Data Filtering for Handheld Device Application

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Abstract

A lot of time and for many reasons, vaccination schedule of children isn't maintained adequately and vaccines get missed or delayed. Until now, a very complicated set of calculations needed to be made before administering any missed or late vaccination dose. The positive impact and importance of vaccination in early childhood stage of a person is undeniably true. Diseases can be prevented by proper immunization procedures, however, with most parents working in this generation and not most clinics pay much attention on the individual planning and notifications of their patients, this research will show a solution to such crucial issue. The research depicts an architectural structure using mobile computing which will plot a chart of vaccination planner synchronous with the parent's personal planner so as to set a schedule amenable to both the parties and a notification through will be generated. This will be a tool for parents and assistance to clinics and hospitals catering vaccinations shots for children.

Keywords: *Data filtering, Handheld Device*

1. Introduction

Vaccination is the administration of a vaccine to stimulate a proactive immune response that will prevent disease in the vaccinated person it contact with the corresponding infectious agent occurs subsequently [1]. Thus vaccination, if successful, results in immunization: Vaccination is a highly effective method of preventing certain infectious diseases. For the individual, and for society in terms of public health, prevention is better and more cost-effective than cure. Vaccines are generally very safe and adverse reactions are uncommon. Routine immunization programs protect most of the world's children from a number of infectious diseases that previously claimed millions of lives each year.

Using this vaccination as an issue in healthcare and implementing in a mobile device makes the authors confident enough that this research will be a milestone to a more sophisticated and useful application in the area of ubiquitous healthcare.

Mobile technology applications have the capability and potential to improve healthcare service quality as they instantaneously provide critical patient test data, enabling medical staff to render treatment immediately[1[[2][3][4]. Mobile services emphasize full-time information accessibility, real time and service-quality. Thus, mobile healthcare applications are recognized as emerging and enabling services in most countries [5][6][7]

2. Related Studies

Our research are based on the following: Childhood Immunization Schedule, This immunization schedule is based on the 2008 Childhood and Adolescent Immunization Schedule recommended by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP). This schedule provides generally recommended dates for immunization based on your child's birthdates. Some diseases or treatments for disease affect the immune system. For children with these diseases or for children receiving these treatments, the recommended immunization schedule may need to be modified. If you have questions or concerns, consult your child's physician or other healthcare professional for advice about your child's immunization schedule.[12]

Another related study to vaccination planner is the eMedCheck; it is an electronic medication screening form that can be run on a PDA. Using this software, POD staff record basic information about family member. The software uses decision rules to determine which medication each person should receive. It also records the results for later analysis.

The objective of such research was to create a mathematical and simulation of mass dispensing and vaccination clinics (also known as points of dispensing or PODs) and to develop decision support tools to help emergency preparedness planners plan clinics that have enough capacity to serve residents quickly while avoiding unnecessary congestion. A poor clinic design will have insufficient capacity and long lines of patients waiting for vaccinations. More patients require more space as they wait to receive treatment. I too many patients are in the clinic, they cause congestion, crowding and confusion.[10]

Vaccine Check Immunization Program is another related study to the one being proposed by the authors. This application is a data unit corporation's vaccine check interactive immunization program. This unique and important program will create an instant immunization schedule based upon the individual's age and immunizations history. The displayed schedule may be viewed by vaccine date, including vaccine required today. The schedule may then be saved for future reference.

3. Problem

3.1 Problem

Due to fast pace of civilization in most countries, the family as the basic unit of our society has an increased necessities and to be able to provide the needs, the father has become not the only sole provider in this unit but the mother as well. However with the demand of work to working mothers the effect would lead to less time for children and attention to their health needs. Thus, with this pressing issue my proposal is to address one of the health needs of an infant to his/her childhood in terms of vaccination and less the burden to a working mother in dealing and setting appointments to the child's pediatrician to have vaccination shots.

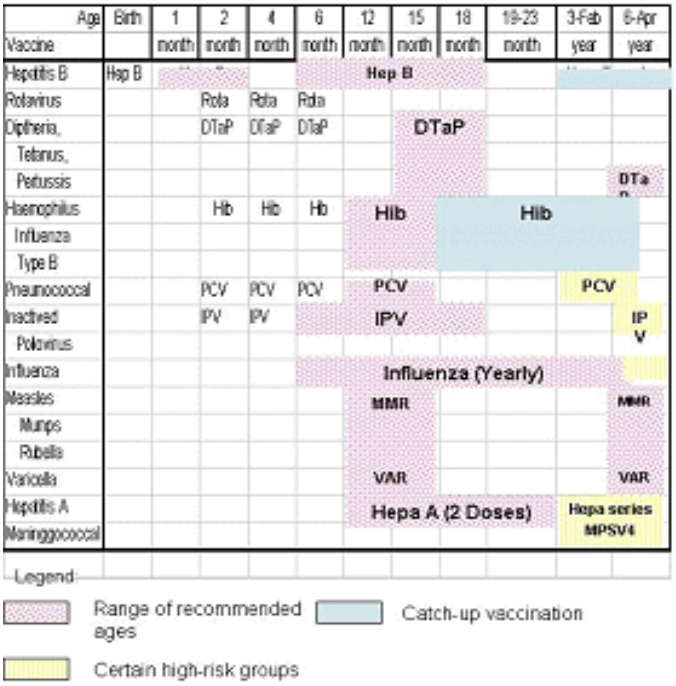
Problems have arisen without vaccination in the community: In 1974, Japan had a successful pertussis (whooping cough) vaccination program, with nearly 80% of Japanese children vaccinated. That year only 393 cases of pertussis were reported in the entire country, and there were no deaths from pertussis. But then rumors began to spread that pertussis vaccination was no longer needed and that the vaccine was not safe, and by 1976 only 10% of infants were getting vaccinated. In 1979 Japan suffered a major pertussis epidemic, with more than 13,000 cases of whooping cough and 41 deaths. In 1981 the government began

vaccinating with a cellular pertussis vaccine, and the number of pertussis cases dropped again.[8]

We don't vaccinate just to protect our children. We also vaccinate to protect our grandchildren and their grandchildren. With one disease, smallpox, we "stopped the leak" in the boat by eradicating the disease. Our children don't have to get smallpox shots any more because the disease no longer exists. If we keep vaccinating now, parents in the future may be able to trust that diseases like polio and meningitis won't infect, cripple, or kill children. Vaccinations are one of the best ways to put an end to the serious effects of certain diseases.

The following table is the Recommended Vaccination Schedule for persons ages 0-6 Years in the United States as of 2008[9][10]

Table 1. Recommended Vaccination Schedule for children 0-6 years



Most parents have realized the need of administering vaccinations to children. Vaccinations come in different stages and in different age levels. Despite there are catch-up vaccination schedules at different age levels worst is high risk is around the corner. Thus it is just convenient and practical for parents to have a digital aid that will do the appointments with their children' s physician instantaneously because parents have tons and tons of workloads and have become preoccupied these in their work these days.

4. Vaccination Planner Architecture

The general architecture of vaccination planner is depicted on figure 1. The objective of this research is to develop a decision support tool that will help parents to automatically

received vaccination shots appointment for their children ages 0-6 years old initially from their Pediatricians. However, it will not only be a conventional type of vaccination schedule from the Pediatrician because as an additional feature it will be able to filter the personal planner of the parent using the mobile device as shown in the Software Representation Diagram of figure 2 and be able to displayed as a blocked calendar in the end of the Web Server. This blocked calendar will be the basis of filtering an amenable schedule both for the parents to bring their children in the clinic for vaccination shots and the child's schedule base on the its vaccination planner schedule in the Pediatricians portal. We are exploring applications of personal digital assistant technology to a range of medical applications.

In this research the researchers used a Connected Device Configuration (CDC) since this is for devices with much greater memory, processing power and network connectivity such as smart phones, set-top boxes, internet, and embedded servers. CDC is defined as a specification that has passed through Java Community Process (JCP). The CDC is known as Java Specification Request (JSR) 36. The CDC specification is much smaller document than the CLDC specification because the CDC is much closer to a Java 2 Standard Edition (J2SE) runtime environment than the CLDC.

Figure 1. Vaccination Planner Architecture

4.1 Filtering

This paper introduces an innovative approach to match suitable schedule to process context. Figure 3 shows the XML Schema of schedule template. Schedule template defines one domain, contains one or more roles and zero or more rules.

A rule indicates that some property of a role is dependent on some property of another role. Different types of rules can be defined according to different types of dependencies. Currently only one type of rule is defined, namely the "setVAlue" type. A rule of "setValue" type indicates that the value of the specified property can be one of a series of options. The following figure depicts an example of schedule template.

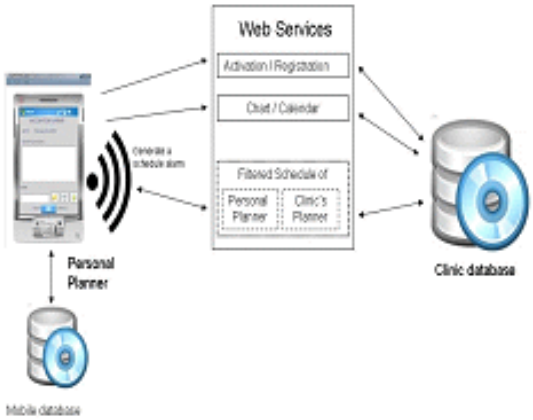


Figure 2. Software Representation Diagram

4.2 Process context

In our approach, the core concept is the process context. Process context can help filter the amenable schedule suitable both to the parents and the clinic. Process context can be automatically created by scheduling process when role need to assign a schedule for vaccination.

Formula 1: Process context = (Criteria, Weight Vector)

Criteria are used to filter out unqualified schedule. Criteria are determined by property dependencies on schedule level, e.g., If a dependency is defined as " the clinic be flexible to provide schedule that the parent wants" , and it is known that the parent requires a specific date then the criteria can help improve the precision and narrow down the result set when finding services in a service repository.

Formula 2: Criteria = {property dependencies}

Weight vector: Weight vector is used to rank all the qualified schedule so that the user can select the best one among them. Weight vector contains the merits and their weight used in ranking. When finding schedule for different roles, the weight vectors are also different from each other.

4.3 Priority Set

Priority set is an asset of domains under which services should be given a higher rank. It can further be divided into two subsets: static priority set and dynamic priority set.

Static priority set: is one schedule process, the static priority sets for finding services for different roles are the same.

The internal process of Auto Vaccination planner finds schedule interface can be demonstrated and shown in Figure 4. When Schedule server receives the process context in a service-finding request, it first extracts the criteria from the process context and uses the

criteria from the schedule repository, and then extracts the weight vector from the process context and uses the weight vector to rank the entire qualified schedule.

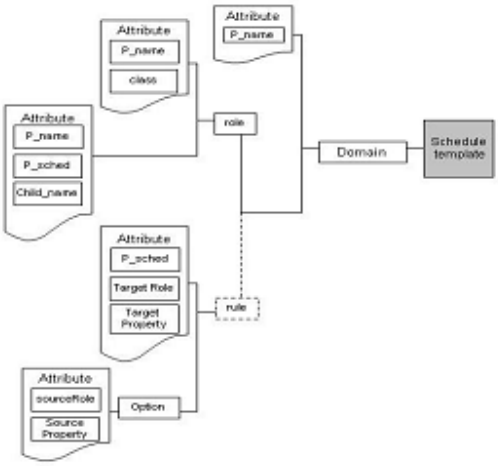


Figure 3. Structure of schedule template

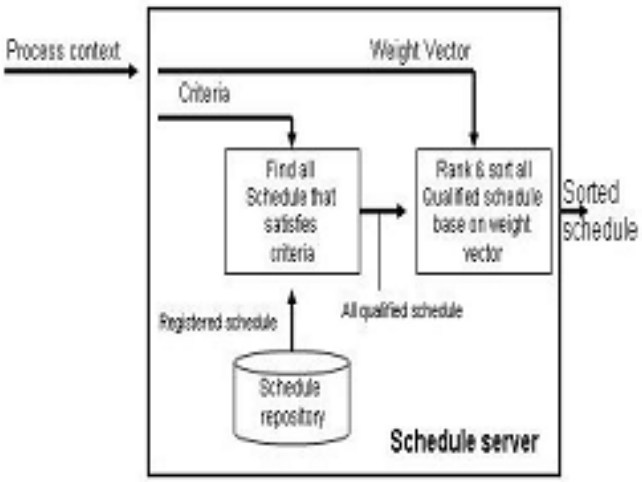


Figure 4. Internal process of schedule interface

6. Conclusion

The expected technological advances indicate the tremendous potential of Vaccination Planner technology. Several emerging technologies, promise further performance improvements. However, a number of challenging tasks should be further addressed in an effort to make this technology affordable, robust, secure, and easy to use. Further challenges include:

- Standards for wireless communication, messaging, and system support.
- Planner and automatic upload to support intermittent upload links to the medical server.

- Given the increasing number of user' s familiar with the use of cell phones and PDAs, we expect wider user acceptance
- The catering of not just children vaccination in the system but as well as the vaccination for all ages.
- Outlining the features of security-enhanced mobile network and protocol for data encryption and device authentication

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