Feature Extraction of Olive Ridley Sea Turtle Using Feed Forward neural Network

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Abstract- The paper deals with the computer based auto detection of particular species of sea turtles. In this process, three parameters have been taken and trained in artificial neural network for detecting the particular species among the popular seven species of the world. The existing algorithm for auto photo identification of detecting the particular species is much complicated due to classification process in the algorithm. To improve this algorithm, new technique has been used in feature extraction of the image and there are 10 images where trained and then finally particular species Olive Ridely is retrieved. These images are trained through artificial neural network and result of the images is plotted in the graphs.

Keyword- Feature Extraction , Feed forward neural network.

I. INTRODUCTION

The primary goal of this paper is to provide an analysis to conserve the sea turtles which are an endangered species all over the world. Many organizations like Conservation Network (SSTCN), Conservation International, and Sea Turtle Organization were some of the organization which works for the protection of this endangered species. There are so many techniques used by the researchers to identify the particular species .The species which is been identified in this paper is olive ridley which are found in and around the Chennai coastal region. Typically these turtle is recognized by color, shape, weight and through its prefrontal claws. This identification is done to estimate number of species in the particular area.

Previously this is done by usual method namely tagging and satellite tracking. These two methods have its own pros and cons. As seen in the computer assisted photo identification of Dermochelys Coriacea [1] for identification of single species of sea turtles. We can also have user friendly keys to identify the specific turtles in which if the key matches for a photos then the identification can be done [2] Methods of Developing User-Friendly Keys to Identify Green Sea Turtles (Chelonia mydas L.) from Photographs for the identification of the particular species by using the user friendly keys. The main difficulties faced in this identification are the time taken for training the images in the database.

To overcome from earlier problem a new technique is implemented namely Computer based Auto deduction of sea turtles. This assessment is done for a single species namely Olive Ridley which are found abundantly in the Chennai coastal region. This technique is implemented for the untagged turtles that are the turtle approaching the sea shore for laying eggs for the particular period of time. In this deduction a new algorithm is been developed where four parameter are taken in to consideration namely color, shape, height and width of the turtle. Initially 10 photographs are taken lively from the sea shore that has been used for the testing and training the dataset in artificial neural network. This trained images are uniquely identify the particular turtles by extracting the parameter.

II. METHODOLOGY

The technique used in this paper is the feature extraction from the sets of images, where these input image is been processed in to ANN fast feed forward method so that the olive ridley image will be trained and the other than the olive ridley images will not be accepted inside the ANN training networks.

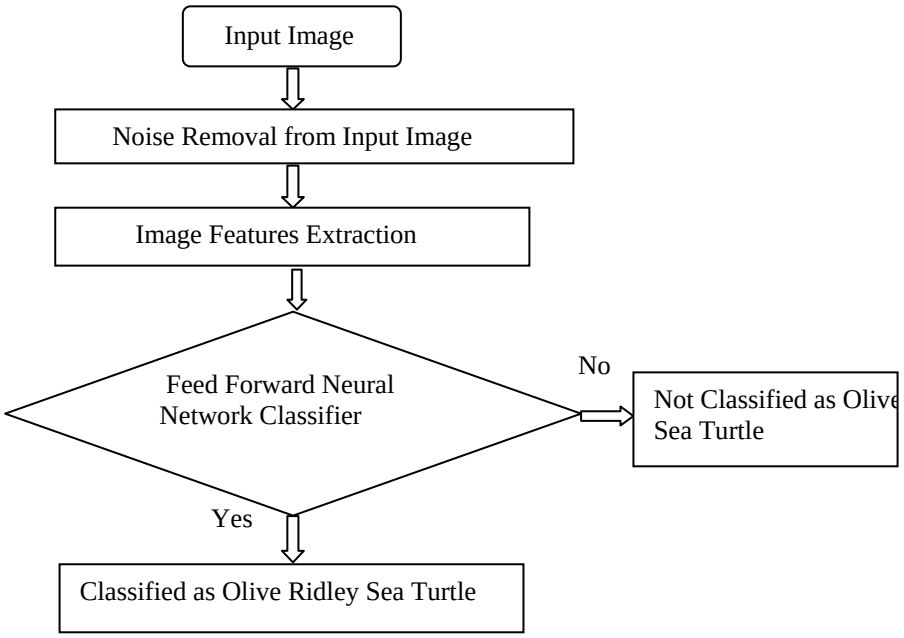

Figure 1: Image Extraction Process

In the figure 1 the input image which taken from the dataset will be a noisy image that is the original image which has unwanted signals. The pixel value in the image can be changed using noise removal algorithms so that image enhancement can be done for preprocessing the image.

A. Image Features Extraction

The feature extraction is used for extracting the color, shape, length, breath of the images. This is done to recognize the olive ridley sea turtle. This method will be trained in ANN feed forward method with these features of olive ridley.

B. Feed Forward Neural network:

The feed forward networks are the single layer of weights where the input images that is directly connected with the output layers with the intervening sets of hidden units. These networks use the hidden units to create input patterns. The table 1 and table two which are described above where the input threshold values is given as an input in network where eight images are trained to make the performance analysis between the networks.

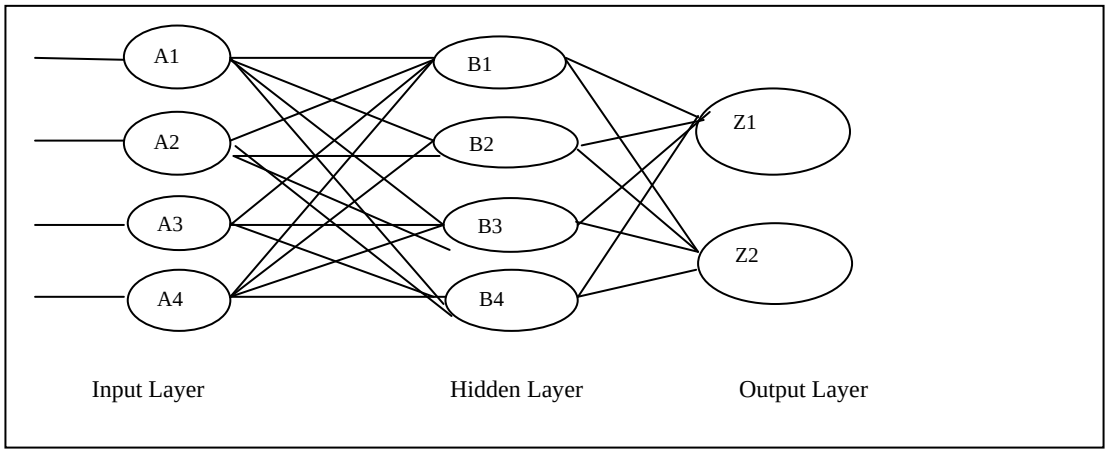

Figure 2: Structure Feed Forward of Neural Network

The figure 2 which explains the basic structure that input layer namely A1 ,A2 ,A3 ,A4 which are given as input in the neural training that has the four parameter shape , color , Length and Breadth .B1,B2,B3 and B4 are the hidden layer of the networks and Z1 and Z2 are the output layer of the network to identify the olive ridley image.

Step 1: Initialize the weight for input
Step 2: when the condition is false, do steps 3 and 10.
Step 3: For each training pair do step 4 and 9
Step 4: Each input values the feed forward receives the input signal x_i and transmits this signal to all unit in the layers above (i.e) hidden layers.
Step 5: Each hidden unit ($z_i, j = 1.....p$) sums its weighted input signals $z_{-inj} = v_{oj} + \sum_{i=1}^{n} x_i v_{ij}$.
Then by applying activation function for the below equation then the signal is send to all units in the layer above .
the output units $z_j = f(z_{inj})$
Step 6: Each output unit (y_k , k=1... m) sums it's weighted with the input signals $y_{-ink} = w_{ok} + \sum_{j-1}^{p} z_j w_{jk}$
and these below mentioned function is activated to calculate the output signals that are described in the equation $y_k = f(y_{-ink})$.
Step 7: Each output unit of the network $(y_k, k = 1,...., m)$ receives a target pattern corresponding to the input pattern. The error information term is calculated as $\delta_k = (t_k - y_k) f(y_{-ink})$.
Step 8: Each hidden unit $z_j, j = (1,....., n)$ will sums its inputs from units in the layer.
Step 9: Each output unit updates its bias and weights. The weight correction term is given by $\Delta w_{jk} = \alpha \delta_k z_j$
and the bias correction term will be given as $\Delta w_{ok} = \alpha \delta_k$.
Step 10: Stop the test condition. This stopping condition may be minimization of errors.

Figure 3: Algorithm of feed forward neural network

The figure 3 which explains the basic structure of feed forward algorithm , were x is represented as input training error and it will be varied from (x1,.., x_i,..., x_n),t will be the target output layer. δ_k Will be the error at output unit (y_k), also δ_j error at hidden unit (z_j).The learning rate for the layers will be as α for which the bias on hidden unit j represented as v_{oj} . The hidden unit j will be as z_j .Finally the bias on the output unit k will be symbolize as w_{ok} also the output unit k will be as y_k .

TABLE I

Images	Color	Length	Breath	Shape
1	1	0	0	1
2	1	1	1	1
3	1	0	1	1
4	1	1	0	1
5	1	0	0	1
6	1	1	0	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	0	1	1

The table 1 is a truth table combination for the neural networks. The threshold value will be saved as a variable in matlab software tool and the images threshold range will be assigned and the result for the training will be displayed as a output in the graphs. That is when the o's value given which means that given image does

not reach the threshold range and the 1's values in the truth table which means that the image reaches the threshold range.

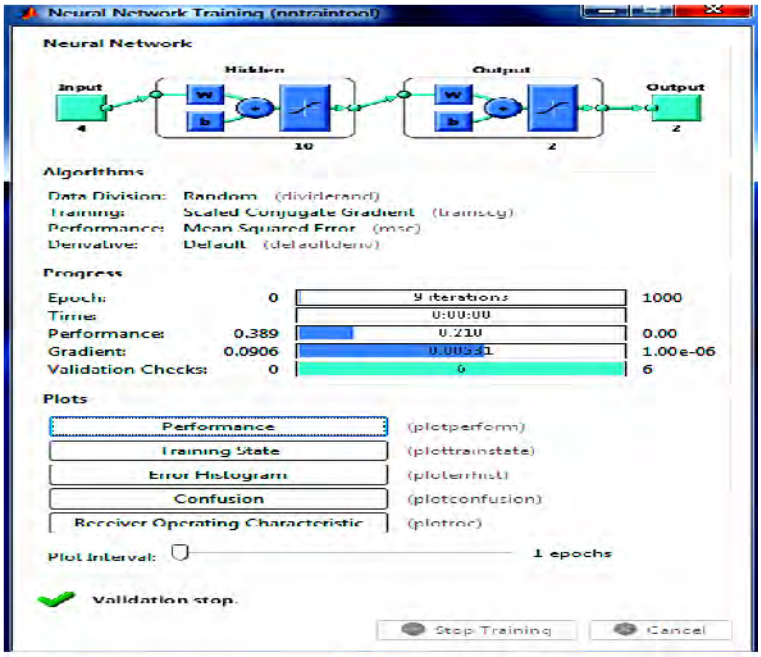

Figure 4: Neural Network Training and Testing

The figure 4 which illustrate the Neural Network training and testing of 10 images in which 4 parameters is given as input that is length , breadth ,color and shape is been trained and tested . The hidden layer is kept as 10 by default with 2 outputs.

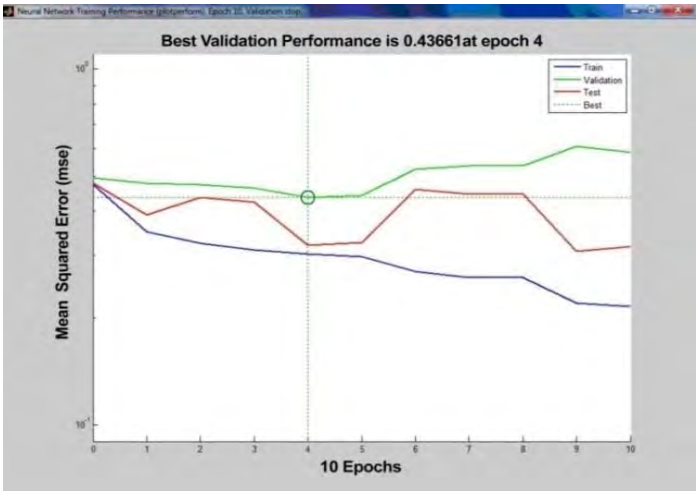

Figure 5: Mean Square Error vs. Epochs

In the figure 5, there are 3 different lines plotted where the validation performance of the training are plotted in the blue color which means the very low state of MSE (mean Square Error) and the test data is near to the trained data of MSE. This graph clearly illustrates that when the epochs keep on increasing then the training and the testing error rate keeps on decreasing.

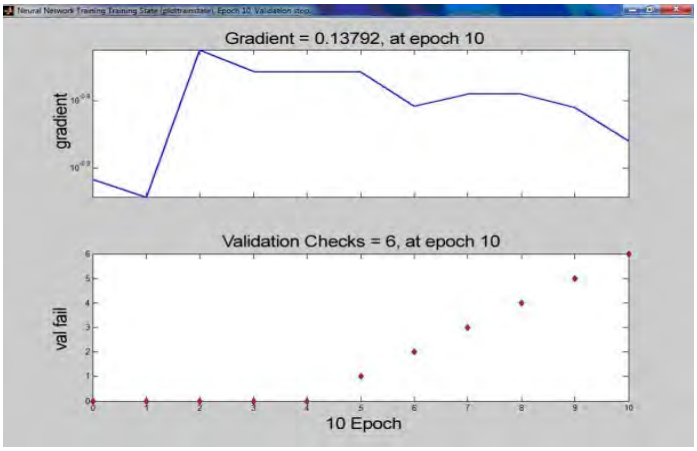

Figure 6: Train State Graph

The Figure6 shows the training state graph which expresses the change between the test and training data. These changes lie in between the 10^{-1} (.1) which is very low error state. In the second graph which shows the validation state where the validation increases from 3 epochs and finally reaches the maximum validation state of 9 epochs.

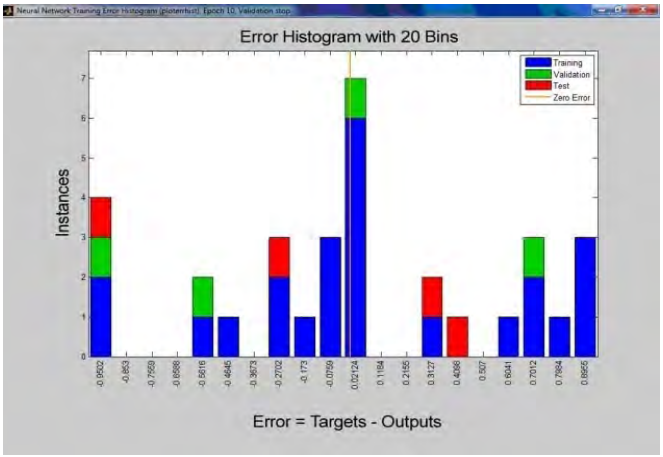

Figure 7: Error Histogram Graph of Neural Network

In the figure 7, the error histograms show the most of negative error for training and little positive error for test data. These errors are less positive for test data which shows that the test data is near to zero error. The blue bar which represents the training of data where it reaches the maximum instance which are above the zero error boundary.

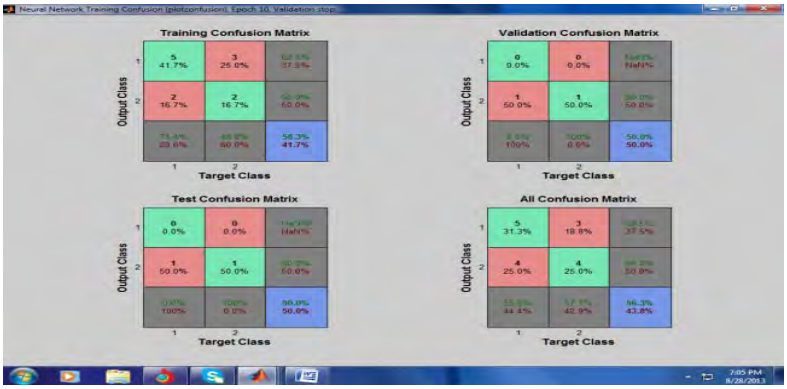

Figure 8: Neural Network Error Confusion Matrix

The Figure 8 demonstrates the confusion matrix table which explains the sensitivity of training, testing and validation of the data. The upper left box shows the class 1 where 5 (41. 7 %) of data classified as true positive and remaining 3 (25.0 %) classified as false positive also 2 (16.7 %) of data are considered to be true negative. This table clearly reveals that the training, testing and validation of data reach the maximum target classes.

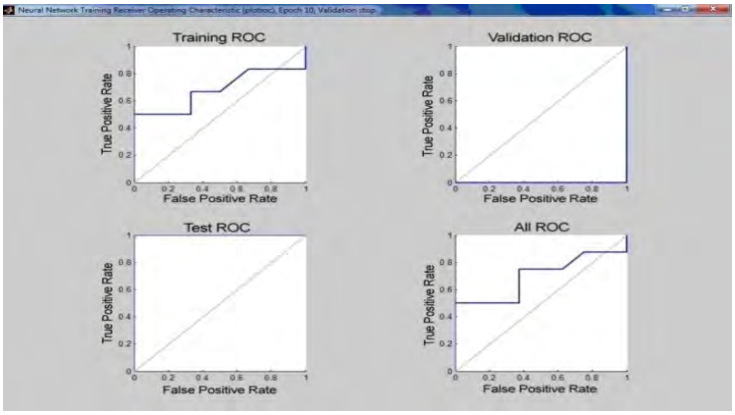

Figure 9: Receiver Operating Characteristic map of Neural Network

The figure 9 which plot the blue colored lines which represent the ROC (Receiver Operating Characteristic) curves for each type of this dataset of olive ridley . The ROC curve which plots the true positive rate (sensitivity) versus false positive rate (1- specificity) as threshold values varies. In our ANN trainer true positive is more than the false positive which reveals that our training and testing is considered to be good, in which it is able to train all the given sample sets which have been trained without any variations inside the map.

TABLE III

PARAMETER	VALUE
No of Input Layer	4
Transfer/ Activation Function	Linear
No of Hidden Layers	10
No of Output Layers	2
Maximum Epochs	1000
Learning Performance Rate	0.210
Training Time	0.001

The table 2 which shows the performance rate of fast feed forward neural network for identifying olive ridley neural network where the training time and mean square error is reduced. Through this method effective training and testing is done.

II. CONCLUSION

In this paper we have developed an a new algorithm for deducting the olive ridley sea turtles for which 10 images have been tested and trained in Artificial Neural Networking using feed forward methodology where connections between the neurons will not form a directed cycle which had been shown in the figure 2 . The four parameters of olive ridley is given as input in neural network where the testing, training and validation are plotted as graph in the nntraintool .The graph clearly reveals that all image have been trained and testing is done without any variations. When the threshold value reaches the table value then the image is considered to be olive ridley , the remaining images will not accepted by the feed forward neural network training .

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AUTHOR PROFILE

Capt. Dr.S.Santhosh Baboo, aged forty Six, has around **Twenty three years** of postgraduate teaching experience in Computer Science, which includes Six years of administrative experience. He is a member, board of studies, in several autonomous colleges, and designs the curriculum of undergraduate and postgraduate programmes. He is a consultant for starting new courses, setting up computer labs, and recruiting lecturers for many colleges. Equipped with a Masters degree in Computer Science and a Doctorate in Computer Science, he is a visiting faculty to IT companies. He has Published more than 100 papers in Journal and Conference. He has produced twelve Ph.D. Scholars in the field of Computer Science and visited foreign countries like Malaysia, China and Nepal.

Capt.Dr. Santhosh Baboo has authored a commendable number of research papers in international/national Conference/journals and also guiding research scholars in Computer Science. He is having One UGC Major Research Project (2012-2015). He is working as Associate Professor in the Postgraduate and Research department of Computer Science at Dwaraka Doss Goverdhan Doss Vaishnav College (Reaccredited at 'A' grade by NAAC), one of the premier institutions in Chennai.

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