Mathematical Problems of Computer Science 45, 122--126, 2016.

Symbiosis of Email and SMS

Arman H. Harutyunyan[1], Sona H. Gharagyozyan[2]

[1]Yerevan State University
[2]Institute for Informatics and Automation Problems of NAS RA
e-mail:a_harutyunyan@ipia.sci.am, sona@ipia.sci.am

Abstract

The specific features of the means of written communication through computer and mobile networks, as well as the prehistory of the establishment of hybrid communication system using IP and GSM network technologies have been examined.

Keywords: Symbiosis, sms, Email, Predictive.

1. Introduction

The new means of written communication- Email and SMS, appearing at the end of the twentieth century, pressed the traditional postal service keeping it mainly as a means to send official documents.

In place of the past epistolary genre with its inherent personality came concise information Emails. Nevertheless, the speed of delivery of messages to the addressee provides undeniable advantages to the electronic means of written communication. At the same time, integrated systems using "one package," technology of Email and SMS, which are complementary to each other are of particular interest.

Without going into a detailed assessment of the advantages and disadvantages of these systems, we have pointed out only the specific functional features of Email and SMS technologies.

2. Problems and Solutions

Originally designed for the exchange of written communications between computers, Email is considered as a system “on demand” despite of its rapid delivery to the addressee. The fact of reading delivered message depends on the time the addressee opens his mailbox. In contrast to Email, SMS is not only a mailing system: the volume of transmitted message is limited, the

delivery of the message is only possible in the zone of mobile network coverage or according to the current roaming agreement of mobile operator.

The message delivery to the “pocket” of the mobile subscriber is an indisputable advantage of SMS technology. Accordingly, either the message is delivered “on demand” almost anywhere in the world (email), or directly into the hands of the addressee, but for the above mentioned limitations (sms). The integrated solution to the “distance” problem of particular SMS service is solved by using IP-communications, as a main environment followed by the locking of current mobile network and Web technologies providing the possibility sending SMS to a specified, local mobile network from computers from virtually any region of the world.

Another above discussed problem: problem “on demand” is associated with the integration of SMS technology in Email system in the form of SMS- notification systems on receipt of Emails in the subscriber's mailbox. Such postal SMS-informants analyze the incoming correspondence of the subscriber separating the letters with return addresses listed by the subscriber to the "white list" to which the subscriber receives SMS- notification, in case of receiving correspondence [1-3].. In other systems of Email-informants, the initiative of sending notification is given to the sender.

The problems to create a "hybrid" system of Internet/SMS is connected to the specifics of displaying Web "pictures" on the display of a mobile phone and with the difficulties inputting alphabetic information. If a modern smartphone with an informant and virtual keyboard is being used while working with the system, no special problems will arise. However, the possibility of a user-friendly operation in a system with other common models of mobile phones leads to the need for a special service software. Mobile subscribers use a wide variety of models of mobile phones: from budget phone with a small screen and a set of keys, providing only the basic functions of mobile communication: a telephone communication and exchange of SMS to multifunctional smartphones with display of 5-6" touchscreen, virtual keyboard, multi-core processors and with the possibility to use Internet.

There often exists the possibility of connecting to the Internet in common models of mobile phones with screens of about 2" and button dialing keyboard.

However, the phenomenon of screen with small format and resolution, as well as of touch-tone, makes it extremely inconvenient use these phones working with network resources. However, not having a wide range of additional functions specific smartphones (often redundant), and they are today in demand (the share of push-button telephones in Russian mobile networks, for example, is more than 30%. In the first quarter of 2015 there have been sold more than 2.7 million of these mobile phones [4,5]) corresponding to the basic purpose of mobile phones and having the indubitable advantage of the "pocket" device, due to the size and the weight (unlike the majority of smartphones, which are considered as "wearable" devices).

These circumstances determine the feasibility of studies and the development of new solutions providing information on mobile devices of a similar class, the development of adaptive interactive "comfort" systems graphical interaction of mobile phone users with communication and information resources of mobile and IP networks (it is evident that this interaction is provided by GSM / IP servers). These dialogue systems should be extremely concise, limitative as far as possible, the participation of the user answers "yes-no" considering the complexity of a set of queries and text on a mobile phone keypad. Problems of writing text messages are solved using predictive typing systems anticipating in the already typed letters of the options of the current and the next word (or phrases) while user is typing using the built-in phone dictionary.

Such systems for mobile phones (designed mainly for typing SMS) have been known since 1999 with the development and encapsulation of the T9 system in mobile phone software and similar functions of iTAP and eZi systems [6,7,8]. Being developed by *Tegic Communications*, T9 is used in mobile phones by most of the major manufacturers (Nokia,

Samsung, Sony Ericsson, etc.). T9 is considered as the most popular system of predictive typing. Unlike T9, iTAP attempts to predict short phrases as well, analyzing not only typed letters of the current word, but also the previous text.

Basic dictionaries of these predictive typing systems include 35-60 thousands of words and expressions, and support most of the European and some Asian languages.

Unlike the mentioned predictive systems when typing the text of SMS there can be offered an algorithm of serial-word letter by letter for the possible continuation of the typing word, using funded words database individual for each user according to the most frequently used words by the user while typing SMS: "Verbal image" of the lexicon used by the user stored on the SMS server. This database is formed by accumulated words containing in the previous SMS sent by the user. Depending on the frequency of the repetition of words corresponding “weight” is attributed to each word determined by the number of repetitions of the word accumulated in the SMS. Such predictive system is installed not in the phone but in a centralized server. The system can be used with any mobile telephone having access to the Internet, respectively, without requiring additional resources (memory, CPU) for its functioning. The system generates prediction not by semantic analysis of words and sentences comparing them with the information from the database but by the coincidence of images: putting in comparison the literal consistent of the typing string to the "images" of the vocabulary fund used by the user while sending SMS accumulated in the individual database. The analysis on the coincidence of characters ("images of words") allows to use prediction system without being tied to a particular language. The database with which the system operates is located on a server in the form of individual lists for each registered user containing a sequence of characters (letters) forming a word. Databases are automatically replenished with words from SMS sent by the user. The use of automatically generated personal database "images of the words" increases the probability of a correct prediction at the initial stages of typing allowing, at the same time, significantly to reduce the size of the lexicon of the dictionary. While typing, the first two letters of the typing word are taken as a reference (base) letters of the word; further the letters set is compared with the dictionary with the issuance tips with the options of word completion.

When typing messages a user can use both Latin alphabet and Cyrillic alphabet. Accordingly, while sending SMS there is a need to convert in Cyrillic in the similar-sounding words, written in Latin letters (operation of transliteration) for reliable message playback at any gadget. In Asnet computer network users can access a number of services of info-communication applications sharing Web and SMS technologies (www. asnet.am/sms applications),developed in the years from 2007 to 2013 at the Institute for Informatics and Automation Problems of National Academy of Sciences of the Republic of Armenia(IIAP NAS RA) [9,10**].** The majority of the above mentioned services used as a basis for the development of info-communication MSS system of IIAP for mobile phones, providing the possibility to comfortably work with SMSoIP and Emails.

Such system provides:

1. Formation and sending of SMS via IP network using Web technologies
2. Formation and sending of Email with SMS notification (mobile network of the region where the server is running) containing user-selected fragment of the letter.
3. The use of graphical dialog interface, automatically adapting to the class of the gadget served at the moment.
4. When accessing the system by a phone with a small screen and keyboard, automatic switching to the dialogue version, minimizing data volume, user typing in the formation

of SMS/Email at the same time the formation of the address part of Email, SMS in single request in a natural language

5. The mechanism of "prediction" typed by the user during the formation of the message.
6. The use of the centralized individual savings with no database on the server system (user requisites, tel. book, Address book**,** dictionary of SMS: "verbal images", etc.).

References

[1] [Online]. Available: https://help.mail.ru/mail-help/settings/notifications

[2] [Online]. Available: http://iglous.ru/besplatnyj-sposob-poluchat-sms-uvedomleniya-o-pochte/

[3] D. Gevorkyan, K. Khachatryan, A. Nanassian, A. Petrosyan, G. Petrosyan, V. Sahakyan and E.Vardanyan "Mail informer- selective incoming e-mail instant phone notification system", *Proceedings of International Conference Computer Science and Information Technologies*, Yerevan, pp. 466-468, 2009.

[4] [Online]. Available: http://secretmag.ru/news/2015/06/24/knopochnie-telefoni/

[5] [Online]. Available: http://sia.ru/?action=show_news&id=305085&section=484

[6] [Online]. Available: http://www.ixbt.com/mobile/review/prtxtsms.shtml

[7] [Online]. Available: http://www.genon.ru/GetAnswer.aspx?qid=29112f32-777b-4d02-b3ab-bbec2afb72ef

[8] [Online]. Available: http://solo-project.com/articles/category/12/message/1241/

[9] D. Gevorkyan, A. Nanassian and K. Khachatryan "New WEB resources ASNET.AM", *Computer Science and Information Technologies*, *Proceedings of International Conference*, Yerevan, pp. 311-313, 2011.

[10] A. Nanassian and K. Khachatryan "Mail2sms.asnet.am – the Alert System of Incoming", *Proceedings of International Conference Computer Science and Information Technologies*, pp. 459-462, 2013.

Submitted 04.11.2015, accepted 22.02.2016

Էլ-փոստի և SMS հաղորդագրության համակցում (Symbiosis)

Ա. Հարությունյան և Ս. Ղարագյոզյան

Ամփոփում

Դիտարկվել են համակարգչում և բջջային ցանցում հաղորդագրությունների փոխանակման տարածված համակարգերը, ստեղծելով տվյալների փոխանակման նախադրյալներ, որոնք օգտագործում են IP և GSM ցանցերը։

Симбиоз Email и SMS

А. Арутюнян и С. Карагезян

Аннотация

Рассмотрены особенности распространенных систем обмена письменными сообщениями в компьютерных и сотовых сетях, предпосылки создания гибридных систем передачи сообщений, использующих технологии IP и GSM сетей. Рассмотрены проблемы доступа к ресурсам подобных систем с мобильных гаджетов, пути их решений.