Smart Communication Adviser for Remote Users

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Abstract. In present days there are many innovations that improve communication for the remote user's application. There is necessary to adapt user interface in content of application and age experience of user. There is presented the concept for applicable and spatially smart established applications focused on utilization and emphasis of information implemented with fuzzy logic recognition.

Keywords: Smart, Mobile, Communication, Wifi, Service, Fuzzy logic.

1 Introduction

Enormous potential of ICT, which are nowadays developed massive thanks sub-miniaturization of implementation of implementation and increased computing power, together with increased data throughput of mobile networks has been a stimulus to create standalone applications connected with the environment and cloud storage, which could easily help users headlong current information that influence them. At the same time, the data stored in the cloud storage and reduce time and mental stress spent on communications controlling with a mobile device.

In the last few years there has been a huge expansion of new technologies and platforms that thanks to globalization existing technologies introduce significant competition. Hall is more used in mobile communication technology equipment, which of these systems is still a powerful tool to use in everyday reality in the semi on-line applications, conforming to the actual circumstances. Among the best-known player on the market in operating systems working on real-time processing Android, iOS, Windows Mobile penetrating and innovative systems based on Bada, MeeGo or SymbianOS.

Much of the users using mobile devices to remotely manage multiple communication channels simultaneously. Above all, however, are the applications that only minimally affect the activity and location of users even though users would it welcome..

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The time of closed development is definitely over and the open development we acknowledge as a mainstream for mobile device evolution progress which comes out from creativity, social networked and intellectual power hided in great number of many individuals. Today most people using mobile devices primarily for daily communication. However by changing establishment of current mobile provider's profits to more close of customers usability with mobile devices, we see more and more only internet online connected devices combining all possibilities of smart device features, where one single mobile device would step up all personal needs.

Nowadays it is no longer the domain of only populated agglomerations, but also places in the countryside with good coverage, where users require quality results depending on the Internet service provider. Often it is practically limited by the user such as the quality of wireless application protocol and used applied reduce deployment for operations requiring complex data support machine vision, learning and recognition [1]. The advantage of short outreach applications, in addition to the high bitrate possibility of using a more precise localization of persons in both buildings and underground or where there is sufficient signal strength of the mobile operator, or PS transmitters. This mass-used by the WLAN network coverage using Wifi router, which increased rapidly in the last decade and the number of smart phones with WLAN capability has grown in recent years. At present, the increasing penetration of these quick short outreach networks and domestic environment both coverage and signal internet creating intranets within the household to household appliances.

2 Problem Definitions

There are basically still the same methods of communication in today's mobile networks and new trends are not currently anticipated. Therefore there is the need to use their own computing device options and cloud storage to enhance interactivity among users but also to the user in the form of smart graphics using fuzzy logic. Based on previous user behavior can improve and adjust approaches to display and interact with user. Within approaches are both text messages and voice conversations further and spoken communication where can trace both forms of communication and intonation, stress and mental condition. Lastly, it's multimedia and visualization between the mobile device and the user. This area is considered a major and beneficial. Although human visual perception in the total amount of information is the main source, but under certain circumstances anonymization environment where mimics and background scenes picture would lead to distortions in the communication process, we show non-visual and face-face communication as equivalent in terms quality of life and perception [3].

Also, there are different kinds of relationship communication, one by one, one row or many-to-many in a bi-direction relationship, and we would consider active (synchronized) or passive (asynchronous) interaction between actors. Others view is about networks and current options.

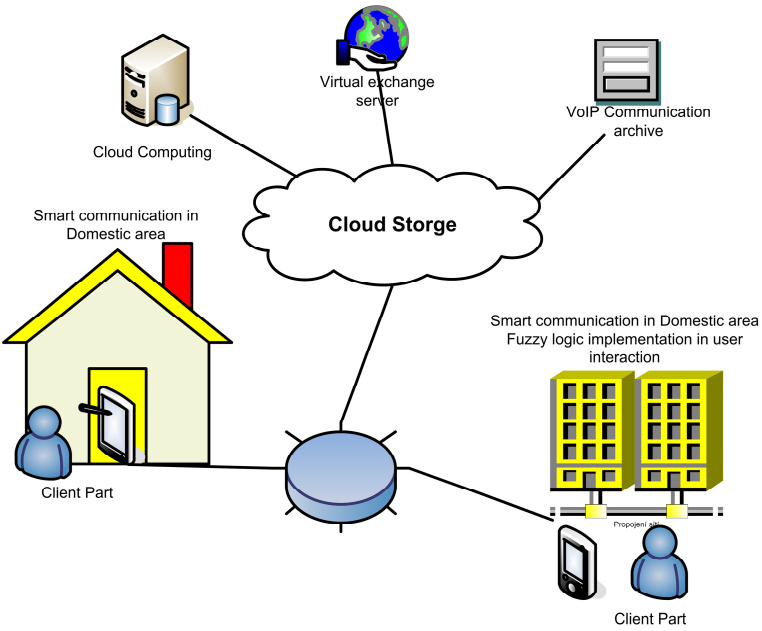

Fig. 1. Smart communication adviser with the fuzzy logic user interaction implementation

Networks for mobile devices are a major problem in the field of mobile communication and how mobile devices can access the network. One well-known standards used by mobile operators is a global system for mobile communications (GSM). Another standard we consider wireless local area networks (Wi-Fi). In the first case, we consider the quality of services in short the major ones are the second generation 2G (GPRS), 2.5G (EDGE), 3G (UTM) or 4G (LTE). Network coverage is analogous soil decreases with increasing generation level. In the second case, it is interesting to IEEE 802.11e standard, which supports services and duality Voice operational Program.

While we are very familiar technological aspects of behavior are influenced by communication protocols and standards. Short message system from the perspective of communication is well known standard for mobile devices, and as the current flow to announce short message service (SMS), where technical restrictions such as length of transmitted messages, and lack of user status confirmation. The maximum message length is defined as 160 characters encoded with 7bits, 140 NUMBER from 8bits or 16bits to 70 chars.

In principle it is possible to communicate via SMS level consider obsolete and this type can be used in case of insufficient data connectivity. The purpose of the smart behavior of users is important to realize that the social objectives based daily human needs, where the information is part of the social union are required as necessary. Social information on inter-personal circle the relationships are with its subjectivity and the importance of the message bridge other information that is based on global knowledge without non-interactivity relationship. For this reason, the natural increase of the applicability of social instant messaging and are aware of the report on the future supply.

Table 1. Request/Response local measurement with object persistence on server side tested with client Android mobile device ZTE Blade

Communication Method	Technology	Latency
AppServer/DB Engine/HTTP-POST	Appengine/ Objectify(JPA)	250ms-400ms (avg. 300ms)
AppServer/Remote Cloud DB/ HTTP-POST	Appengine/ MySQL	450ms-600ms (avg. 500ms)
AppServer/Local DB/ HTTP-POST	Tomcat7/ObjectDB	350ms-450ms (avg. 370ms)
JVM Server/DB Engine/ TCP/Socket-Object Serialization	Socket Server/ ObjectDB/	20ms-30ms (avg. 23ms)

The main type of communication is voice services. It means two-way voice communication with minimum latency of movement towards active speech type of process. There is technical aspect of voice communication in real-time needs of network latency. Therefore we take into account the concept of Real Time Protocol (RTP) to exchange data with low latency [2] in combination with the original session protocol (SIP) as the control flow of communication. All client-server-client cases to consider latency and network speed for proper recommendations regarding the quality of services available.

The table tested server / client technology, which uses the Android mobile device and said appropriate usability.

3 Methods

Outline of a possible solution is a diagrammatic view in higher abstraction introduced in this paper gradually. Context description for the basic representation of the current scenario as the most common cases is shown in Figure 2a we focus on the communication process of the system itself smart interactive user environment with fuzzy logic recognition neighborhood. (see Figure 2).

Home environment where network access is provided by home WLAN access point, a personal mobile device that is able to recognize the real environment of the user location to the specified credential wireless docking station or GPS location. Access to the environment recognition is defined by user input. In some cases, recognizing only the Wi-Fi connection should be sufficient for intelligent behaviour. [5]

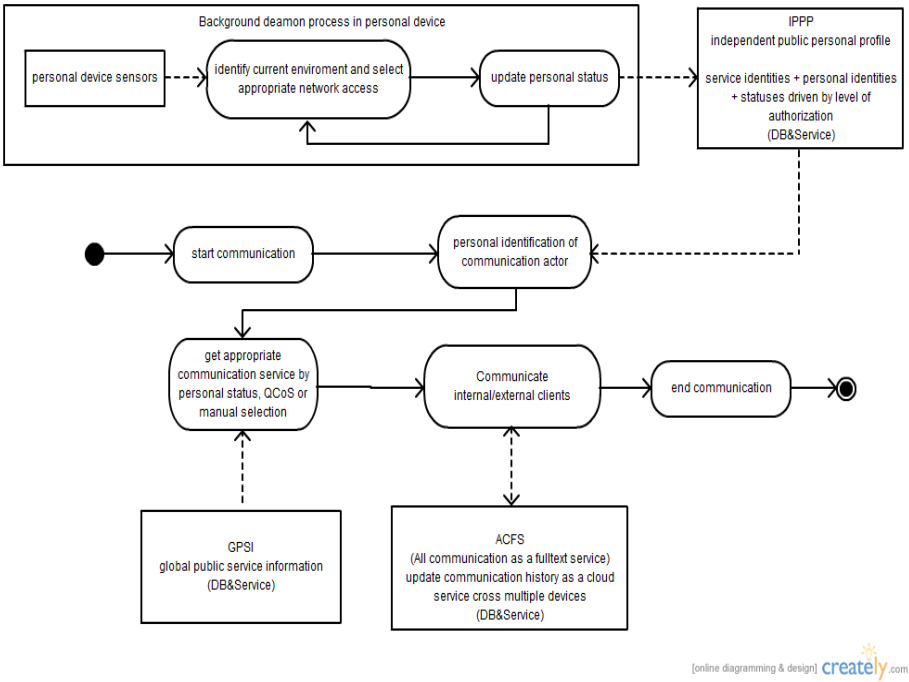

Fig. 2. Schema of communication process

The proposal was divided into three separate parts, which were mandatory for the success of intelligent communication behavior counseling. The first defines the independent public profiles personal services, which basically getting information from various sources, such as social networking, messaging servers, and other authorized external inputs. This service is to be personally responsible for the location and status of the connection based on the availability of services and the current environment.

A knowledge base for mobile applications is the second mandatory part of the concept of an independent information service where the cost and quality of the descriptions.. Is it possible to call this type of service as the cost and quality of the knowledge base, which will increase in accuracy over time [6].

Other compulsory part of the concept is an interface for mobile devices marked in the schema as cell tower that would be necessary as extensional bridge in terms of the concept of usability. And the last is a mandatory part of mobile applications consider the iPhone, Android and Windows Mobile platform-based client, which informs the user about the quality and price of services by location and environment. Supports part of the concept should be open Wi-Fi community where independent Wi-Fi providers could propose micro real low cost of Internet access. For better understanding, the following section describes the communication process (see Figure 1).

The draft communication process was divided into several parts. The first element was designed with personal identification, which is desired to communicate. The second element is to establish communication links between players in online or offline mode. That influence selection of communication services in terms of the required quality, price and availability. After selecting the defined or default configuration of communication itself provides internal or external services. Optionally, history of interaction is stored as a cluster service for future use on different devices accessible via the web client or mobile client. The whole process ends by any act or failure services [7].

The assessment, based on knowledge of the cost of services as a set of data obtained from a mobile operator in the price lists. These resources are available on the website providers, which would be processed automatically pages analyzer or manually by a human operator into the system. Another way would be by agreement with the provider of the information extraction than external data format such as XML. Knowledge of the quality of service is based on empirical data obtained from the mobile device applications, where it is, under certain circumstances, have influence on the accurate measurement of the network [8].

4 Fuzzy Logic Implementation

The expert systems are specialized computer programs for decision support. Diagnostic expert systems (Fig. 4.) are designed for a predetermined set of valuation of alternative solutions (diagnoses). Carry out an effective interpretation of the data to determine which of a predetermined set of the final best solution corresponds to the real data concerning a particular case. The system's knowledge base in which are stored in the form of procedural knowledge to solve the case. Knowledge is obtained from the expert. The specific data to the problem are stored in the user data base. Confrontation of specific data and general knowledge performs control mechanism that gradually evaluating each hypothesis generates the hierarchical list [9].

There is huge possibility to use fuzzy logic expert system in our task. The main task is to define relationship functions, to we can precisely define position and other thing defined in background daemon process in mobile device. The main parts of fuzzy model will be processing of data form mobile device sensors and actuators, which could produce bigger amount of information. It is based on fuzzy rule-based language model, in which the formalization of linguistic terms (linguistic values of input and output linguistic variables) using fuzzy sets to represent knowledge about how to troubleshoot the application of rules of type IF-THEN, for operation over knowledge and learning procedures are used fuzzy logic as defined below.

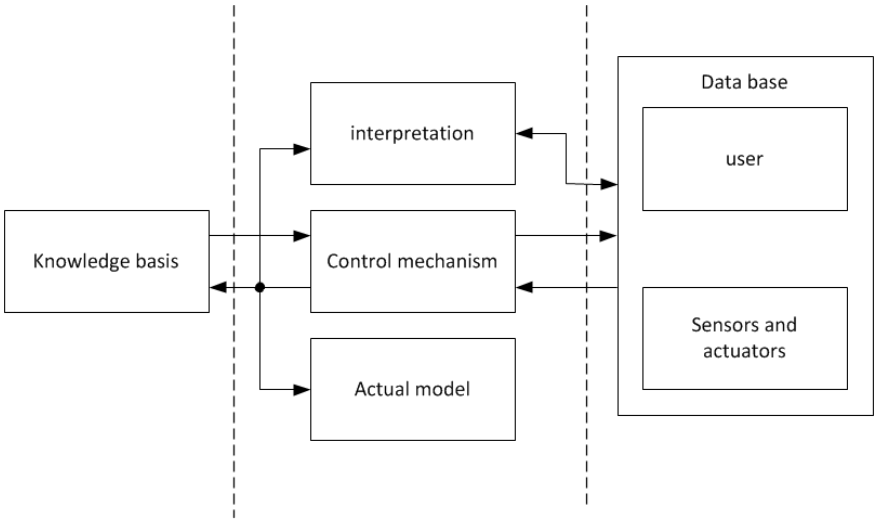

Fig. 3. Fuzzy model decision system structure

$$R_m^{(k)} : IF\left(X \ je\, LX^{(k)}\right) \ THEN \ \left(Y \ je\, LY^{(k)}\right) \quad k = 1,2,...n \tag{1}$$

There is presumption, all the rules are in the rule set connected by fuzzy logic operator or with interpretation as the normal disjunction (max). These rules set declares knowledge basis of basic fuzzy logic expert system. This kind of summation fuzzy model is the basis of our work. The final relation in our model we can describe as below:

$$R_m(x,y) = \bigcup_{k=1}^{n} R_m^{(k)}(x,y) \tag{1}$$

The final decision should be interpreted in graphical way too as displayed below. Basic variable definition could be described is described in standard way by using triangular relationship function as defined below. The each row is for each rule in rules set, each chart in row describes value of input value and the third chart in the row is output variable function with two values (M and V).

The relationship function is defined in normalized space; it means the values at x axis have the maximum value equal to one. The y axis has probability ratio as defined in [4]. Under the definition of input variables triangular function it is important to define model output variable. Information about wifi networks and RSSI values of Wifi networks should be done by this fuzzy logic system the first. The very important thing is to obtain in minimal three wifi networks with minimally 20% signal in the range. The next input value for our fuzzy logic system should be GPS sensor with for the satisfactory quality of service or A-GPS with internet connection. Elements of these approaches will be most important part of future work. [4]

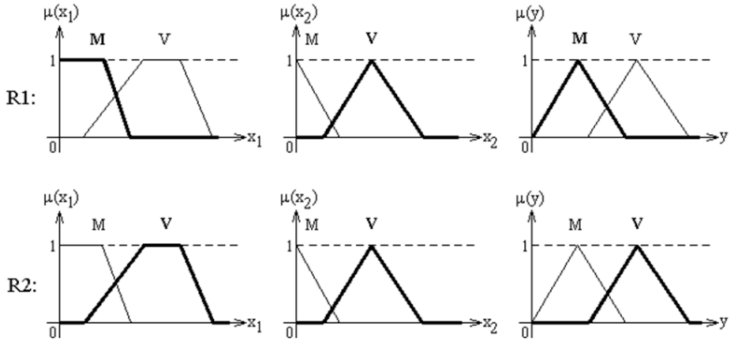

Fig. 4. Decision making in fuzzy expert system

5 Prototype Applications

The android mobile application is a part of our concept now. This application is not using described fuzzy logic solution, but it is fully prepared for that. This application is available through Google play market. This application gathers information about wifi networks in the range without any data pre-processing in smarter mathematical tools. The collected data are sent to remote community server (OWICO). GPS data are used as location information, which are collected from included GPS sensors and form A-GPS platform, using internet connection, which should be every time available, because the wifi connection is mostly used as internet provider service. Proposed system could be used without internet provider too, the standard wifi network is satisfactory too. Our system was tested in the same condition. It is important to thing about speed and latency criteria, which are marked for each location.

The packets of measured data are delivered to the server (OWICO). This is influenced by wifi network quality and location, what should be very restrictive for quality of implementation. Building global knowledge based system with more precise results it is important the independent user community would start up and is encouraged by free of charge access to internet by Wi-Fi networks at high frequent locations. We considered the environmental behaviour when mobile device stops moving it triggers background processes. They are searching the best QoS and reassign communication clients or change communication status. Only allowed viewers and run predefined tasks in recognized environment are allowed. This is a possible enhancement of our prototype.

6 Conclusions

This mind experiment produces technical concept of smart communication. It leans to design of independent required services. Very important part will be fuzzy logic implementation, which helps to solve the desired problem in the networks and Smart Communication Adviser for Remote Users. It encouraged development of real

communication clients which supports concepts of smart environment services. The behaviour of users and devices should be hooked on global knowledge base, supported by fuzzy logic decision databases too. Reasoning of home, public and work environments as well as capabilities of network (up to 4G networks and wifi) is the challenge for next future works as an improvement of this mind experiments. Users behaviour will be influenced by QoS and technical requirements and of course the dramatically is the passive and active communication too. It is necessary to keep in mind the influences of social media. It would be catastrophic to commute user's behaviour from social media only, the underlying changes could be done in proposed system. The system should be tested by any reference system, which could be camera system of buildings, or street camera systems. The system could be implemented to smart workplaces management too. In this case it will be very useful to measure the other signals too. The biological signals like pulse frequencies – which show us possibly useful information about human effort. This could help us to make the system more precise. The next biological signal should be body movement too. There is very useful to used fuzzy logic decision system, because measured biosignal data could be declared as stochastically measured data.

The concept supposed to be a pattern for development cross-platform application which provide advisory in inter-personal communication and inspire of cohesion services possibilities.

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