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**Research Article**

# BIOMETRIC TECHNOLOGY

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**A R T I C L E I N F O**

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**A B S T R A C T**

Biometric Technology has swiftly emerged as an efficient solution for improving digital security. Biometric systems enable unique behavioral or physiological attributes of people to be used for identification and authentication.Biometric methods have been developed to recognize animals as well.Various examples of biometric authentication using facial, fingerprint recognition have been cited in the paper.The potential for error is consistently being reduced by advances in technology that allow it to utilize even more biometric data to make a positive match.



## INTRODUCTION

### *Biometric Technology*

*Biometric* Verification is a means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures

### *Biometric for Specially Abled Human Beings*

The disabled population while enrolling for their biometric checks, will not be able to record some or any of the biometrics. Example: Individuals who have missing limbs or certain visual impairments. Some individuals like those with cerebral palsy and motor neuron disease may have a little control of their muscle movement. They will find it very difficult to hold their head or fingers still long enough for a facial, iris or fingerprint recognition device. The recordings may be 'Fuzzy'.

But, the physical disability would not be any disqualification for the people in getting their Unique Identification. Many new advanced mechanisms have evolved to enroll the persons who don't have eyes and fingers to offer their biometric samples and one of them is discussed below.

### *Cephalometry*

A cephalometric radiograph outlines of the facial bones and teeth of a person is shown below.

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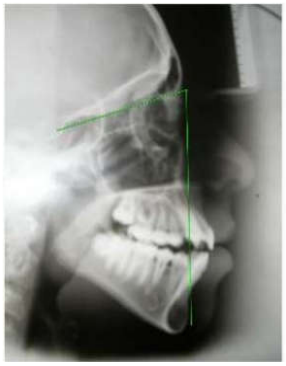
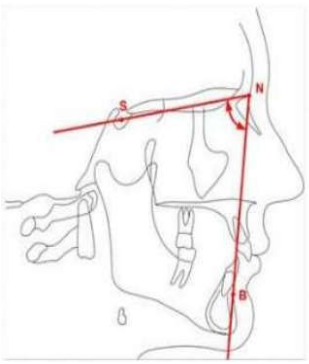
The tracing identifies specific skeletal and dental landmarks. One is able to make linear and angular measurements of the teeth and jaw. This information is critical to develop an accurate diagnosis and treatment plan. It helps in recognition of the person.






### *Biometric in Daily Life of a Normal Person*

1. Many high security facilities have used biometric technology for years when it comes to ensuring only authorised personal gain access to the most well protected establishments. Example: Office access, College attendance and many more.
2. Fingerprint recognition in the case of the mobile is becoming more and more widespread
3. In blood banks the crucial data is being stored digitally with donors using finger print or iris recognition to access their vital details

***Problems with Biometric – Finger Print Recognition***

***Dry-Finger Problem***

This problem occurs mostly during winters. The fingerprint system may register and verify the fingerprint but after few days it starts failing. This is due to regular changes in the finger skin due to dry finger problem

***Solution:*** Certain finger Vein and advanced fingerprint scanners have ability to avoid dry finger issues.

Dry finger Image  Normal Finger Image

***Finger Print -Recognition Problem***

The fingerprint system may register some users but when they try to verify their finger, it fails or false matches with other's finger. At the time of registration the fingerprint scanner may have registered the low quality image but later it does not match with the finger images captured at the time of verification.

***Solution:*** Fingerprint matching based on Error Propagation

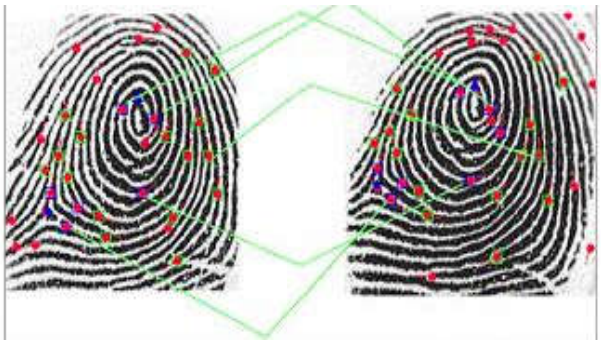
We find through visual inspection of the mismatched fingerprints that fingerprints of the same type tend to be confused with each other. The solution to this problem is given in following algorithm.

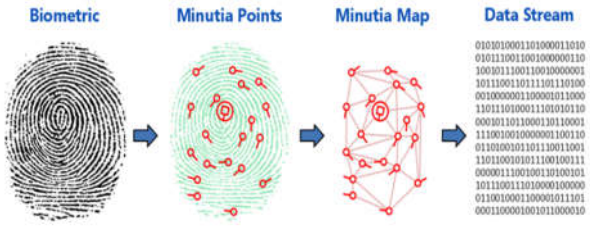
Each ridge is represented by its direction and sampling values. And each minutia is repented by its type, position, direction as well as the ridges it resides (one ridge for an end and three ridges for a bifurcation). Our matching algorithm is a threestep method:

First, each minutiae in the reference template is matched with each minutiae in the input template and all resulting potential correspondences are used to find several most reliable one, the initial correspondences, using Hough transformation;

Secondly, all minutiae surrounding the correspondence are matched and those minutiae pairs whose matching error are less than certain thresholds are added to the MatchedSet; Finally, we adjust the matching error of each unmatched minutia According to the information provided by the MatchedSet recursively until the number of elements in MatchedSet stops increasing. A conformation process which checks the consistency of the matching errors of elements in the MatchedSet is made to label and remove the mismatched minutiae after each iteration.

The algorithm makes use of matching pairs of ends and bifurcations, thus provides more reliable alignment of two templates. Further, the similarity of the common region is used as the similarity measure of two fingerprint templates and the concept of error propagation is applied to track nonlinear deformation adaptively.






***Biometric for Animals***

**Fish**

Identification based on minutiae based skin markings.

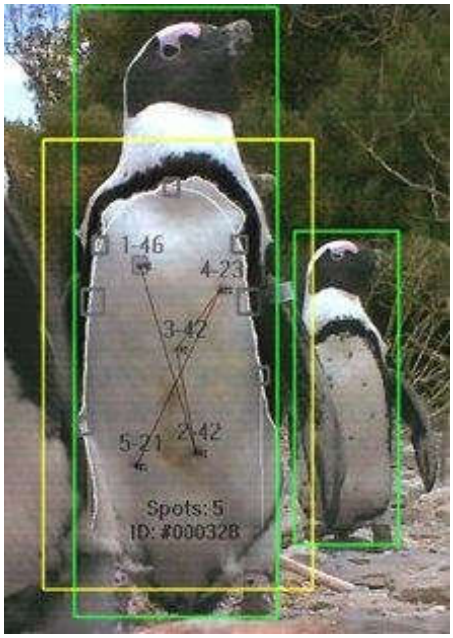
Both head and body of this Acanthurusdussumieri show minutiae-type structures.

***Zebra/TigerStripes***

Identification based on binarization and Skeletonization

***Penguin Recognition Project***

Software picks upthe finger like patterns of black and white feathers of penguins and uses patterns to identify




***Datasets Preparation and Proposed Algorithm for DogFace Recognition***

The most general problem in all the dog datasources has no name labels of dog. Another challenge is recognizing twins pet animal (dog). Once twins grow up, they may develop differentiating looks but newly born twins are extremely similar

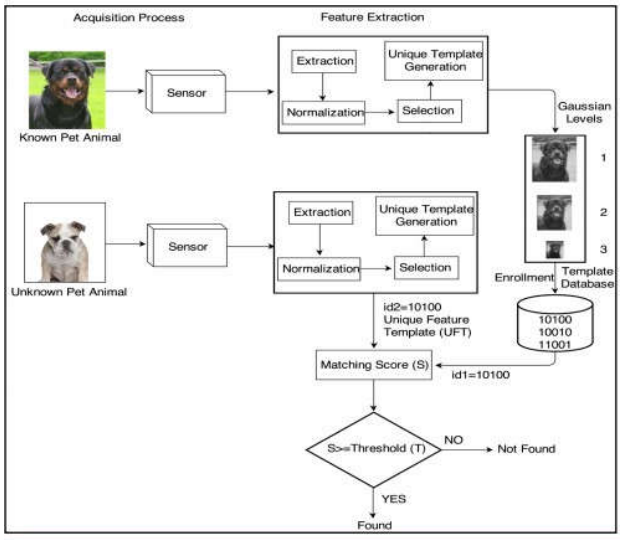
The feature extraction algorithm such as PCA (Principal Component Analysis) [18], LDA (Local Discriminant Analysis) and ICA (Independent Component analysis) are motivated by the observation that dogs have been distinguished (not apparently) facial profiles. Further, it is difficult to restrict pose and huge texture variations of dog, implying that holistic face recognition algorithms may not yield good results. On the other hand, local feature based algorithm may provide good results. These algorithms would work based on covariates independent of conditions during image acquisition process, thus providing equal weight age to each subject up for analysis.

The schematic descriptions of proposed pet animal (dog) face recognition biometrics system can be view edas having modules:1) Sensor module;2) Feature extraction module;3) Matching module (training and testing phase). Insensor module, pet animal (dog) face image is captured by a suitable sensor device of camera (high resolution) as raw biometric data.

In feature extraction module: The quality of the pet animal (dog) biometric data acquiesced by the sensor or camera is first assessed in order to determine its suitability for further processing. After quality of biometric data enhancement, biometric data is then processed and a set of salient discriminatory features extracted by holistic appearance approach (PCA, LDA, ICA and its variants algorithm. Problem of their body dynamics study canbe solved by proposed face recognition methodology. In matching module, face database is divided into two parts:

1) Intraining phase, systemis trained and extracted features from 40% of petanimal (dog) face database

2) In testing phase, it is matched or test against 60% of database of stored templates to generate match scores and identifying the pet animal (dog). The steps involved in pet animal identification block diagram with Gaussian smoothing techniques are Proposed pet animal (dog) face recognition biometrics system are shown in Figure.

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