enables and assists the citizen to place compliant through an SMS on their mobile phone in natural language.

1. INTRODUCTION

The Municipal Corporation (MC) of Mumbai [1] takes care of the upkeep of the city. There are several departments within the MC to handle different aspects of the city upkeep. It is important for the MC to know about the problems that exist in the city so that the problem areas can be handled quickly and keep the city in good health. For easier handling of city upkeep, the city is divided into wards. The city of Mumbai has about 24 wards. Any complaint relating to or originating from a place is handled by that officer of the ward in which the complaint falls.

Like any MC, proper functioning of the city depends on active citizen participation. Mumbai MC allows the citizens to voice their complaints and any complaint is handled promptly by the concerned departmental authority in that ward. Once a complaint is registered by the citizen, an appropriate departmental authority is notified about the complaint for action. It is however important that active citizen participation is evoked only if the citizens are given an easy, cheap mode of lodging their complaints. The Mumbai MC allows its citizens to place their complaints through several channels. The chief modes of complaint registration mechanisms are (a) a visit to the local ward office - where a person in charge listens to the complaint and asks for some personal details and put it across into an electronic form for other departments within the MC to handle the complaint, (b) through a contact center over a telephone - where the complaint is registered by an call center agent by typing the complaint into the system and more recently (c) through a web interface [6]. These modes have been used by the citizens to lodge their complaints but these modes of complaints bare the web based complaint registration system have poor active citizen participation because of the difficulty in using the forum to lodge complaints. The web interface (Figure 1) has had a large number of users though the penetration of computers with Internet connectivity is not very high. On the contrary the mobile phone penetration is high in India, significantly more in the city of Mumbai [5]. It makes sense to provide an mobile phone based interface to the citizens to lodge their complaints using their mobile devices. The most straightforward way to enable use of mobile devices to file complaint is to port the web interface into Wireless Markup Language (WML) so that it can be browsed by the WAP browser on the mobile phone. While this is easy, it is expensive in two ways (a) WAP enabled mobile phones are more expensive and (b) citizens need to pay the telecom operator for the accessing the complaint registration system through their phone. These are dampeners for an active citizen participation.

In this paper we propose a novel SMS based natural language interface to enable citizens to register complaints. The advantage of this system is (a) it requires no change in the already existing web interface to lodge complains, (b) doesn't require the citizen to remember any specific information to file the complaint and (c) the SMS channel makes economic sense in India and sets tone for active citizen participation. In Section 2 we describe the web based system and describe its short comings, Section 3 describes the proposed system, and we conclude in Section 4.

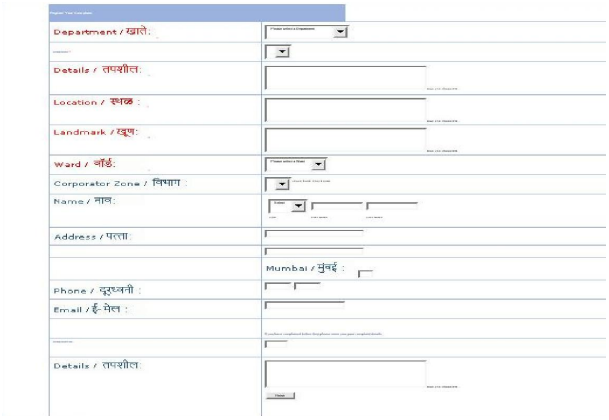

Figure 1: Web interface to register complaints.

2. BACKGROUND

The web based interface [6] to help people lodge complaints is a recent initiative. The interface consists of essentially (a) a set of drop down boxes where the user needs to choose from a select list of predefined options and (b) text box where the user is required to type in the text message. The interface consists of six mandatory fields that need to be filled. The mandatory fields are

1. Department (drop down menu; example, Drainage, Road and Traffic etc),
2. Complaint type (drop down menu which is based on the department selected),
3. Details - where the user needs to write the actual complaint,
4. Location (name of the region where the complaint is applicable)
5. Landmark (a description of location, for example, near church)
6. Ward (drop down menu, user need to choose from a list of 24 wards). Here the user needs to be aware of the ward name before lodging the complaint. Usually, people are unaware of the ward name.

The optional inputs required by the system are (a) Name of the person lodging the complaint, (b) Address of the person lodging the complaint, etc. Once all the mandatory fields are filled up the system generates a complaint number and displays on the web page. This complaint number can be used to query the status of the complaint at a later date.

The web interface while allowing the user to lodge complaints has some serious constraints. The use is restricted to choose from among the list of pre defined drop down menus list. This poses a major problem in the sense that the user tries and fit his complaint into one of the predefined drop downs. This results in a wrong fit and the complaint being directed to the wrong department which in turn affects the time taken to resolve the problem. The second major constraint is the need for the user to be aware of the ward number, additionally the user needs to have access to a networked computer. The proposed system tries to overcome these issues. The need for a networked computer is removed by facilitating lodging the complaint through a mobile phone and the need to select the *correct* department is removed by enabling the user to pose a complaint in natural English and the need to know the ward number is removed by the system determining the ward number based on the location and landmark details entered by the user.

3. SYSTEM DESCRIPTION

The functionality of the system emulates the functionality of the web based complaint filing system. The user use the mobile phone instead of accessing the web interface. The user needs to send his complaint in 160 characters (limit imposed by SMS). The system would then interpret the query (using natural language processing techniques and obtain the mandatory field information required to fire a http query to [6] and fetch a complaint number from the website [6]. In the event the SMS complaint is incomplete in the sense of not having all the mandatory information to generate a complaint number; the system would generate dynamically a set of queries which have to be answered by the user.

The block diagram of the system is shown in Figure 2. The system makes use of the already available web interface [6] to complaint filing platform and assist the citizen to file his complaint using his mobile phone. The proposed system enables any person in Mumbai to lodge a complaint by sending a SMS from his mobile phone to a pre-determined short code or mobile number. The system enables the user to send his complaint in natural[1] English. The input to the system is a free format English SMS. The system internally analyzes the SMS complaint using a set of natural language processing techniques and converts the free form English compliant into a form suitable for the web interface to generate a complaint number. In the event the SMS sent by the user is such that a complaint number can not be generated by the web-based system, the proposed application will intelligently generate queries and send it to the user as SMS. The user responds to the SMS. This information, in addition to the free form complaint sent by the user is used to lodge the complaint with the web- based complaint registering system and generate a complaint number. The complaint number is then sent as a SMS to the user for his reference and tracking of the complaint. A typical scenario is when a user sends an SMS to a pre-determined short code with the complaint information in free English (for example, *Garbage has not been lifted from under the flyover in Mulund*). The system analyzes the complaint SMS for completeness. An SMS is deemed complete if all the required mandatory fields required to lodge the complaint are identifiable in the complaint SMS. This results in two scenarios, namely, (a) the complaint SMS in complete and (b) the complaint SMS is incomplete.

Scenario - 1. **Lodged Complaint Complete**
User: *Sends an SMS complaint*
System: *(a) Files the complaint with the web-based complaint lodging system, (b) obtains a complaint number from web-based complaint system and (c) sends the complaint num-*

[1]free of format

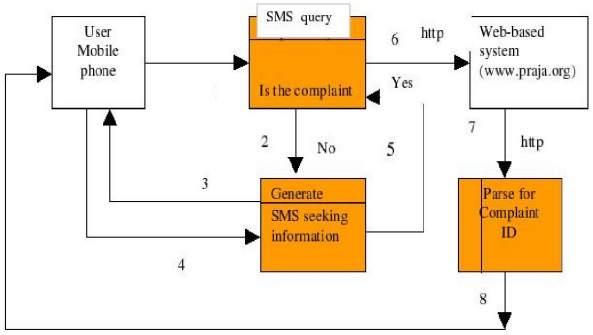

Figure 2: Block diagram of the proposed system.

ber as a SMS to user.
Data Flow: *1 - 6 - 7 (see Figure 2)*

In Scenario 1 there is no interaction with the user after the initial complaint SMS has been sent by the user. The user is able to lodge his complaint through a single SMS. While in Scenario 2, the system interacts with the user and more than one SMS is required to be sent by the user to register his complaint.

Scenario - 2. **Lodged Complaint is Incomplete**
User: *Sends an SMS complaint*
System: *(a) Identifies the "missing fields" in the user complaint, (b) Intelligently generates and sends one or more SMS requesting information from the user. For example, SMS "1" for "Smelly Garbage", "2" for "Garbage not picked up"*
User: *Responds to one or more SMS through selection*
System: *(a) Assimilates all the information from all the responses and then files the complaint with the web-based complaint lodging system, (b) obtains a complaint number from web-based complaint system and (c) sends the complaint number as a SMS to user.*
Data Flow: *1 - 2 - 3 - 4 - 2 - 3 - 4 - ... -5 - 6 - 7 - 8 (see Figure 2)*

3.1 Functional System

The mobile interface allows the user to lodge a complaint in natural English. The system tries to decipher the mandatory details required to file a complaint using a set of natural language processing techniques. For any natural language processing based system it is mandatory to build domain specific knowledge base. Usually these knowledge bases are crafted manually by a team of linguistic and domain experts.

The input to the system is a user complaint (SMS), in natural English. The complaint SMS is minimally parsed [4] to extract the relevant information from the complaint. Initially all the stop words[2] in the SMS are removed. The system then checks for any spelling mistakes in the complaint and corrects it[3]. Using an ontology[4] and domain specific knowledge the SMS query is parsed to determine the nature of complaint and the department. The location and the landmark details are picked up from the query with the help of Mumbai specific location knowledge base the landmark and the location details are used to determine the ward number details using a location - ward number knowledge base.

The system has been prototyped and is currently being run as a pilot with limited number of users to check the functional experience of the users. The initial feedback has been very good. The details collected in the pilot phase (especially the SMS complaints) are being used to refine the natural language interface (for example, [2], [3]) of the system in terms of updating the knowledge base. Subsequently, as and when SMS in Indian languages becomes more easy, the system would be enabled for citizens to lodge their complaints in their local languages.

[2]Stop words are words that by themselves do not give any extra information to the message

[3]a variant of dynamic programming algorithm is used in the spell check module

[4]a special kind of dictionary where relationship between words are captured

4. CONCLUSIONS

We have proposed a SMS based novel mobile interface for users to lodge complaints about the city. The system is accessible to everyone who owns a mobile phone and is available 24 × 7. The system uses the back-end infrastructure but gives the user the flexibility to file his complaint by sending a free format natural English complaint. The natural language processing based system is capable of analyzing the query and extracting the mandatory fields required to file a complaint. In the event of the complaint SMS being complete, the system generates a complaint number (actually generated by the back-end system) and send this complaint number to the user through and SMS. In the event the complain is incomplete, the system poses SMS questions to the users asking for specific information. The system then uses all the information given by the user to file the complaint.

5. REFERENCES

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