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School of Information Technology& Engineering M.Tech Software Engineering

SWE1015 --Biometric Systems

Slot: B_2

PROJECT REPORT

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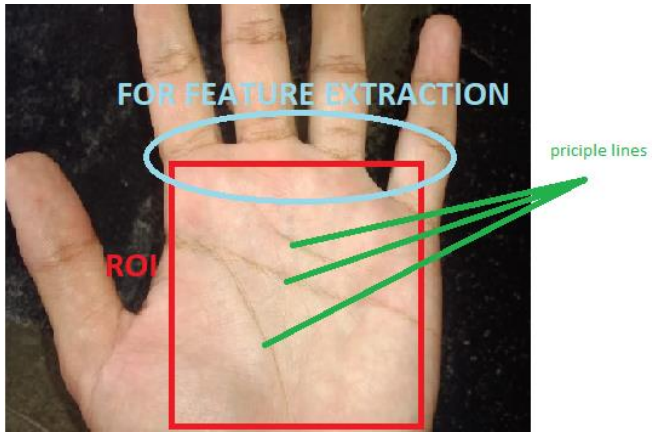
Abstract:

This is an article explaining about the literature survey of the project/application (palm detection through camera serving the authentication), in this article starting with the how we started choosing this idea rather than going to other more accurate and secure traits like iris, finger print etc., we are going to explain about the what are the techniques we adopted and how can be they easily implemented and can installed. this article lets you also know about the reference from which the idea was taken, how well the palm trait is correct, various techniques that could be used, machine learning techniques which we used, easy ways to implement or install this application this application. In this time of covid19 we need to have a secure authentication which needs to be contactless, secure, accurate and cheap. The whole idea is about, we need some system or an innovative idea which is futuristic, cost efficient, accurately working. technology for authentication purpose, whether it might be a data leak or some physical property we need something to protect it. In touch based has hygiene and latent prints issues as per now we should also concentrate on the cost, data privacy and accuracy so for such kind of problems we should chose the sustainable, efficient and cheap solution and that's why we choose contact less palm print through camera that could serve the authentications.

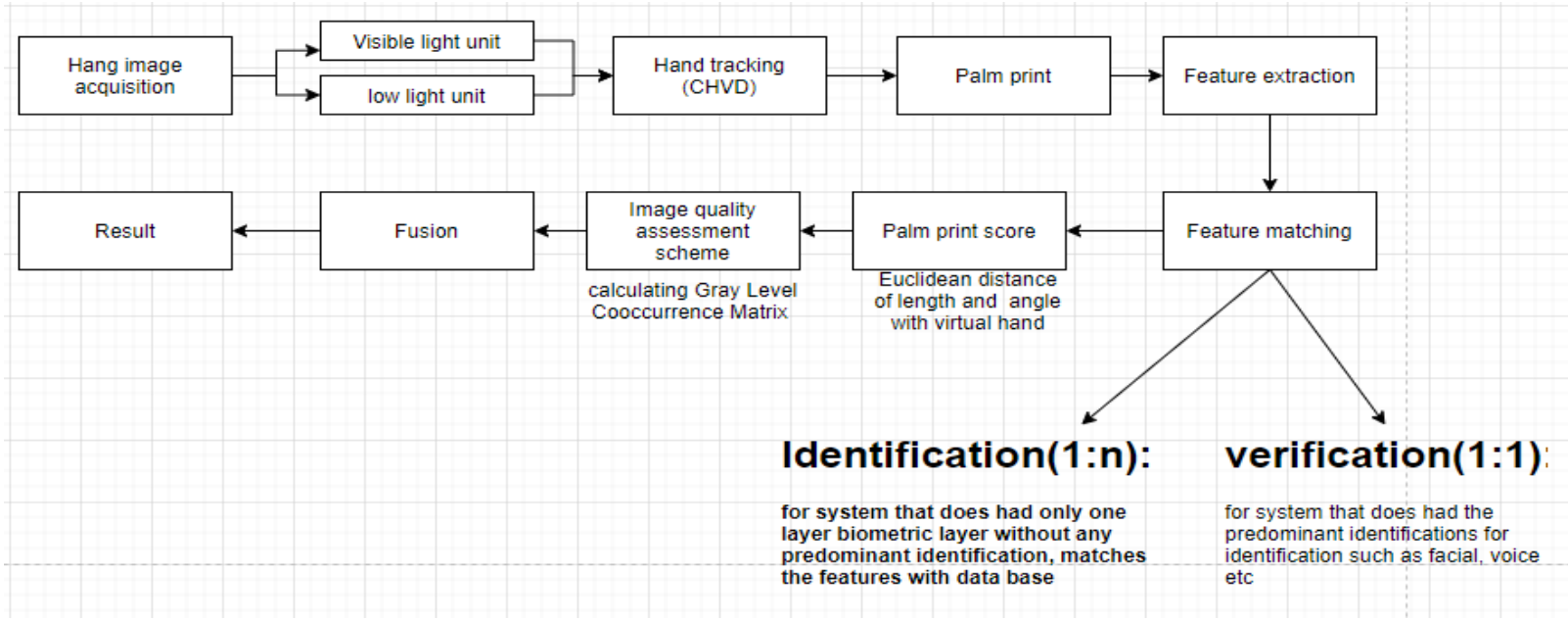
Introduction:

As of late, biometry has risen as a solid innovation to create greater degree of security to individual confirmation framework. Among the varied biometric characteristics that may be used to acknowledge an individual, the human hand is that the oldest, and maybe the foremost successful form of biometric technology (Hand-based biometry, 2003). The alternatives that might be separated from the hand epitomize hand unadulterated arithmetic, unique mark, palm print, knuckle print, and vein. These hand properties are steady and dependable. The human day to day activities make the principle lines on the hand good structured which could be used for the easy feature extraction and also will sustain throughout the life span of human(Yörük et al., 2006). aside from that, the hand-scan technology is usually perceived as non-interfering as compared to other biometry system like finger, iris etc. scan systems (Jain et al., 2004). The users don't need to be cognizant of the manner during which they act with the system. These blessings have greatly expedited the readying of hand options in biometric applications. At present, a large portion of the hand procurement gadgets are upheld contact based style. The clients are expected to the touch the gadget or clutch some fringe or guiding peg for their hand pictures to be caught. There are variety of issues related to this touch based style. Firstly, individuals are involved regarding the hygiene issue during which they need to place their hands on an equivalent detector wherever numberless others have additionally placed theirs. This problem is especially exacerbated throughout the eruption of epidemics or pandemics like COVID19, sars and respiratory disorder A (H1N1) which may be unfold by touching germs leftover on surfaces. Secondly, latent hand prints that stay on the sensor’s surface can be derived for illegitimate use. Analysts have incontestable precise systems to utilize inert fingerprints to shape projects and forms of the satire fingers (Putte and Keuning, 2000). Thirdly, the device surface are going to be contaminated simply if not used right, particularly in harsh, dirty, and out of doors environments.

This article presents a Palm detection through camera which serves authentication. Palm prints ask the great streaming example designed by rotating wrinkles and box on the zone surface of the hand. 3 types of line designs are obviously noticeable on the palm. These line designs are known as the chief lines, wrinkles, and edges. Principal lines on the hand are thickest and the easy features that could be easily extracted using the camera. The chief lines portray the premier recognizable choices on the palm. the majority have three principal lines, that are named because the crease, head line, and life line Wrinkles are thought to be the diluent and additional irregular line patterns The wrinkles, particularly the articulated wrinkles round the chief lines, may likewise contribute for the discriminability of the palm print. On the contrary hand, edges are the barely recognizable difference surface conveyed all through the territory surface. The ridge feature is a smaller amount helpful for discriminating individual as they can't be perceived below poor imaging supply.



Architecture:



Explanation:

Image acquisition:

The image acquisition is done using good quality ccd cameras, Although CCD-based palm print scanners may capture prime quality pictures, they need careful device setup. This style includes adequate decision and design of the focal point, camera, and light-weight sources. in sight of this, a few specialists extended to utilize advanced cameras and camcorders as this setting needs

less exertion for framework style. The greater part of the frameworks that conveyed advanced cameras and camcorders show less severe limitation on the clients. They didn't use pegs for hand placement and that they did not need special lighting management This was accepted to broaden client acknowledgment and decrease upkeep exertion of the framework. all the same, they may cause drawback because the image quality is also low because of uncontrolled illumination variation and distortion because of hand movement.

Working:

CCD (Charged Couple Device) camera comprises of a focal point and an image plane (chip exhibit) containing minimal strong cells that convert light-weight energy into electrical charge. The yield is simple picture. The key camera boundaries epitomize

• picture plane calculations: parallelogram, round, or liner chip exhibit size (for example 512 × 512, furthermore saw as camera goal, i.e., the quantity of cells evenly and vertically).

• cell size (e.g., 16.6 × 12.4μm, aspect ratio=4:3, not square)

• Spectral reaction (28%(450nm), 45%(550nm), 62%(650nm)) noticeable light: 390-750 nm, IR light-weight 750 nm and better

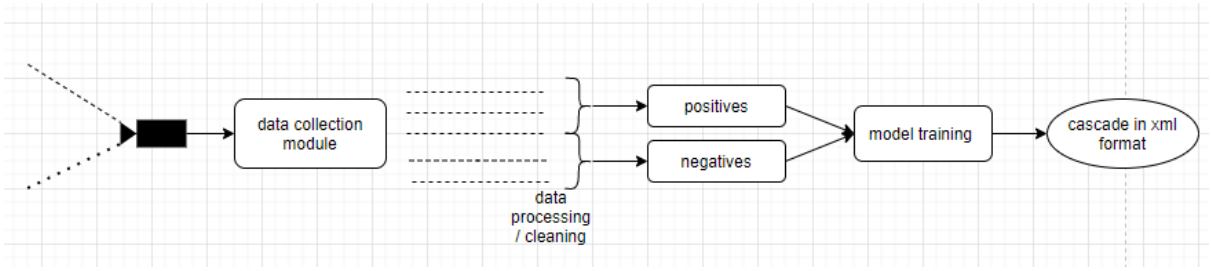
• Aperture

Aside from CCD scanners and computerized camera/camcorder, there was likewise investigation that utilized advanced scanner all things considered, advanced scanner isn't suitable for period applications because of the long examining time. In addition, the photos is additionally deformed due to the squeezing effect of the hand on the stage surface.

Feature extraction:

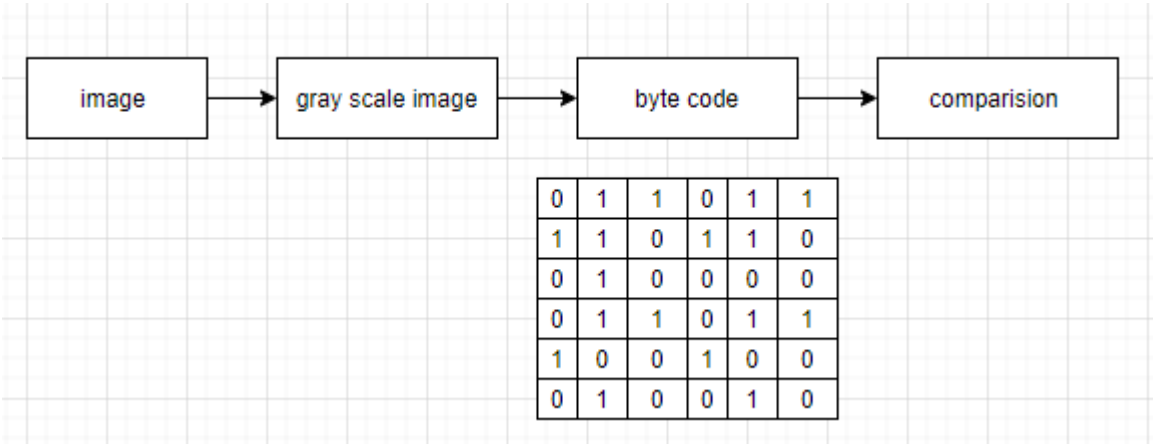
Various methodologies are extended to remove the differed palm print alternatives. The works according within the literature are often loosely classified into 3 classes, specifically line based mostly, appearance-based, and texture-based. Some prior examination in palm print followed the line-based course. The line-based methodology contemplates the auxiliary information of the palm print. Line designs like guideline lines, wrinkles, edges, and wrinkles zone unit extricated for acknowledgment. The later researches used a lot of versatile approach to extract the palm lines by mistreatment edge detection strategies like Sobel operator, morphological operator, edge map , and changed radon transform. modified additionally researchers World Health Organization enforced their own edge detection algorithms to extract the road patterns

For detection:



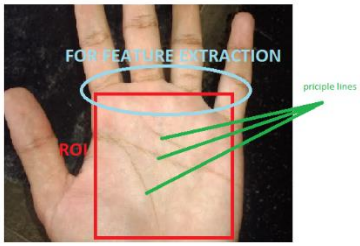
Appearance based:

Then again, the appearance-based methodology is extra basic since it treats the palm print picture as a whole. Normal procedures utilized for the appearance-base methodology grasp head component investigation (PCA), straight discriminant examination (LDA) and autonomous segment examination (ICA) there have been conjointly scientists WHO built up their own calculations to explore the vibes of the palm print

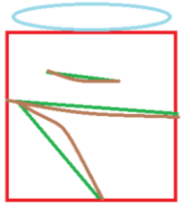


Score based: (Line based):

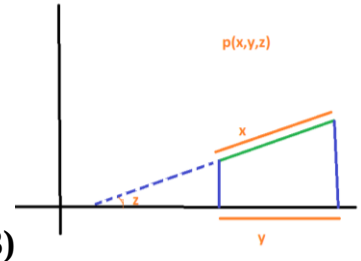
This method is same as the appearace based , but where in here we do caluclate the euclidean distance of the parametre of the principle line like actual length , projection of axis , angles made with the axis etc with an pre built virtual hand and will compare the score to find out the hand

1) 

(getting roi)



2) **(tracing the princle line and simplifying them as straight lines)**

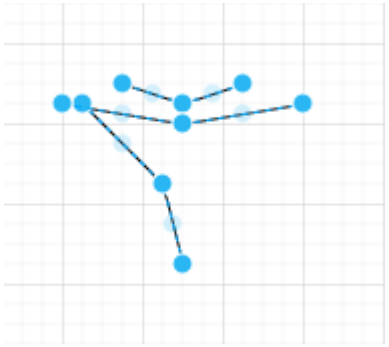
3) 

(function creating to caluculate euclidean distance)

Texture based / pattern based:

the pattern-based/texture based way of palm feature extraction treats the palm print as a pattern image. Subsequently, applied arithmetic procedures like Law's convolution veils, Gabar channel, and Fourier revamp might be acclimated figure the vibe energy of the palm print. Among the methodologies tried, 2-D Gabor channel has been appeared to gracefully taking an interest result. Ordinal scale has additionally appeared as another powerful methodology to extract the pattern feature It distinguishes extended and line-like picture locales that are symmetrical in direction. The separated element is thought as ordinal element. A few analysts had moreover investigated the work of surface descriptors like local paired example to display the palm print surface. additionally to the current, there have been different techniques that studied the palm print texture within the frequency domain by mistreatment Fourier rework and distinct cosine rework

ROI:



(getting the intersecting points of principle lines graph of ROI)

Matching:

Depending on the categories of options extracted, a spread of matching techniques were wont to compare 2 palm print pictures. Apart of everything putting aside , these strategies might be partitioned into 2 classifications. : geometry-based matching,(math based coordinating,) and feature-based matching (highlight based coordinating). The geometry-based matching techniques sought-after to check the geometrical primitives like points features on the palm. once the purpose options were set mistreatment methods like fascinating purpose detector , distance metric like Hausdorff distance may be wont to calculate the equally between 2 feature sets.

At the point when the palm print design was described by line-based element, geometrician separation might be applied to encode the closeness, or rather distinction, between 2 line portions spoke to inside the Z2 casing of reference. Line-put together coordinating with respect to the full is seen as more enlightening than point-based coordinating because of the palm print example might be higher portrayed abuse the well off line alternatives when contrasted with separated information point. In addition, analysts guessed that clear line alternatives simply like the chief lines have adequately solid discriminative capacity. For investigation that examined the topological space procedures like PCA, LDA, and ICA, the majority of the creators embraced geometrician separations to encode the coordinating scores. For the contrary examinations, a spread of separation lattices like city-block separation and chi sq. separations were conveyed. Feature-based matching encompasses a nice advantage over geometry-based matching once low-resolution pictures square measure used. this can be thanks to the explanation that pure mathematics primarily based matching typically needs higher resolution pictures to amass precise location and orientation of the geometrical options

Aside from the 2 primary matching approaches, a lot of difficult machine learning techniques like neural networks, Support Vector Machine , and Hidden mathematician models were conjointly tested. In more often than not, assortment of the coordinating methodologies will be consolidated to yield higher precision. investigation indicated that the blending will be acted in a really hierarchic way for the lift in execution and speed. once the palm print options were reworked into binary bit-string for illustration, overacting distance was utilised to count the bit distinction between 2 feature sets. There was associate degree exception to the present case wherever the angle was used for the competitive committal to writing theme.

Literature survey :

Authors &Year	Methodology or Techniques used	Advantages	Issues	Metrics used
Geraldine Kwang,Roland H . C. Yap Terence Sim Rajiv Ramnath 2009	Hidden Markov Model	Detail explanation about the facial and fingerprint techniques , basic survey on real time usage	No issues on working level of system ,Complex, costly	subjective evaluation (through the general usage)objective performance metrics

Shanmukhappa Angadi, Sanjeevakumar Hatture-2017	Preprocessing, binarising, normalising using SVM	An innovative peg-free hand-geometry-based user identification system using spectral properties of a minimal edge connected hand image graph is presented.	Rate of identification need to be improved	CIR, FRR, FAR
Pu Tu, Chen Huang	Hand gesture recognition system: Using Kinect device.	No data input device is required, recognizes voice, hand and face and is helpful in rehabilitation.	Has not researched full potential, easily hacked, so occurs privacy issues, not enough research available.	The Kinect measured timing of movement repetitions very accurately(low bias, 95%)
Yu Sang , Laixi Shi , And Yimin Liu (Published Year:2018)	Micro Hand Gesture Recognition System Using Ultrasonic Active Sensing , Markov Model , Neural network.	The benefits of Markov model analysis are simplicity and out-of-sample forecasting accuracy. They make better predictions than more complicated models,	Markov analysis is not very useful for explaining events, and it cannot be the true model of the underlying	1)achieves a recognition accuracy of nearly 90% by using symbolized range-Doppler features 2)Markov & neural network model obtain a

		ell known in econometrics.	situation in most cases.	recognition accuracy of 96.32%
Peter B. Shull , Shuo Jiang , Yuhui Zhu, and Xiangyang Zhu (Published Year: 2019)	Barometric Pressure Sensing:Hand Gesture Recognition and Finger Angle Estimation via Wrist-Worn	BPS reduces the interference from the signal.	Reduces voltage slightly and interfere with the direct current flow causing abruptions.	When using LDA(Linear Discriminant Analysis) wrist gesture recall was 98%, and precision was 98%, finger gesture recall was 94%, and precision was 94%, and counting gesture recall was 88% and precision was 88%.
Feiyu Chen, Honghao Lv, Zhibo Pang , Junhui Zhang , Yonghong Hou , Ying Gu, Huayong Yang, and Geng Yang (Published Year: 2019). [2]	Assistive Robot Interaction and BSN (Body Sensor Networks) along with dynamic time warping.	BSN's has the advantage of prolonging the network lifetime of a recognition system.	The inherent nature of BSN's introduces practical issues with their deployment and since there are many sensor nodes connected, this could serve as an	Feature Extraction, DTW Algorithm,Image Processing Time = 36.3ms/image. Accuracy:97.6%

			access point to the network for a malicious at tacker	
Yifan Zhang , Congqi Cao , Jian Cheng, and Hanqing Lu(Published Year: 2018)	EgoGesture using Egocentric methodology.: A New Dataset and Benchmark for Egocentric Hand Gesture Recognition.	Since we all have an egocentric slant to some degree we can all benefit from softening our egocentric edge.	False Consensus Effect , Curse of Knowledge, Illusion of Transparency, Spotlight Effect.	This dataset gesture samples = 24 000 and 3000 frames for both color and depth modalities from 50 distinct subjects.Designed 83 different static and dynamic gestures focused on interaction with wearable devices and collect them from six diverse indoor and outdoor scenes, with variation in background and illumination. Accuracy: 92%

Inference:

Considering the above literature survey the common issues of the existing systems and the proposed solutions of them are

1. **Cost:**

   as we are building up a system which uses the ccd camera as the primary sensor in it, and the simplified hardware which is only required for taking input not to calculate anything else we can cut most of the price there which makes our system the most cheaper (cost efficient)

2. **Complexity**

   As for the considered system does not contain any high level complex algorithms, we are only using simple things like machine learning technique for the detection of region of interest, Euclidean distance, point to edge detections etc the system is no complex(simple) and could be understandable for anyone

3. **Accuracy**

   As we are using three level verification in palm detection (image comparison, Euclidean score calculation, and pattern based approach) there no question about the accuracy in system

4. **Efficiency**

   As we are going to use the single contact less, less hardware involvement system there no worries regarding issues like rear and tear , usability time , and when it comes to life time and real time usage the quality and efficiency of the camera plays the major role in system

5. **Hygiene and latent prints**

   As we are going build the contactless system, there will be no issues about the hygiene and latent prints on the sensors

Conclusion:

In this article primarily we clearly explained about the contact less palm print recognising biometric system which can serve the authentications, we explained about each biometric module(sensor ,feature extracting ,matching) in detail including the algorithms involved in each of them. secondary we came across a set of literature survey of the existing system and articles and simplified the issues of them at a common level and explained how the proposed system could satisfy them. this sort of approach practically could bring the efficient biometric system.

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http://www4.comp.polyu.edu.hk/~csajaykr/myhome/papers/TIP_11.pdf
http://cdn.iiit.ac.in/cdn/cvit.iiit.ac.in/images/Thesis/MS/chhayaMS2010/Chhaya_Thesis2010.pdf
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.721.707&rep=rep1&type=pdf

https://www.coep.org.in/resources/coeppalmprintdatabase

http://lbms03.cityu.edu.hk/studproj/cs/2011csjmm629.pdf