

# Finger Vein Extraction And Authentication For Advanced Voting System

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**Abstract-** Smart voting based on biometric authentication in the developing field of modern security system. The process of creating the clusters of finger vein samples based on the images that are extracted. The present paper deals with the application of finger veins pattern as an approach to gain best result in terms of classification accuracy, Equal Error Rate and to remove the limitation of the Local binary pattern which is its sensitivity to noise. The paper analyze different techniques of Gaussian filter, Haar wavelet transformation, K-means clustering and SVM to make finger vein recognition more reliable. Among many authentication systems finger vein is promising as a foolproof method of automatic personal identification. ZigBee is a wireless technology developed as an open global standard to address the unique needs of low cost, low power wireless M2M networks. ZigBee standard operates on the IEEE 802.15.4 physical radio specification and is designed to provide an easy-to-use wireless data solution characterized by secure, reliable network architectures. Arduino UNO is a tool for making computers that can sense and control more of physical world than your desktop computer and can be used to develop interactive objects, taking inputs from a variety of switches and provides output. GSM is a globally accepted standard for digital cellular communication and it defines the function and interface requirements in detail but do not address the hardware. The GSM message is sent in response to an unauthorized user. The votes are updated in the database and results are published fast which consumes less time and reduces man power.

**Keywords-** Vein Recognition, Arduino, ZigBee, GSM, Gaussian function, K-means, SVM.

## I. INTRODUCTION

In the changing world new technologies are identified which is helping in enhancing the society. But there are some intruders who misuse it. In our country voting is not considered so important by the people. Nowadays there is increase in the use of biometric devices for authentication process and they are simple to use. The method of recognizing a person using physiological features such as iris, finger print,

finger vein etc. These images are unique which is appropriate and more secure when compared to the other traditional authentication system. But is very much essential that everyone should vote. There are also malfunctions which occur in the voting system. In order to provide a secure voting system we propose a new system involving the concept of finger veins. Finger vein is more secure that it is impossible to cheat in casting their votes. An embedded finger-vein recognition system for authentication in voting system is introduced. Using the novel finger vein algorithm the system is implemented on an embedded platform. LCD display is used to display the message related to the current status. It is a secure voting system. If an unauthenticated person voted it send a GSM message to the mobile otherwise it activates a buzzer and sends a message to the higher official indicating about the unauthorized user.

## II. RELATED WORK

Based on the concept of voting many methods were implemented to provide a secure voting system.

In [1] the system where the election team would visit the residential address and check the details of the voters and will provide them an ID card.

In [2] the voting was based on user components like touch screen to provide ballot display. This method was provided to tabulate the data and provide them in the form of a printed copy. But transmitting the individual ballots was not a safe one.

In [3] the voting was done through the net. An android application was used and by using the username and password provided to the users votes were casted.

In [4] voting was conducted by making use of a GUI application. It was similar to the online voting system using android. A software was being used to cast their votes. But malfunctions occurred since everything was through net and fake proofs were provided.

In [5] finger print concept was used which involved casting their votes by finger print. Though it was a secure system, by using the forensic powder finger print was recognized and malfunctions occurred.

In [6] a software is developed with a simple and self-explanatory GUI where it is used by people to vote in election. The authenticated user should login to the server on particular conditions to cast his vote where the development is done on the Ethernet.

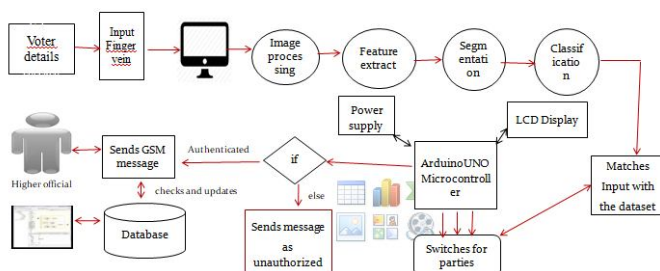
**III. EXISTING SYSTEM**

In the existing system [1] the voters details will be checked prior and making use of the identity details they were allowed to vote which consumes time and man power. After casting their vote an electoral ink will be applied on the finger indicating that they have voted and they are not allowed to vote anywhere else. But even the electoral ink was duplicate and malfunctions were carried out. Due to this an insecure voting system is carried out. [2]Transmitting the individual ballots or vote total to central location for formation of final result which could results in missing of devices.[3]Fake proofs are provided in online voting which cannot be recognized and there are also chances for server failure. [4]Finger prints can be traced using the forensic powder. [6]Software failure may occur and the entire family should be familiar to deal with software access.

**IV. PROPOSED SYSTEM**

The finger-vein is a promising biometric pattern for personal identification in terms of its security and convenience. The veins are unique to every individual and it is hidden inside the body which is mostly invisible to human eyes, so it is difficult to forge or steal. The non-invasive and contactless capture of finger-veins ensures both convenience and hygiene for the user, and is thus more acceptable. The finger-vein pattern can only be taken from a live body. Therefore, it is a natural and convincing proof that the subject whose finger-vein is successfully captured is alive.

**V.SYTEM ARCHITECTURE**



**Image Processing**

The use of computer algorithms to process an image is called digital image processing. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. A wide range of algorithms are applied to the input data and this can avoid problems with noise and signal distortion. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. Mathematically involving Gaussian blur to an image is same as convolving the image with the Gaussian function. This will accurately find the bokeh effect. A Gaussian blur is a low pass filter.

The following formula is used for calculating the image,

$$G(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{x^2}{2\sigma^2}}$$

If it is the product of two Gaussian points then it is done by

$$G(x, y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$$

where x is distance from the origin in horizontal axis and y is the distance from the origin in vertical axis.

**Feature Extraction**

Feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is similar to dimensionality reduction.

When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a features vector). This process is called feature selection. The desired data can be performed through reduced representation to complete initial data where the selected features contain the relevant data.

Feature extraction involves reducing the amount of resources required to describe a large set of data. The major problem with performing the analysis of complex data is the number of variables that are provided. Analysis with a large

number of variables generally requires a large amount of memory and computation power, also it may cause a classification algorithm to overfit to training samples and generalize poorly to new samples. It is a method of constructing combinations of variables that describes the data with sufficient accuracy. The best citation needed results are achieved when an expert constructs a set of application-dependent features, a process called feature engineering. If no expert knowledge is available the dimensionality reduction techniques are highly helpful. Independent component analysis

- Isomap
- Kernel PCA
- Latent semantic analysis
- Partial least squares
- Principal component analysis
- Multifactor dimensionality reduction
- Nonlinear dimensionality reduction
- Multilinear Principal Component Analysis
- Multilinear subspace learning
- Semidefinite embedding
- Autoencoder
- Deep feature synthesis

**Image Segmentation**

The digital images are partitioned into disjointed sets which is the process of image segmentation. The meaningful regions may represent objects in an image of three-dimensional scene, regions corresponding to industrial, residential, agricultural, or natural terrain in an aerial recognizance application, and so on. A region is a connected set of pixels and the objects are considered either four-connected, if only laterally adjacent pixels are considered, or they can be eight-connected, if diagonally adjacent pixels are also considered to be connected. Image segmentation is an efficient and natural process for humans. A human eye (or rather, mind) sees not a complex scene, but rather a collection of objects. In contrast, image segmentation is not an easy task in digital image processing, and it may become a serious problem if the number of objects is large or unknown or if the boundaries between objects are not clear. Three of the most commonly used techniques for digital image segmentation are the gray-level thresholding technique, gradient-based segmentation technique, and the region growing technique.

C. Figure 5.1 Input image

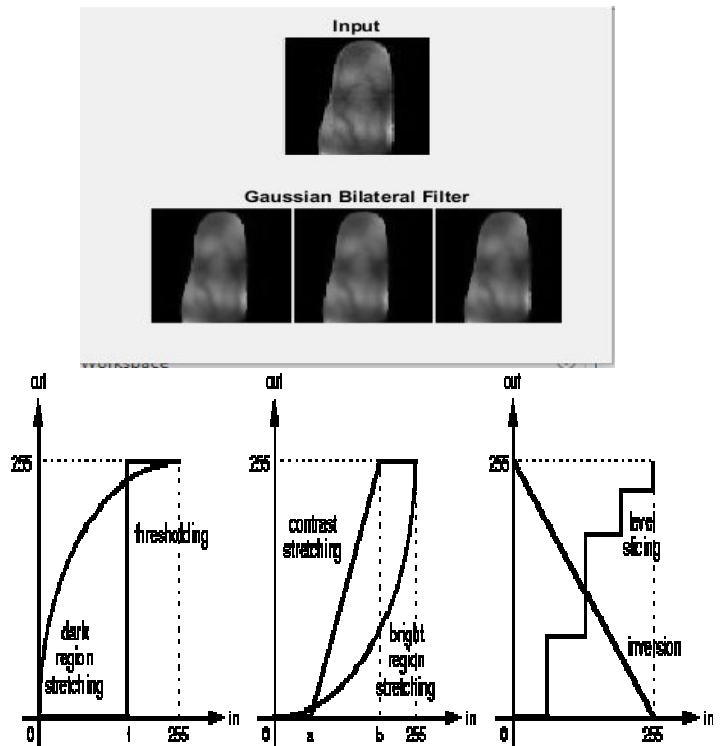


Figure 5.2 Feature extraction

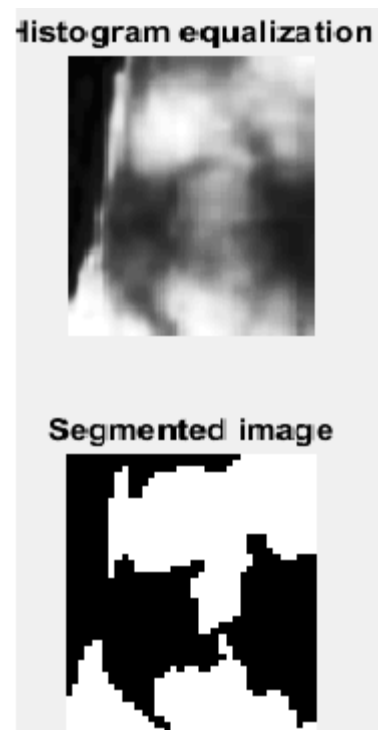
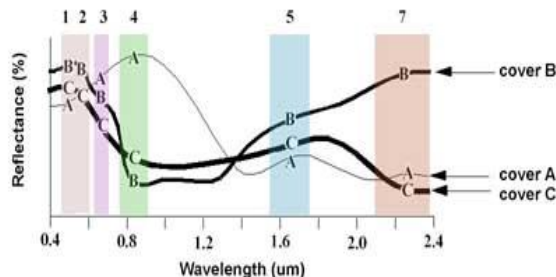


Figure 5.3 Segmented image

**Classification**

The process of categorizing the pixels from a digital image into several land cover classes called themes. This categorized data may then be used to produce thematic maps of the land cover present in an image. Classification is done

based on the spectral pattern which is found within the data and numerical basis for classification. The objective of image classification is to identify and portray, as a unique gray level (or color), the features occurring in an image in terms of the object or it also represents the type of land cover that is represented on the ground.



Classifying images deals with digital image analysis is a part of the image classification. It is very nice to have a "pretty picture" or an image, showing a magnitude of colors illustrating various features of the underlying terrain, but it is quite useless unless to know what the colors mean. Supervised and unsupervised classification are the two main classifications. We identify the examples of information classes in the image called training sets. A statistical characterization of the reflectance of each information can be made through image processing software. It is referred as signature analysis and it involves developing a simple mean as a complex that provides detailed analyses on that various terminologies like mean, variance. The image is classified by examining the reflectance of information and to make decisions on the signatures that it resembles.

Unsupervised classification is a method that examines large number of unknown pixels and it divides them into many class based natural groupings that are found in image values. Unsupervised classification does not require analyst specified training data as required in supervised classification. The values within a given cover should be together in the measurement space. In contrast data in different classes should be separated.

Unsupervised classification are spectral classed groupings of image values. It identifies the spectral classes that are not known initially but it must be compared to some reference data. This classification also identifies information values of spectral classes. Supervised approach is used to define the categories of information that examines the spectral separability. This approach determines separable class along with the information value.

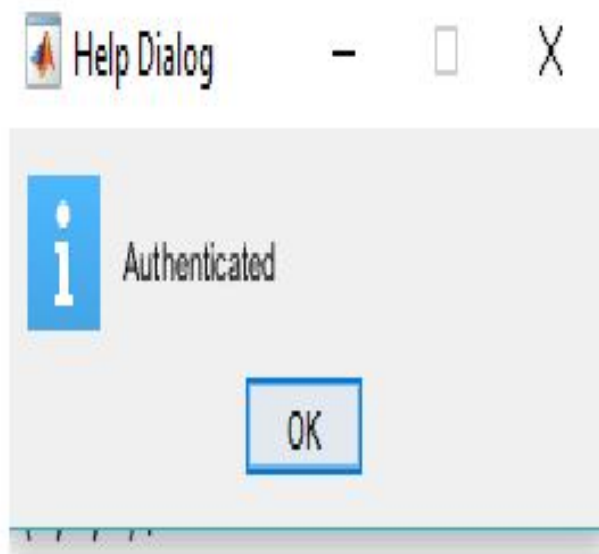
Unsupervised classification is becoming increasingly popular in agencies involved in long term GIS database maintenance. They use clustering procedures in order to get fast access and require a very little operational parameters. Thus it is becoming possible to train GIS analysis with only a general familiarity with remote sensing to undertake classifications that meet typical map accuracy standards. This tool can provide rapid means of producing quality land cover by using ground truth assessment procedures.

**VI. FUTURE ENHANCEMENT**

To achieve a more convenient system in smart voting, we would scan the individuals iris and the images will be stored in the voters database by giving appropriate AADHAR card number. When a person comes for voting then iris of that person would be detected and that image is compared with that corresponding image in voters database. Similarly if he/she is an authenticated person then information of the voter will be displayed in the PC which is compared to the voters id. If the details are matched then the person will be allowed to vote.

**VII. CONCLUSION**

A nation with less voting percentage will struggle to develop as using a right leader for the nation is very essential. Unfortunately our nation lacks in the 100% of voting. This is mainly due to failure of the security level in the existing voting system. Our application tends to make our nation into a developed country by increasing the percentage of vote by developing the high security voting system. Lets make our country smart and lets make our nation to be super power.



**REFERENCES**

- [1] F.T.Wu and H.B.Lim “UrbanMobilitySense:A user centric participating sensing system for transportation activity surveys,”IEEE sensors J.vol. 14,no 12,pp.4165-4174,”Dec 2014.
- [2] G.Cardone ,A.Cirri,A.Corradi and L.Foschini,”The participacet mobile crowd sensing living lab:The testbed for smart cities,”IEEECommun.Mag.,vol.52,no.10 ,pp.78-85,oct.2014.
- [3] M.Pouryazdan and B.Kantarci,”The smart citizen factor in trustworthy smart city crowdsensing ,”IT prof.2016..
- [4] R.K .Ganti F.ye and H.lei .”Mobile crowdsensing:current state and future challenges,”IEEE commu.vol 49,no.11 ,pp.32-39 nov-2011.
- [5] A.Monroy Hernandez S.Frnham E.Kiciman,”Smartsocieties:vol 20,no.4,pp16-19.jul/aug 2013.
- [6] B.Guo,Z.Yu,D.Zhang and X.Zhou.”Cross community sensing and mining“.IEEECommuni.Vol.52,no.8,pp,144-152.aug2014
- [7] G.Cardone ,A.Cirri,A.Corradi and L.Foschini,”The participacet mobile crowd sensing living lab:The testbed for smart cities,”IEEECommun.Mag.,vol.52,no.10 ,pp.78-85,oct.2014.
- [8] M.Pouryazdan and B.Kantarci,”The smart citizen factor in trustworthy smart city crowdsensing ,”IT prof.2016.