"Asha App - Connecting to Digitalization"

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Abstract: Immunization is a vital part of the proper development of the child. Immunization is an easy, secure and efficient process of protecting individuals against the world's most infectious diseases by administering vaccines. Immunization reduces the spreading of diseases thus protects the society from harmful diseases. Immunization plays an essential role in the child's life as a preventive health action because it protects them from the most dangerous childhood diseases. According to the World Health Organization (WHO), Immunization currently averts an estimated 2 to 3 million deaths every year but an estimated 18.7 million infants worldwide are still missing out on basic vaccines.

Our recommendation algorithm assists in these processes by using deep data mining and by accessing records of child vaccines to highlight locations with lower rates of vaccination. The model has been implemented for the ASHA workers to control vaccination across the coverage area.

Keywords: Immunization, disease, Vaccine, reminder.

Introduction

Vaccines have significantly contributed to worldwide reductions in morbidity and mortality by reducing the incidence of serious infectious diseases. Today, people all over the world experience the benefits of immunizations, beginning in infancy. Most adults in the United States have not witnessed firsthand the devastating illnesses against which vaccines offer protection, for example, polio, diphtheria, and Hemophilic influenza meningitis. However, as the incidence of vaccine-preventable disease has declined, many do not appreciate the potential of these diseases to reemerge, and the potential adverse effects of the vaccines themselves take on greater saliency among certain stakeholders. Indeed, vaccine safety concerns exist among a diverse range of individuals, institutions, and formal and informal networks worldwide.

Overview

Healthy individuals are immunized with immunogenic materials that induce immunity to serious pathogens. A "schedule" is a tool that is used to ensure that the recommended immunizations are provided to shield both children and adults from disease when they are the most vulnerable. In the United States, schedules recommended by the U.S. Advisory Committee on Immunization Practices (ACIP) (schedules for children from birth to age 6 years, children and adolescents ages 7 through 18 years, and adults) are based on the immunogenicity of vaccines and the burden and timing of disease Each schedule is designed and updated yearly on the basis of new evidence This report focuses on the vaccines that protect young children under age 6 years against 14 different pathogens because that time period is when multiple inoculations are given.

Children may receive as many as 24 injections by 2 years of age and up to 5 injections in a single visit. Immunization schedules vary around the world, however, with the variability being due in part to the different patterns of disease that exist globally. Additionally, levels of antigens and immunization timing and number differ. Some countries also have different approaches to post-marketing surveillance systems, as will be described in.

Although the number of vaccinations recommended is greater than ever before, the vaccines used in the current immunization schedule actually have fewer antigens (inactivated or dead viruses and bacteria, altered bacterial toxins, or altered bacterial toxins that cause disease and infection) because of developments in vaccine technology. For example, the vaccines to prevent whooping cough used before 1991 contained 3,000 different potentially antigenic proteins. From 1980 to 2000, the immunization schedule's total number of antigens decreased by approximately 96 percent (from 3,041 to 123–126).

Ever since vaccines were introduced in the 18th century, questions and concerns about their safety have been voiced. However, the protection against feared, deadly diseases that vaccines offer encourages the majority of health care professionals and laypeople to support immunization. Although research on the adverse effects of individual vaccines is robust and a required part of the approval process by ACIP, questions about the safety of the entire recommended immunization schedule for children persist. Moreover, how safety is interpreted varies according to the severity of an adverse event and the benefit of the vaccine. For example, some might believe that one serious adverse event that occurs once in 1 million doses is "safe enough" compared with the benefit of prevention of serious disease, whereas others may consider that risk unacceptably high.

Motivation

This system is mainly developed for the Asha worker. That Asha worker is one of the social workers who work for the Indian government. That worker needs to manage all citizen data and sent it to the government. This kind of work done by those workers manually. To help this worker we create this app to manage all data and work. This app maintains all children's data, children's vaccine details, etc.

Objective

- To handle the citizen data
- To predict the vaccinated children data
- To analysis on citizen feedback.
- To provide all necessary requirement to citizen at a well time
- To keep a record of children Health.

Literature Survey

1) Uzair Aslam Bhatti, Mengxing Huang. This paper is to automate this system for hospitals, vaccinators, and children, allowing a comprehensive system to solve these immunization problems. The process begins with the registration of the child and ends with the recommendation of a vaccine

Advantages:

- It is used for many parents who not get updates about the vaccine.
- It is also useful for to get regular vaccine and their maintain history.

Disadvantages:

- It is required for a smartphone to install this app.

2) Sourabh Shastri, Paramjit Kour. In this paper, the tool has been developed to analyze the child immunization's own data by using the technique viz. Development Of A Data Mining Based Model For Classification Of Child Immunization Data Naïve Bayes algorithm for classifying the dataset, as the districts are already classified into priority and no priority districts by National Rural Health Mission, Government of India.

Advantages:

- It is useful to predict the number of vaccines to children.
- It is getting data or results using previous data of children.

Disadvantages:

- This algorithm is not getting perfect results.
- It should be used another algorithm

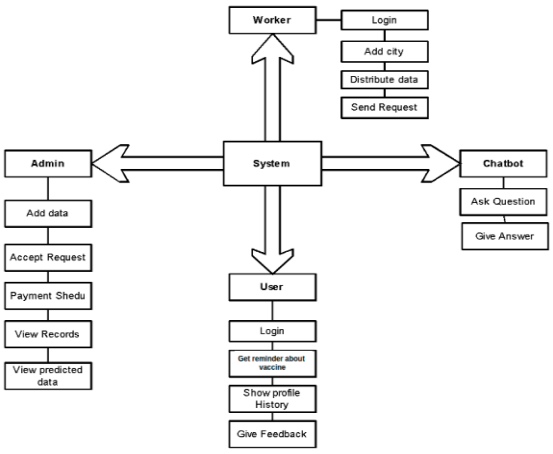
3) Chiara Zucco∗, Sergio Bella et.all. a system architecture is proposed in order to monitor the patient's opinions about a tele home care service. The presented architecture is composed by three main steps: the development of survey instrument defining a systematic survey's a survey tool for administrating questions to patients, an analysis module that will perform both Sentiment analysis and Emotion mining on open text answers, and more general Machine Learning techniques to monitor patient's opinion and make predictions about patient's dropout.

Advantages:

- It provides feedback to parents about the vaccination of your child.

Disadvantages:

- They require a large amount of data to analyze.



- **Proposed Work**

Fig 1: Architecture Diagram

Overview

In this paper, we explore the design and validation of a new generation of tools for health assessment, which

make use of ubiquitous low-cost smartphones. We have integrated several software tools into a mobile platform which we call ASHA App. This app mainly aim is to help Asha worker for maintaining the citizen record. Admin has worked is add the data that need to Asha worker for distributing to citizens. Another work is for admin is maintained or schedule the daily allowance of Asha workers and also they check if the vaccine does not gets in which area. So that work is admin. The second model is ASHA worker's main work is to distribute data to citizens at define date and time and also add citizen correct information.. Asha worker sends a request to admin for any requirement related to data or citizen. Other many works are doing those workers and last but not Least module is Citizen. That module checks only notification and those which get data from the government.

Algorithm: KNN (K-nearest neighbor)

For vaccine recommendations for children, we implemented a data mining approach with a collaboration that helps suggest the correct vaccine based on historical data from vaccination centers in which the vaccines are stored centrally,

- Where Ca - represents the child's age,
- Vi is the vaccine identified,
- Ci represents the child's unique ID,
- d is the dataset for children who we made,
- Sd is sample data
- Nk is the nearest node
- Require: Input Ca, Vi, Ci, d

1. Sample Sd from d
2. Select the nearest nodes from d (KNN approach)
3. Build the tree to select the nearest age child Nk or select the nearest schedule from record Rv
4. Vs = ∅ (vaccination selected, default zero)
5. for i ← 1 to Nk
6. Match Ca = d
7. If Ca not found,
8. Match Ca = Rv
9. End if
10. Ca = {d} ∪{Rv}
11. End for
12. Return Ci

- The algorithm selects the child's record from historical data and compares it with the standard schedule.
- If the record is not available, then the best matching case is applied based on the child's age in the previous record.
- The above procedure helps identify how many children are not vaccinated and have deficiencies with regard to particular vaccines.
- We applied the above method to a dataset of the child, which aided in the tracking of vaccination records with missing immunizations and in reducing disease occurrence in children.
- Our decision support system informs vaccinators as to which area will have a high priority for vaccination and how many vaccines are required in the future: if Vi is the vaccine ID, VN is the non-vaccinated child, and Ci represents the total number of children, then the total average N of unvaccinated children will be

$$V_N = \sum_{k=0}^{n} \frac{(C_{ik} + V_{ik})}{N}, (1)$$

- Our model is helpful for caregivers and can track the schedule of vaccinations in several ways.

The KNN Algorithm

1. Load the data

2. Initialize K to your chosen number of neighbors

3. for each example in the data

3.1 Calculate the distance between the query example and the current example from the data.

3.2 Add the distance and the index of the example to an ordered collection

4. Sort the ordered collection of distances and indices from smallest to largest (in ascending order) by the distances

5. Pick the first K entries from the sorted collection

6. Get the labels of the selected K entries

7. If regression, return the mean of the K labels

8. If classification, return the mode of the K labels.

Naïve Bayes Naïve Bayes is one of the efficient learning algorithms in data mining and machine learning. Naïve Bayes is a simplest probabilistic classifier that makes use

of Bayes theorem that works on conditional probability or is a way of calculating posterior probability. This classification is named after Reverend Thomas Bayes who introduced Bayes theorem and this was first applied to text classification by Mosteller and Wallace. Naive simply means that all the features that make up a document are independent of each other. Bayes theorem is a mathematical formula that performs the calculation on the basis of conditional probability i.e. it uses knowledge from prior events to predict future events and combinations of values in the historical data. The conditional probability of an event is the probability of an event occurring given that another event has already occurred.

According to the definition of conditional probability:

P (B/A) = P (A and B)/P (A) where B represents dependent event and A represents the prior event. It builds the model based on training data, lookup for new data to which class label it belongs to by calculating probability.

Let D be a training set of tuples and each tuple is represented by an n-dimensional attribute vector,

X = (x1, x2, . . . , xn) and their associated class labels are of m classes, C1, C2, . . . , Cm. Bayes rule can be stated a

$$P(Ci/X) = \frac{P(X/Ci)\,P(Ci)}{P(X)}$$

$$\text{Posterior} = \frac{\text{Likelihood} \times \text{Prior}}{\text{Evidence}}$$

s: Where P(Ci/X) is the posterior probability of class given predictor with which classification can be done in an optimal way for a variety of effectiveness measures.

P(Ci) is the prior probability of class (Ci), the Naive Bayesian classifier predicts that tuple X belongs to the class

Ci.P(X/Ci) is the likelihood or posterior probability of X conditioned on Ci.

P(X) is the prior probability of X.

To reduce the computational value, the class independence assumption is introduced. The conditional independence

The assumption that the probabilities P(X/Ci) are independent given the class c and hence can be naively multiplied as follows:

P(X1, X2,...., Xn) =P(X1/Ci)P(X2/Ci) . . .P(Xn/Ci).

This can be represented as:

P(X1.....Xn|C) = Π i=1 to n P(Xi/C) [22]

In the case of zero probability, the laplacian correction is used for smoothing the data set called as an expert parameter.

There is a simple way to avoid zero probability by adding one value. We assume that our training set is too large that if one value is added on to each count, in probability the negligible amount of difference is estimated. The advantages of Naïve Bayesian classifier are that it requires small training data set, easier for implementation, fast to classify and more efficient, thereby, working well on categorical data and can be used for both binary and multiclass classification problems, etc.

2. Sentiment Analysis

Given a text containing multiple features and varied opinions, the objective is to extract expressions of opinion describing a target feature and classify it as positive or negative. We now describe the proposed algorithm.

Algorithm:

Input a text and check whether the sentiment is positive, negative or neutral.

Prerequisites:

– Book1.csv: It is an excel file written in CSV format where positive and negative words and its corresponding values are stored.

We set the value of positive words +1 and negative word -1. It is our main database file.

– Input file: It is an input file that is used for sentiment analysis where some texts are stored.

– Data structure: Here we use an array list named Filebean which has two attributes key and values. We use two array lists. For database file named as 'file content' and for input file named as 'wordlist'.

1) Step-1: Read the contents of the file store it into the Filebean.

– Step-1.1: Read the contents of the file.

– Step-1.2: For each line split the line with the delimiter "," and store in the Filebean.

2) Step-2: Read the contents of the input file and store it in the Filebean 'wordlist'. Here we consider three cases: -

– Step-2.1: Remove the '.' And ',' by replacing with the blank character.

– Step-2.2: Split the word using space and store the word into the wordlist. If there is space that means, there is more than one word.

– Step-2.3: If the file contains one word so we store it directly into the wordlist.

3) Step-3: compare the contents of two array list file content and array list.

– Step-3.1: check whether the two keys/words are equal or not.

If equal, then add the value of the key of the file content together.

– Step-3.2: If the sum is less than zero then the result is positive.

If the sum is equal to zero then the result is neutral otherwise, if the sum is greater than zero the result is negative.

Methodologies

1. Admin

- Admin handles all data insertion and Asha worker requirement of citizen.it is also manages the Asha worker payment schedule. Predict the vaccine to children.

2. Asha Worker

- Asha worker enters the system via a login using a special username and password. Asha worker adds citizen information like name, child name, and their ages, etc. they also add the requirement of any data to admin.

3. Citizen

- The citizen has Login using username and password. They can view their notification about the vaccine or any other data.

Tools and Technologies Used:

This application is mounted on the Internet, to the user has to make sure that the machine, which he is using, is connected to the Internet through Lease Line, Telephone line or Cable.

Also, Microsoft Internet Explorer 4.0 and above or Netscape Navigator 4.74 and above must be installed on the machine.

Conclusion

The use of mobile phones increased as the number of users has dramatically risen; where mobile phones have become part of peoples' lives can be applied in a health center and the parents who need this service can register all the required information about their children in a health center. The goal of this project is to help parents to receive SMS messages that provide time-specific information about their children's vaccination appointments for their children. may help parents in ensuring that children's vaccination is taken as scheduled. This would lead to immunize children against diseases and prevent the spread of diseases.

Future Scope

A future goal will present a specific case study for the proposed system to detect possible abandonments paths. Integrating the survey administration in a telemedicine session will allow the gathering, at the same time, different types of data related to patient's health conditions as well as comments on how patients perceive themselves and the telemedicine program, for more complete monitoring.

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