



DEVELOPING AN ANDROID APPLICATION (SUVIDHA) FOR PENSIONER USING FINGERPRINT AUTHENTICATION

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Abstract

Pension is an arrangement of providing people with an income when they are no longer earning a regular income from employment. The term retirement plan refers to a pension granted upon retirement. Retirement plans may be set up by employers, insurance companies, the government or other institutions such as employer associations or trade unions. Depending upon the previous record of pension management system, there is need for robust pension management system that can handle the pension process and authorize the pensioner efficiently. A platform for retiring employees to access easily their information and update the information of authenticated pensioners and generate the Life certificate which is the main purpose of the application.

Index Terms: Retirement plan, Life certificate

I. INTRODUCTION

A pension is a fund into which a sum of money is added during an employee's employment years, and from which payments are drawn to support the person's retirement from work in the form of periodic payments. A pension may be a "defined benefit plan" where a fixed sum is paid regularly to a person, or a "defined contribution plan" under which a fixed sum is invested and then becomes available at retirement age. Pension is usually paid in regular instalments for life after retirement.

Life certificate is to state that the person is alive. Pensioner has to renew his life certificate yearly. If the life certificate of the person is renewed then only the person's pension continues. If the certificate is not renewed then

the person would be declared dead and the pension of that pensioner is stopped.

The system provides Android Application for pensioners using fingerprint. System propose fingerprint which can be executed inside the devices with a limited computational power. System also provides services for pensioners like authentication and generation of Life certificate. Life certificate is generated every year to know the pensioner is alive or not.

This system is a platform for retiring employees to access easily their information and update the information of authorize pensioners and generate the Life certificate which is the main purpose of the application.

II. PROBLEM STATEMENT

Android operating system supports most applications in today's technical world. It is an open source operating system which highly satisfies the user's needs. The System, will be used for pensioners to make available some services. System mainly contain fingerprint and Authentication of the pensioner.

In System Services include Authentication, life certificate generation. For the authentication process user captures the fingerprint using mobile camera. Preprocessing is the first stage in fingerprint recognition. Alignment is the next stage where the transformation between 2 images of fingerprint is recovered. Matching is then applied which matches the sample input image with the stored images in the database.

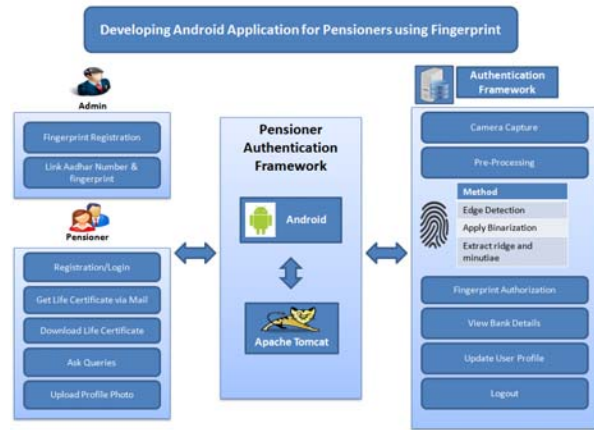
System contains, User login using fingerprint authentication, minimum of 2 images will be captured at the time of login. Images will be

captured using android camera and some preprocessing will be applied to detect minutiae and curve lines it is 1: N matching. After the authentication process Life certificate of pensioner will be generated. User can perform the certain operation like update, view his profile, ask queries and Upload the new Profile photo. User can view the details of his account like balanced amount, remaining amount etc.

Developing Android Application for pensioners using fingerprint mainly deals with providing pensioners to make available some services. Services include fingerprint Authentication and life certificate generation, using Fingerprint Matching Algorithm.

III. SYSTEM ARCHITECTURE

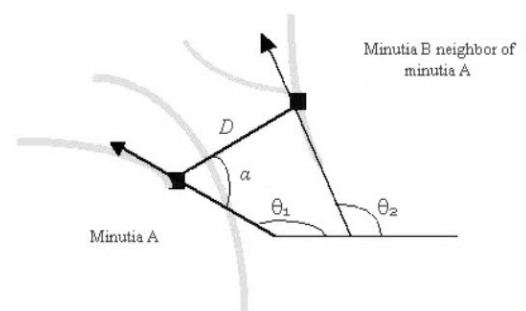
- We have two parts i.e. few operations are performed by admin and other by the pensioner.
- The admin registers the finger print of the pensioner and as we are linking it to Aadhar number, it will link to Aadhar number and fingerprint.
- The pensioner will priorly login if he /she is an existing user or else will register if a new pensioner.
- Pensioner's priority is to generate the life certificate as to continue the pension, so the pensioner will use fingerprint for such process. If the fingerprint matches then the life certificate would be generated i.e. authentication process.
- The generated life certificate is to be sent to the bank authorities as it is also a source of proof that the pensioner is alive and he/she receives the pension, in our system the pensioner could directly mail the life certificate to the bank authority associated, as we have provided an email option in our system.
- We could update the profile.



IV. ALGORITHM

Fingerprint Matching Algorithm: Features Extraction

- Calculate the Euclidean distance between the central minutia and its neighbour minutia (segment D in Fig) referred to as E_d .
- Calculate the angle between segment D and the central minutia ridge direction (angle α in Fig) referred to as $D_r\alpha$.
- The difference angle between central minutia and neighbour ridge orientation angle ($\mu_1 - \mu_2$ in Fig) referred to as $O_d\alpha$.
- Calculate the ridge count between central and neighbour minutiae: given two points a and b, the ridge count between them is the number of ridges intersected by the segment (In Fig. ridge count value is 1) referred to as R_c .



Fingerprint Matching

To compute the dissimilarity between two minutiae in different templates, the algorithm uses the information about the neighbour features.

1. To find the difference in absolute value between corresponding features:

$$Ed\text{-Diff} = |E_{d1} - E_{d2}|$$

$$rc\text{Diff} = |R_{c1} - R_{c2}|$$

$\text{draDiff} = \text{--- Dra1 Dra2 ---and}$

$\text{odDiff} = \text{--- Oda1 Oda2 ---}$.

2. To check that every feature difference value is below the corresponding acceptance Threshold; if only one difference value exceeds the relative threshold, the two neighbours cannot correspond in the two neighbourhoods (edDiff must not be greater than edDiffThr , rcDiff than rcT hr , edDiff than draThr and odDiff than odT hr). The set of the four feature difference thresholds can be globally defined as the features bounding box, which makes the algorithm tolerant to small non-linear distortions.

3. To multiply each feature difference for the relative weight value

$\text{edWghtDiff} = \text{edDiff} * \text{edWght}$,

$\text{rcWghDiff} = \text{rcDiff} * \text{rcWght}$,

$\text{odWghtDiff} = \text{odDiff} * \text{odWght}$ and

$\text{draWghtDiff} = \text{draDiff} * \text{draWght}$

The different weight values are necessary to attribute more importance to the features that match better, for example the Euclidean distance. To obtain each weight value, we have also divided by the respective feature difference bounding box threshold, since we want these differences to be normalized and homogeneous.

4. To sum together all the four weighted differences to represent the global dissimilarity between the two neighbours:

- $\text{NeighDissimilarity} = \text{edWghtDiff} + \text{rcWghtDiff} + \text{draWghtDiff} + \text{odWghtDiff}$.

V. PROPOSED SYSTEM WORKING

- Pensioner priorly creates an account.
- After successful creation of account the pensioner need to select the hand of which fingerprint is to be stored.
- Then the user selects the finger to be used for authentication.
- Authentication process starts with capturing an image through mobile camera and comparing the captured image with stored images in the Database.
- After user authentication is successful, Life certificate will be generated.
- User can download this certificate in .pdf format for further use.
- User will be able to view his bank account details, profile and also edit the profile if required.

- User can mail the generated life certificate to the bank holding his/her account.

VI. TECHNOLOGY USED

• Android

Android is an operating system (OS) designed basically for touchscreen mobile phones. It is based on the Linux kernel and currently being developed by Google. Android's user interface allows direct manipulation, using touch gestures, swiping, tapping and pinching, to manipulate objects on the screen, virtual keyboard for textual input.

Applications that are more popularly known as "apps", extend the functionality of devices. They are written using the Android SDK (software development kit) and mostly use the Java programming language which provides complete access to the Android APIs.

• Eclipse

Eclipse is an open source community whose projects building tools and frameworks are used for creating general purpose application. The most popular usage of Eclipse is as a Java development environment.

Eclipse is an open source community, whose projects are focused on building an open development platform comprised of extensible frameworks, tools and runtimes for building, deploying and managing software across the lifecycle. The Eclipse Foundation is a not-for-profit, member supported corporation that hosts the Eclipse projects and helps cultivate both an open source community and an ecosystem of complementary products and service

The independent not-for-profit corporation was created to allow a vendor neutral and open, transparent community to be established around Eclipse. Today, the Eclipse community consists of individuals and organizations from a cross section of the software industry.

• NetBeans

NetBeans is a software development platform written in Java. The NetBeans Platform allows applications to be developed from a set of modular software components called modules.

Applications based on the NetBeans Platform, including the NetBeans integrated development environment (IDE).

The NetBeans IDE is primarily intended for development in Java, but also supports other languages, in particular PHP, C/C++ and HTML5.

NetBeans is cross-platform and runs on Microsoft Windows, Mac OS X, Linux, Solaris and other platforms supporting a compatible JVM.

• MySQL Database

A database is a separate application that stores a collection of data. Each database has one or more distinct APIs for creating, accessing, managing, searching and replicating the data it holds.

MySQL is the most popular Open Source Relational SQL database management system. MySQL is one of the best RDBMS being used for developing web-based software applications.

A Relational DataBase Management System (RDBMS) is a software that Enables you to implement a database with tables, columns and indexes, guarantees the Referential Integrity between rows of various tables, updates the indexes automatically, interprets an SQL query and combines information from various tables.

VII. CONCLUSION

The pensioner's application would be useful to pensioners. The work will become a bit simpler and would save time. It would also protect from frauds as the person dies he couldn't be authenticated as generated life certificate won't be renewed and then the person's pension would be stopped. This would be helpful for the senior citizens of our country.

VIII. ACKNOWLEDGEMENT

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REFERENCES

- [1] "Android Based Mobile Application Development for Web Login Authentication Using Fingerprint Recognition Feature" IEEE-2015; Nilay Ylldmm and AsafVarol
- [2] "An Asymmetric Fingerprint Matching Algorithm for Java Card" IEEE i Chieti-Pescara, Italy; Stefano Bistarelli, Francesco Santini, and Anna Vaccarelli
- [3] "Device Fingerprinting in Wireless Networks: Challenges and Opportunities" Device Fingerprinting in Wireless Networks: Challenges and Opportunities-2015; Qiang Xu, Rong Zheng, Walid Saad, and Zhu Han
- [4] "Fingerprint acquisition with a smartphone camera; Prof. Dr.Ir.R.N.J. Veldhuis, Dr.Ir.L.J.Spreeuwers, Dr.M.M.J. Dhalle.
- [5] Digital Image Processing by Rafael C.Gonzalez and Richard E. Woods.
- [6] JEEVAN PRAMAN - <http://jeevanpramaan.gov.in>
- [7] "Dougherty Urges All Be Fingerprinted: U.S. Attorney Describes Sciences of Crime Detection to Democrats". The Brooklyn Daily Eagle. March 8, 1938. Retrieved July 1, 2014
- [8] "Peer Reviewed Glossary of the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST)" (PDF). Retrieved 2012-09-14.
- [9] "Fake finger reveals the secrets of touch", Nature, 29 January 2009, doi:10.1038/news.2009.68.
- [10]"Fingerprint grip theory rejected". BBC. June 2009. Retrieved March 17, 2010.
- [11]<https://en.wikipedia.org/wiki/Fingerprint>