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APPLICATION OF CORRELATION TECHNIQUES OF IMAGE PROCESSING DATABASE FOR SNAKES IDENTIFICATION

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Abstract: **Snakes are very useful animal in ecology, farming and also in medicine, but now a days this animal comes under Wild Life Protection Act 1972 because of their decreasing population. The present study is an attempt to identifiy the Snakes through database by using Correlation Techniques of image processing. Object detection and recognition based on image processing is vastly concentrating field in research. The motivation for this study is to build data based system for detecting and recognizing snakes through scales for the animal biodiversity researchers. The animal detection and recognition is an important area which has not been discussed. Technology used in this research can be modified further to use in applications such as security and monitoring purposes etc.**

Keywords: **Snake, MAT LAB, Identification.**

1. INTRODUCTION

Snakes are elongated, legless, carnivorous reptiles of the suborder serpentes. Like all squomate are ectothermic, amniotevertebrates covered in overlapping scales. Snakes are the members of the class reptilia commonly they are known as reptiles. All over the world, near about 3783 types of snake species are found out of which 297 species of snakes are found only in the India. The snakes found in India show great diversity and their length varies from 6 mm to 10 m, while weight ranges between few grams to several kilograms. These remarkable reptiles can live in every biogeographic region of the world, at an altitude higher than 5000 m and also survive in deep waters (Bansode *et al*., 2016). Snakes occupied deserts, forests, marshy, swampy places, lakes, streams and rivers of different terrains (Dhamankar, 2006).

Snakes are friends of mankind by their ecology and biology but they may be harmful if not handled properly and not understood them properly. Not all snakes are poisonous, few are semi poisonous while majority are non poisonous. Species of Cobra, Krait and Viper are common poisonous snakes found in Maharashtra with their species diversity. Rat snakes (Dhaman), Water snake (Pandivad), Grass snake, Boa's (Mandul, Durkya Ghonas) are non-poisonous snakes and few snakes have semi poisonous ability. Some species of snake may show little or major varied colour pattern with change in habitat however the body colouration. Shape and size of scales on head, abdomen and dorsal body surface; shape of tail (Tambre and Chavan, 2016).

These remarkable reptiles can live in every biogeographic region of the world, at an altitude higher than 5000 m and also survive in deep waters. Shelter for snakes is almost anything close to the ground that they can enter or get beneath to avoid predators and extreme temperatures. Boards on the ground, log and leaf piles, cracks and crevices in foundations,

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rock walls, ground-hugging shrubbery, dense patches of vegetation and narrow spaces beneath decks and outbuildings are all popular forms of cover (Mukadam and Kadam, 2016).

Snakes are also a challenging group for biological sampling due to their deadly poisonous bite and aggressive attacking behaviour. In India, however, all snake species are protected under the Indian Wildlife Protection Act, 1972, and cannot be touched or handled for this type of sampling. Being a highly Vulnerable group for Extinction due to rapid urbanization, population pressure, habitat alteration, poaching to some extent and illegal international trading, our knowledge of snake diversity needs to be updated in this regard. Biological realities specific to snakes make it imperative to have some reliable method to study their diversity and make correct species identification without killing, physical handling, or otherwise disturbing their resting burrows (Khedkar *et al*., 2014)

Similar technique of image processing has been used by Udaya and Lasantha in 2016 for classification of animal.

The present study demonstrated and applied Image Processing Techniques of correlation database for the identification of snakes by non-invasive method from snake skin exuviates.

Skin Shedding or Skin Exuviates

The molting of the skin occurs regularly in snakes. This is when old skin is outgrown. In the case of snakes, it is called *shedding* or *ecdysis.* Snakes will rub against rough surfaces to shed their skin.

Molting (shedding, ecdysis) in reptiles results from cyclical changes in the underlying skin structure. Snakes periodically molt their outermost layer of epidermis, permitting the replacement of skin that has been abraded or damaged, the disposal of parasites, and growth (Greene,1997). The process of ecdysis is therefore viewed to signify a renewing of vital forces or as a sign of immortality (Crump,2015).

Scales

All reptiles have scales, but not all scales are the same. Snakes can either have smooth scales or keeled scales. The kind of scales a snake has gives us an important clue in its identification. Smooth scales give the snake a shiny, sleek appearance. Keeled scales have a raised ridge along their mid-line, giving the snake a rough-textured appearance.

Fig 1. Cobra *(Naja naja)* Skin Shedding.

Fig 2. Cobra Body Scales

Fig 3. Indian Rat Snake*(Ptyas mucosa)* Skin Shedding.

Fig 4. Body Scale

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2. MATERIAL AND METHODS

In the present study only snake skin exuviate or skin removal of snake which is a waste product of snake were used.

The skin exuviate or skin removal is collected from different regions of Aurangabad. Samples are then labelled and length is measured. Samples were scanned in scanner and Scanned Samples were proccessed in MAT LAB software using image processing technique for recognition of snake.

3. RESULT

In the present study, skin of *Naja naja* and *Ptyas mucosa* was studied and observed data is presented in the form of images (Fig)

Correlation-Based Techniques

Let $\mathbf{I}(\Delta x, \Delta y, \theta)$ represent a rotation of the input image **I** by an angle θ around the origin (usually the image center) and shifted by Δx, Δy pixels in directions *x* and *y*, respectively; then the similarity between the two fingerprint images **T** and **I** can be measured as

$$S(T, I) = \max_{\Delta x, \Delta y} CC(T, I(\Delta x, \Delta y, \theta)) \quad (1)$$

where $CC(\mathbf{T},\mathbf{I}) = \mathbf{T}^{T}\mathbf{I}$ is the cross-correlation between **T** and **I**. The cross-correlation is well known measure of image similarity and the maximization in (1) allows to find the optimal registration.

Histogram Equalization:

Histogram equalization is to expand the pixel value distribution of an image so as to increase the perceptional information. The original histogram of a snake image has the bimodal type , the histogram after the histogram equalization occupies all the range from 0 to 255 and the visualization effect is enhanced .

Average Filter

The Average (mean) filter smooths image data, thus eliminating noise. This filter performs spatial filtering on each individual pixel in an image using the grey level values in a square or rectangular window surrounding each pixel.

Thinning

The final image enhancement step typically performed prior to feature extraction is thinning. Thinning is a morphological operation that successively erodes away the foreground pixels until they are one pixel wide. A standard thinning algorithm is employed, which performs the thinning operation using two subiterations. This algorithm is accessible in MATLAB via the `thin' operation under the bwmorph function. Each subiteration begins by examining the neighbourhood of each pixel in the binary image and based on a particular set of pixel-deletion criteria, it checks whether the pixel can be deleted or not. These subiterations continue until no more pixels can be deleted.

Matching

The matching process involves computation of the similarity measure for each disparity value, followed by an aggregation and optimization step of the given snake scales. Since these steps consume a lot of processing power, there are significant speed-performance advantages to be had in optimizing the matching algorithm.

The images of the snake scales is matched by taking either left image as the reference (left-to-right matching, also known as direct matching) or right image as the reference (right-to-left matching, also known as reverse matching).

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MATLAB Interface

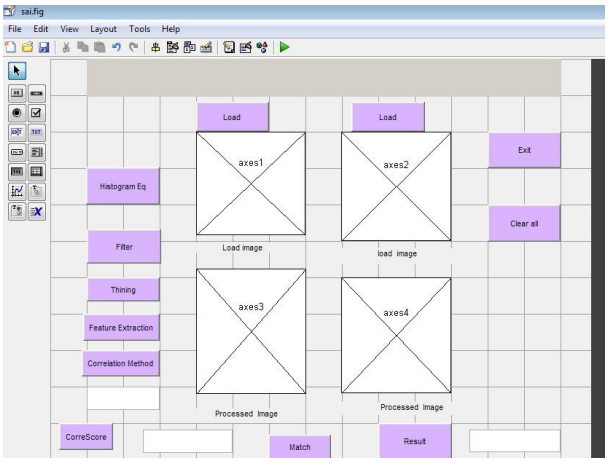

Fig 5. *GUI Designing*

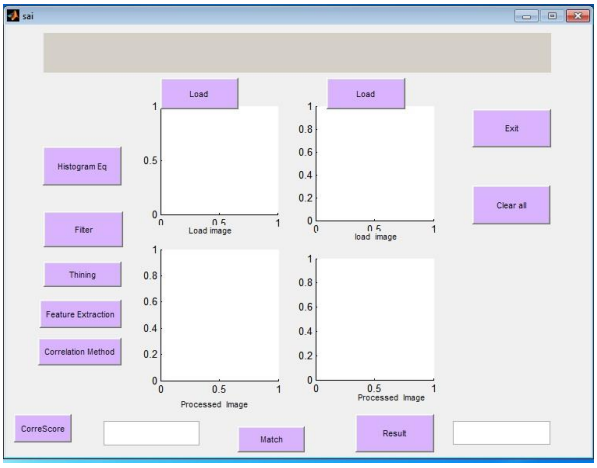

Fig 6. *Data (Image) Loading*

Cobra

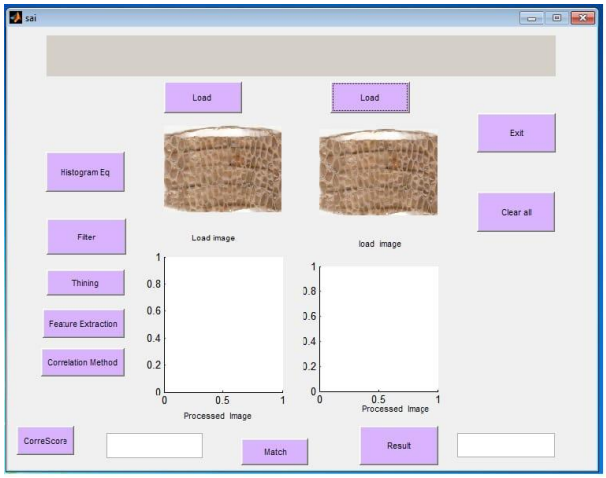

Fig 7. *Upload Image*

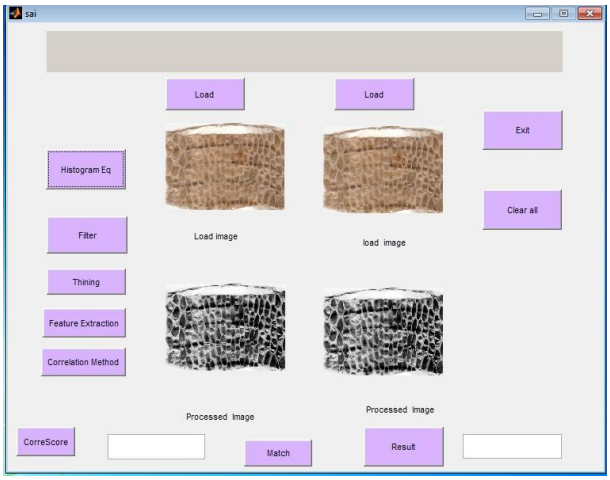

Fig 8. *Histogram Equilization*

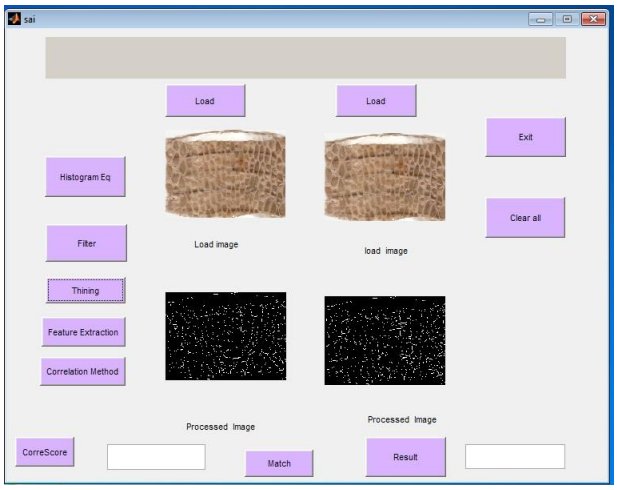

Fig 9. *Thining Process*

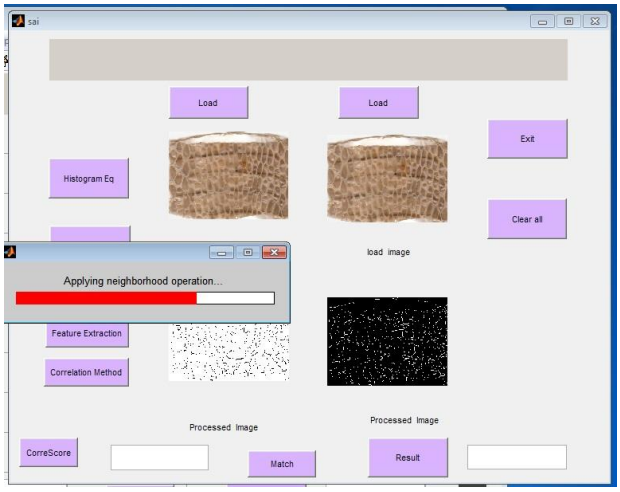

Fig 10. *Applying Neighborhood Operation*

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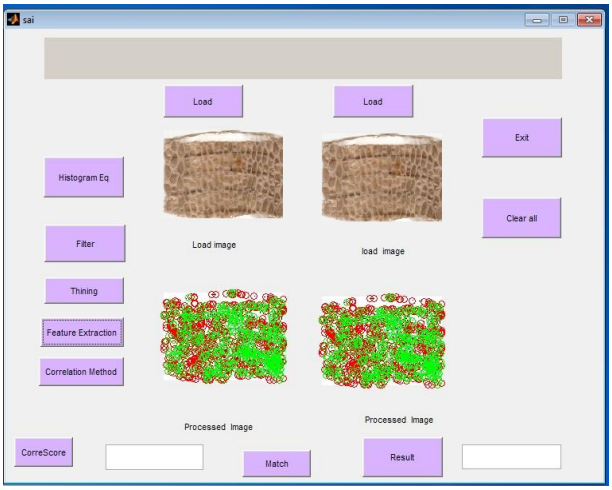

Fig 11. ***Feature Extraction***

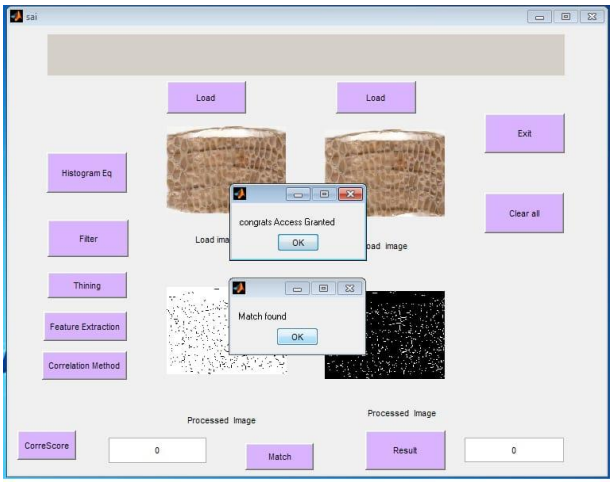

Fig 12. ***Final Result***

Indian Rat Snake

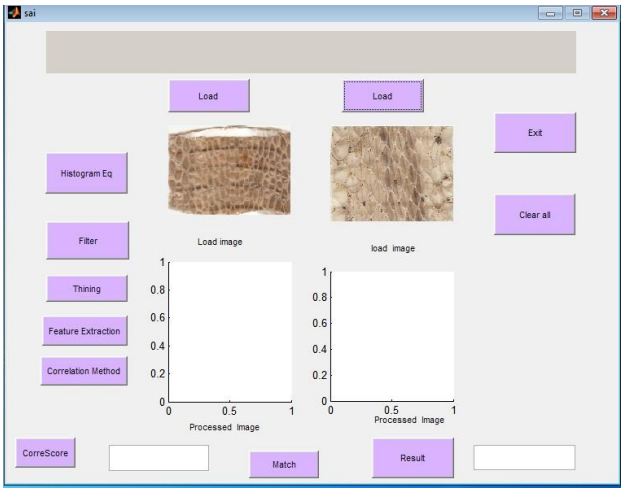

Fig 13. ***Upload Image***

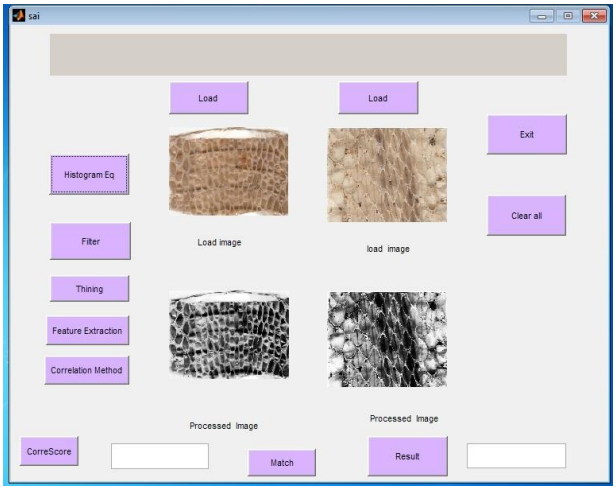

Fig 14. ***Histogram Equilization***

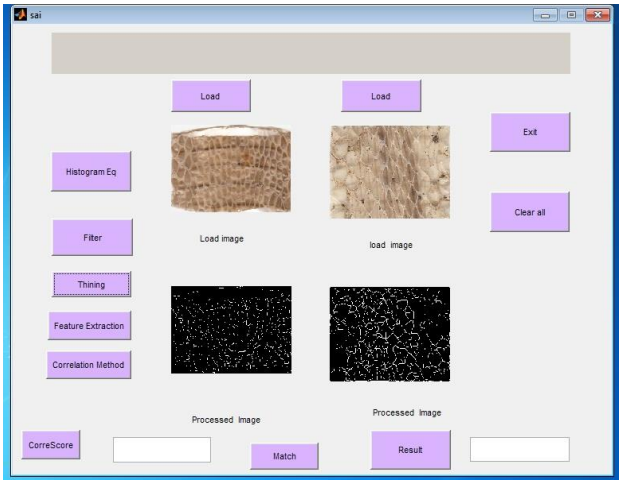

Fig 15. ***Thining Process***

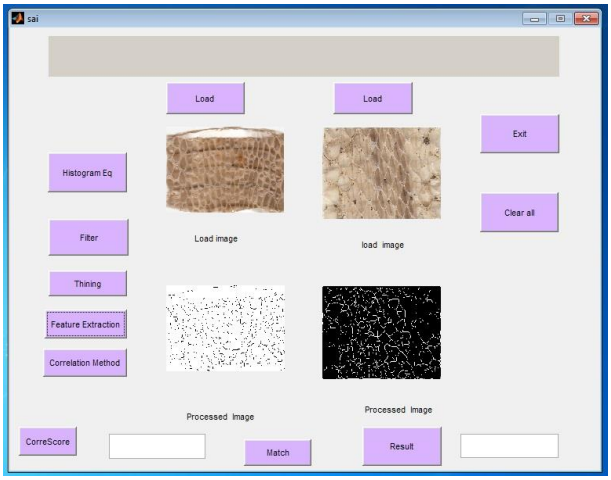

Fig 16. ***Applying Neighborhood Operation***

4. DISCUSSION

The ability to make correct species identifications is a critical component of any biodiversity estimation as well as for enforcement of conservation protocols. Morphological plasticity and regional scale variations can confound the use of traditional taxonomical procedures for identification of species and requires enormous numbers of specimens. The enormous numbers of specimens needed to use this methodology has also led to the opinion that such animal collections can be responsible for lowering the biodiversity of some vulnerable group of species (Akbarsha, 2007; Rosse, 1995; Sathyanarayana, 2009, 2013). Globally, there is also great pressure to minimize the handling and use of animals in experimentation. In addition, compliance with ethical procedures in animal experimentation is becoming more and more time consuming.

5. CONCLUSION

The use of Correlation Technique as an alternative identification and study method signifies a shift from the nearly exclusive dependence on morphological characters to identification of species. This study demonstrates the usefulness of correlation technique of snake species identification in a non-invasive way because we have successfully used snake exuviates for obtaining high quality image for creating a database needed for the identification of snake species. Exuviate samples work well with squamates in concert with easy to collect. One of the main goals of our study was to use exuviate samples to establish a database for snake species from Maharashtra state in future of the Correlation Technique (Image Analysis Technique) for identifying species and assigning them to major units (corresponding to genera and families).

The difficulty of procuring enough specimens due to restrictions on handling and collecting of live specimens has no doubt contributed to this paucity of material. This further emphasizes the value of the approach we used which requires only the exuviate material which would otherwise be discarded.

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