

Biometric Child Vaccination System

Mrs. Prajakta Mahajan, Gaurav Pawar, Raturaj Misal, Pratik Gitte, Chaitanya Kalel

Department of Computer Engineering
Pimpri Chinchwad Polytechnic, Pune, Maharashtra, India

Abstract: *With a number of emerging applications requiring biometric recognition of children (e.g., tracking child vaccination schedules, identifying missing children and preventing newborn baby swaps in hospitals), investigating the temporal stability of biometric recognition accuracy for children is important. The persistence of recognition accuracy of three of the most commonly used biometric traits (fingerprints, face and iris) has been investigated for adults. However, persistence of biometric recognition accuracy has not been studied systematically for children in the age group of 0-4 years. Given that very young children are often uncooperative and do not comprehend or follow instructions, in our opinion, among all biometric modalities, fingerprints are the most viable for recognizing children. This is primarily because it is easier to capture fingerprints of young children compared to other biometric traits, e.g., iris, where a child needs to stare directly towards the camera to initiate iris capture. In this report, we detail our initiative to investigate the persistence of fingerprint recognition for children in the age group of 0-4 years. Based on preliminary results obtained for the data collected in the first phase of our study, use of fingerprints for recognition of 0-4 year-old children appears promising.*

Keywords: Child Vaccination

I. INTRODUCTION

Biometric recognition has undoubtedly made great strides over the past century. The success of fingerprints in forensics and law enforcement has fueled a broad range of applications for biometric systems, ranging from national civil registries [8] to mobile devices [7]. The focal subject groups for biometric applications in law enforcement, government and personal devices are primarily adults and adolescents (e.g. typically over 5 years old in India's Aadhaar Program [8]). As a result, biometric vendors, system integrators and the research community have primarily focused on developing data capture and recognition solutions for adults. Furthermore, the pros and cons (e.g., in terms of recognition performance, cost, system vulnerability) of using different biometric traits (e.g., face, fingerprint, iris) for recognition of adults have been identified [15]. Fundamental premises about the use of biometrics are: (i) a biometric trait is unique to an individual, and (ii) its recognition performance does not change with time (persistence). While the uniqueness and persistence properties

II. LITERATURE SURVEY

2.1 Jeev: A Low-Cost Cell Phone Application for Tracking the Vaccination Coverage of Children in Rural Communities published in 2013 by IEEE International Conference on Healthcare Informatics Jeev, a software application is used to track the vaccination coverage of children in rural communities. Jeev synergistically combines the power of smart phones and the ubiquity of cellular infrastructure, QR codes, and national identification cards. They present the design of Jeev and highlight its unique features along with a preliminary evaluation of its performance. They plan to pilot test Jeev in a rural population to study its effectiveness and identify socio-cultural issues that may arise in a largescale deployment. Jeev does not use any biometric data. It is based on a client-server model and uses low cost text messaging. Data captured by different clients can be synchronized on the server in real-time. They presented a preliminary evaluation of Jeev's performance and energy consumption using the National Immunization Survey datasets to show its efficiency.

2.2 Real Time Access to Online Immunization Records and its Impact on Tetanus Immunization Coverage in the ED published in 2016 Second International Conference on Cognitive Computing and Information Processing (CCIP) The main objective of this paper was to evaluate the impact of online access to the state Immunization Information Systems (IIS) on the immunization practices of emergency department (ED) providers in a pediatric academic tertiary care center. To improve the coverage, informatics experts have suggested the importance of including and allowing inpatient systems for ordering and documenting immunizations, support for two-dimensional barcode technology for documenting, exchange of immunization data with a health information exchange or an immunization repository such as GRITS and more importantly, access to immunization forecasting tools with reminders to improve immunization coverage of hospitalized patients. Providing interactive reminders and alerts at POC for clinicians to reduce "missed opportunities" to vaccinate, should be looked into, balancing any alert fatigue that may be triggered due to too many alerts. Also, models are developed to precisely evaluate online decision support systems such as (IIS), for their utility and impact to modify short-term and long-term patient outcomes.

2.3 Immunize - Baby Steps for smart healthcare published in 2017 International Conference on Innovations in Green Energy and Healthcare Technologies (IGEHT) They presented in this paper, a generic system to address healthcare issue, where a common platform to store and retrieve complete child medical history information. It includes mandatory vaccination schedule details of child along with the previous medical history records. Reminders to provide timely vaccinations to their child are also provided to alert parents to give their child health protection. Using Web and Mobile based technology, parents and doctors get access of the child's medical reports online anywhere, anytime with required privileges. This work helps both parents and doctors to provide better quality healthcare services. Using java servlet technology, java Server Pages (JSP) in the server side and java script, j-query at client side, web based application is developed. Here, JSP pages are used for the presentation layer, and servlets for processing tasks. Servlet acts as a controller responsible for processing requests and is responsible for deciding the JSP page to forward request. JSP page retrieves objects created by servlet and extracts dynamic content for insertion within a template. Using MySQL database, data is stored and retrieved.

2.4 Use of Mobile Phone and Facility-based Server Technology in Routine Immunization and Disease Surveillance Activities in Nigeria: Strengthening Polio Surveillance published in 2018 International Conference on Smart Computing and Electronic Enterprise (ICSCEE) This study's objective is to document and assess the use of mobile phone and facility-based server technology in the supportive supervision of routine immunization and disease surveillance activities in Nigeria. The results showed a significant improvement over the paper-based collection processes and this was realized within a secured data collation environment with optimum timeliness, security and quality control. The study concluded that the premise-based server is cost effective compared to total cloud cost over 5 years. Visualizations on the facility based server have ensured the ability to triangulate real-time data with dashboards for every day follow-up of data from the field which can be very useful in emergencies and outbreak responses. The visualizations of data coming from the field is a robust and veritable tool to make faster and better decisions for polio surveillance and routine immunization support.

2.5 Parental Reminder and Planner for Children Vaccination published in 2019 IEEE 9th International Conference on System Engineering and Technology (ICSET)

Main intension of this is project is to make an easier way of reminder for the parents to have an online vaccination planner website. Other than that, it also helps to keep record of the vaccinations which has been given earlier and it's easier to view the record anytime. The methodology that is used to develop this web-based system is by using Agile Unified Process (AUP) it consists of four phases which are inception, elaboration, construction and transition. As an outcome of the observation and survey, there are few difficulty takes place and the resolution can be done by developing this Parental Reminder and Planner for Children Vaccination. As a conclusion, by developing this Kids Vaccination Planner it will become a good initiative to help the parents to keep track of their kids vaccines and this web based system also have some enhancement to be made for the future works. Besides that, this project has an additional backup in Google Cloud which helps to prevent loss of data from the Database.

III. PROBLEM DEFINITION

In the existing systems some captures and processes infant fingerprints using fingerprint readers and inexpensive net books while in others the infant’s date of birth and database of the infant’s complete medical history are maintained. It reminds parents about the timely vaccination shots by using E-Mail on the type and date of vaccination. Doctor can view the vaccination history details along with previous medical records for providing the right vaccination to the child and can upload and update the latest vaccination shot details in the system.

IV. ARCHITECTURE DIAGRAM

This project is to implement algorithms which would be used to send SMS to the registered parents/users. Firstly, the input data is acquired from the biometrics of the parents and the first vaccination is provided after the registration when the child is born. The data is sufficient to create a unique CHILD ID and PARENT ID. Secondly, messages are sent through SMS to alert them about the next vaccination prior 2-3 days. Also, when certain outbreaks take place, alert messages are sent and information if any medical camp is organized in that particular region. Accessing the child’s data and updating the vaccination is done by the medical practitioner using the biometrics of the parents. The medical practitioner uses his/her email id to login. The parent would have their own account to keep in track of the vaccinations that have been given. This way, the data for the children in the rural area being immunized can be tracked. Since only the biometrics of the parent is used it provides a secure environment.

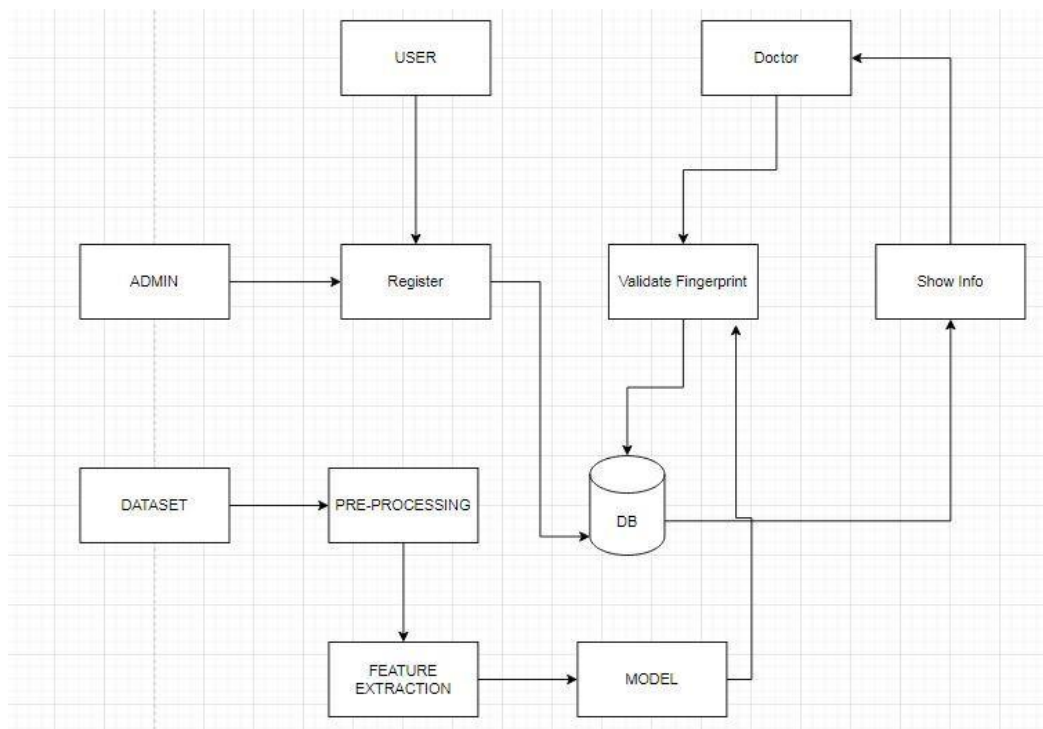


Fig 1. Architecture Diagram

V. MODULE DESCRIPTION

Fingerprint Identification Process

At first, since the fingerprint

Next, **extract the features** and prepare feature set

Then, **pre-select and match** the features with n number of templates If a match, identify person’s ID and store in database

Fingerprint Enrolment Process

At first, capture the fingerprints

Next, extract the features and prepare feature set

Then, create a template and store the data in the database

Fingerprint Verification Process

At first, acquire the fingerprint

Next, abstract the features and prepare the feature set

Then, check whether the feature set match with one template

If a match, then claim the particular user ID is true and store in the database Feature Extraction

It collects important features of fingerprints from pre-processed input

Acquisition of Images from Sensor

It senses the biometric information like a fingerprint for registration and recognition

Pre-processing

It eliminates undesirable and noisy data for more clarity on ridge structure It uses image pre-processing and enhancement approaches

Feature Extraction

It collects important features of fingerprints from pre-processed input

Matching

It matches the collected unique features with stored data (template) in the database

VI. CONCLUSION

We have implemented a Biometric Vaccine for infant project and it will be a beneficial and easy to use project which can help to detect unvaccinated people.

REFERENCES

- [1] J Thomas MR, Lip GY. Novel risk markers and risk assessments for cardiovascular disease. *Circulation research*. 2017; 120(1):133–149. <https://doi.org/10.1161/CIRCRESAHA.116.309955> PMID: 28057790
- [2] Ahmed M. AlaaID1, Thomas Bolton, Emanuele Di Angelantonio, James H.F. RuddID, Mihaela van der Schaar,—Cardiovascular disease risk prediction using automated machine learning: A prospective study of 423,604 UK Biobank participants, *PLOS ONE* 14(5): e0213653. <https://doi.org/10.1371/journal.pone.0174944> May 15, 2019H. Poor, —A Hypertext History of Multiuser Dimensions, *MUD History*, <http://www.ccs.neu.edu/home/pb/mudhistory.html>. 1986. (URL link *include year)
- [3] Stephen F. Weng, Jenna Reys, Joe Kai1, Jonathan M. Garibaldi, Nadeem Qureshi, —Can machine-learning improve cardiovascular risk prediction using routine clinical data?, *PLOS ONE* | <https://doi.org/10.1371/journal.pone.0174944> April 4, 2017
- [4] Rine Nakanishi, Damini Dey, Frederic Commandeur, Piotr Slomka, —Machine Learning in Predicting Coronary Heart Disease and Cardiovascular Disease Events: Results from The Multi-Ethnic Study of Atherosclerosis (Mesa), *JACC* Mar-20, 2018, Volume 71, Issue 11
- [5] <https://www.cdc.gov/heartdisease/facts.htm>. Available [Online].
- [6] Senthilkumar Mohan, Chandrasegar Thirumalai, Gautam Srivastava —Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques, Digital Object Identifier 10.1109/ACCESS.2019.2923707, *IEEE Access*, VOLUME 7, 2019 S.P. Bingulac, —On the Compatibility of Adaptive Controllers, *Proc. Fourth Ann. Allerton Conf. Circuits and Systems Theory*, pp. 8-16, 1994. (Conference proceedings)