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Feature Extraction For Western Ghats Birds

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Abstract

The research paper focuses on developing an automated model for extracting different kinds of features from bird's images and prepares a bench marking dataset which will help to evaluate the performance of the classification algorithms in an effective manner. This proposed work has been implemented using Visual Studio .net framework in which C#.Net is the front end tool and SQL Server is the back end tool. The user has to upload image in the format of jpeg or png. This tool automatically analyzes and extracts prominent features of such as wing type, wing pattern, shape, edge tail, legs from the Western Ghats bird image using Convolution Neural Network (CNN). The extracted features of an image will be stored in the database and to retrieve those features of an image, CNN uses small square bounding box of image pixels. This tool helps the user to extract the entire prominent feature which plays a vital role in classification process.

Keywords: feature extraction, feature recognition, CNN, wing pattern analysis, machine learning.

1. Introduction

Identifying and extraction of bird's features is one of the challenging roles for users due to the similarity of the birds' forms/image background and lack of experience. So there arises a need for computer system based images to help the user to extract the prominent features of bird. This proposed work aims at investigating the use of CNN a type of deep neural network for extracting relevant features from different type of captured bird's image. In recent days, new innovative techniques are developed using deep learning techniques to recognize the species of Western Ghats birds using prominent features. Convolution neural network is considered to be an effective tool to recognize visual features from High resolution images as it requires a least level of preprocessing. This research concentrates on developing a deep learning model by making use of train and test colored images of Western Ghats Birds in order to extract the bird's features such as wing type, wing pattern, shape, edge tail, legs.

When the extracted features are supplied as an input to the classifier the process becomes much easier when compared to the manual way of identification. CNN have important components

which makes the process of feature extraction much easier. Feature extraction process helps in extracting the features from bird images. In this phase, features are detected when network performs a series of convolution and pooling operation. The main task is to extract features from raw Western Ghats birds input images, when extracting bird's most important relevant and descriptive information for object recognition CNNapplies a number of filters to the raw pixel data of an image. The result of applying filters to an input image is captured and stored as the feature maps of a CNN. The numerical representation of objects facilitates processing and statistical analysisof various algorithms in machine learning. In the feature extraction process, the feature vectors extracted from the raw data (Image of a bird) is given to the CNN which is trained with the training dataset. The extracted features are then passed to the predictive model and stored in databases.

2. Literature Review

In paper [1] image, audio or video were used to predict bird's species. CNN is used to identify a particular image of bird belongs to which species. Audio processing method effectively identifies the species of bird by capturing the audio signal of birds. Mixed background sounds in environment while processing of video, audio information makes identification more complicated and this approach completely deal with a small number of image or voice data.

In this paper [2] the author presents,baseline approach which distinguishes one bird from another.The features of bird such as shape and posture are the commonly used to classify birds. Mostly research authors can identify or classify the bird from its shape because this characteristic is more difficult to change. Basically birds can also be differentiated using its tail. Birds' tail can be recognizable in many ways such as long and Pointe and notched, or rounded.

In this paper [3] the authors replaced fixed size images with appropriately large size images as input to convolution neural network. They used inverted residual block module in their research to reduce the network parameters and computational cost.But they have not generalized any bird's dataset this approach completely focus on biological images.

John Martinsson et al.[4] presented the convolution neural network algorithm and deep residual neural networks to detect images based on effective feature extraction and signal classification. This approach used an experimental analysis for different images. But their approaches did not consider the images of other species found in the background. To effectively identify the background species huge volumes of training data are required.

Marcelo T. Lopes., et al. [5], effectively focused on the automatic identification species of birds from audio or video recorded bird's voice. This approach completely deals with different species identification of bird's based on audio signal processing and data mining techniques with the MARSYAS feature set. Finally experiments were conducted in the database collected on different type of bird songs from 85 species out of which the system could identify only 15 species.

Juha Niemi, Juha T Tanttu et al [6], proposed effective automatic bird image identification using Convolution Neural Network (CNN) along with deep machine learning classification algorithms. They also proposed a data augmentation method in which images are converted and rotated in accordance with the desired color. Finally this approach takes a birds image as an input and gives the effective identity result of the bird as an output.

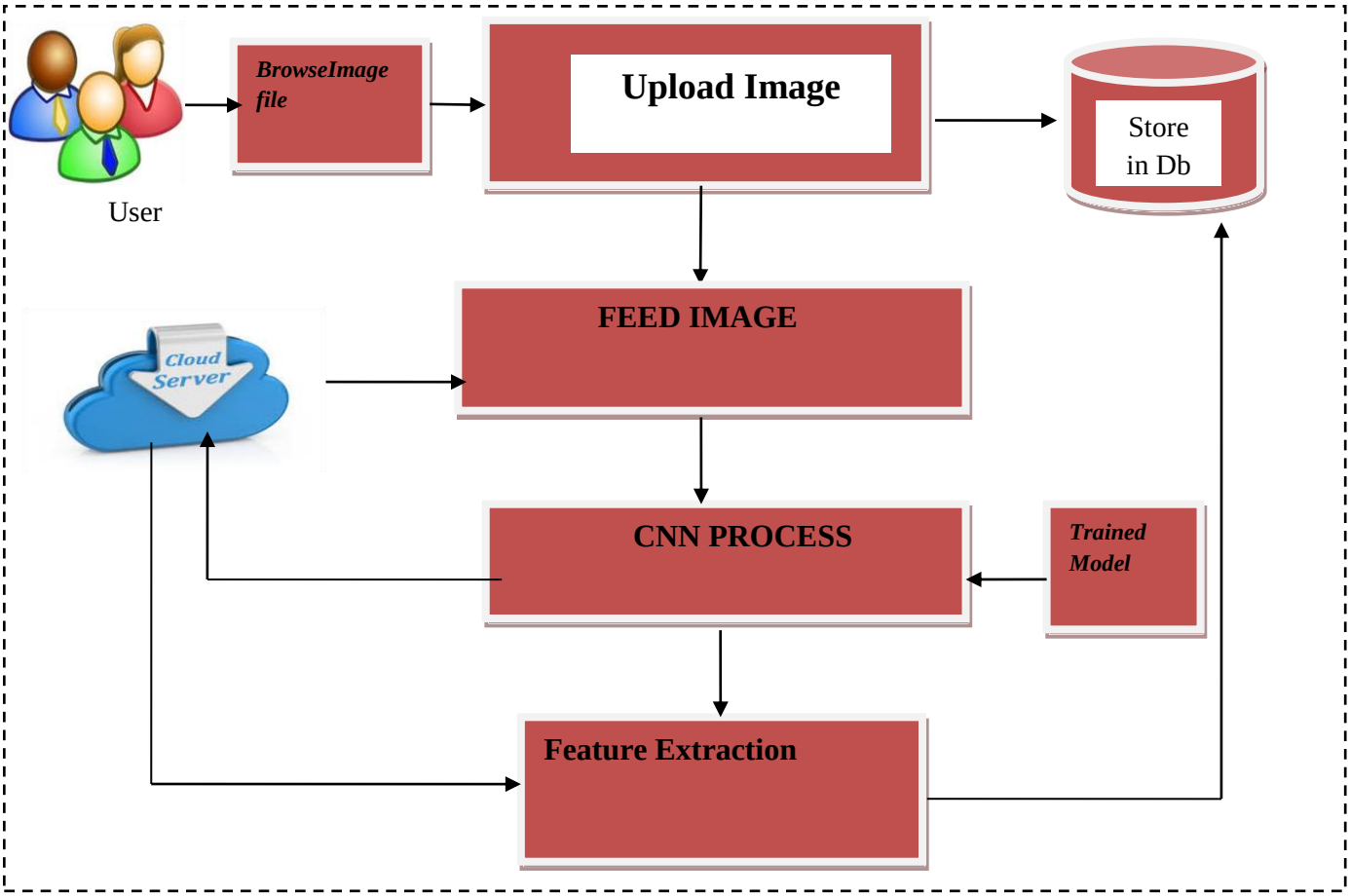
3. Problem Definition

Existing system user wants to know any type of bird features information they need to search manually. It's difficult to collect the information process and requesting process done manual by the user. The existing system is general application, doesn't have the flexibility to maintain and search effectively. Suppose if user want to know the different types of birds they have to make another search. This is very difficult task for the user .The existing system is tedious and time consuming. There are many applications which identify the bird through its voice and image. But existing application only focus with Birds identification and species identification only stillfinding quality application to get Western Ghats Birds Dataset information. This provides necessary details for betterment in knowing better details about a bird they could see. Another important drawback of the system is Multi-label classification problem-when there are many species singing at the same time.

4. Proposed System and its Contributions

The proposed research designed in the favor of the user, which helps them to identify the species of birds easily using the prominent features extracted. The different type of features extracted from bird's images using CNN enables to prepare dataset in an effective manner. User can browse any type of image and process with new feature extraction tool. This tool automatically analyze the features details of bird such as wing type, wing pattern, shape, edge tail, legs, etc stored in database and helps to identify the species in an effective manner.

4.1Architecture Diagram of Proposed system



a. User Enrollment

Using this module user can register in the registration form he has to fill with personal details such as name, address, mobile number mail id and username, first name and password etc.This will maintain in a separate table user can log on this application. After the successful login they can do further process effective manner.

b. Birds Imageuploadprocess

This module could be accessed by the user after successful authentication.In this module, user can browse the image and can upload in this application .The uploaded image is temporarily stored in database. User uploaded image file is given as an input to CNN where CNN is coupled with trained dataset and performs feature extraction.

c. Convolution Neural Network

Convolution neural network algorithmhas four layers. These layers are input layer, convolution layer, sample layer and output layer. Each layer of CNN performs the following operations

i. Convolution Layer

The convolutional layer is the more important block of aCNN.This layer comprises of individual feature detectors which convolves the features of image separately.The functionality of this layer is to effectivelyextract high-level features and low – level feature such asedges, color, gradient, orientation from the user uploaded image.

ii. Pooling Layer

The pooling layer helps in reducing the computational power required to process the data through dimensionality reduction (i.e.) size of the complete convolved feature is reduced the. This layer is used for extracting dominant features which are rotational and positional invariant, thus maintaining the process perform effectively during the training phase.

iii. Fully Connected Layer

Fully connected layer have full connections to all activations inside the preceding layer. In this, the output obtained from max pooling is converted to a onedimensional array and that should be given as an input to the input layer.The role of the Fully Connected Layer is to accept array of data and merge it completely with extractedfeatures to create a wider range of features, making the convolutional network more capable of classifying the species based on features.

5. Feature Extraction

Feature Extraction is the important process it categorize them according to their similarities, patterns and difference. Features are detected when network performs a series of convolutional and pooling operation. To extract features from user upload image trained dataset is required. Whenever a user uploads an input file, the image is temporarily stored in the database. This input file is then fed to the system and given to CNN where CNN is coupled with a trained dataset. CNN consists of various convolutional layers. Various features such as head, color, body, shape, and the entire image of the bird are considered for classification to yield maximum accuracy. To completely extract and learn features from user uploaded image, CNNs apply a number of filters to the raw pixel data of an image. The result obtained after applying filters to a user uploaded input image will be captured by the feature maps of a convolutional neural network. This feature map is the output of each layer and each alignment is given as an input to a deep convolutional network to extract features from multiple layers of the network. There after the extracted feature from Western Ghats bird's image is stored in database.

5. **Western Ghats Birds Dataset Information**

After successful feature extraction complete Western Ghats Birds Dataset is stored and maintain in sql Server database**.**Finally we have a different set ofWestern Ghats Birds images and pass the images through the CNNT which extractlist of bird's features such as wing type, wing pattern, shape, edge tail, legs, etc from birds' image and store information in database.

5.Experiment Result

This section describes the implementation result and report process. Implementation is the realization of an application or execution of plan, idea, model, design of a research. This section

explains the software datasets and process which are used to develop the research. The proposed system has been successfully implemented which can accurately predict the outcome of protein localization in cells.

5.1. Software Specifications:

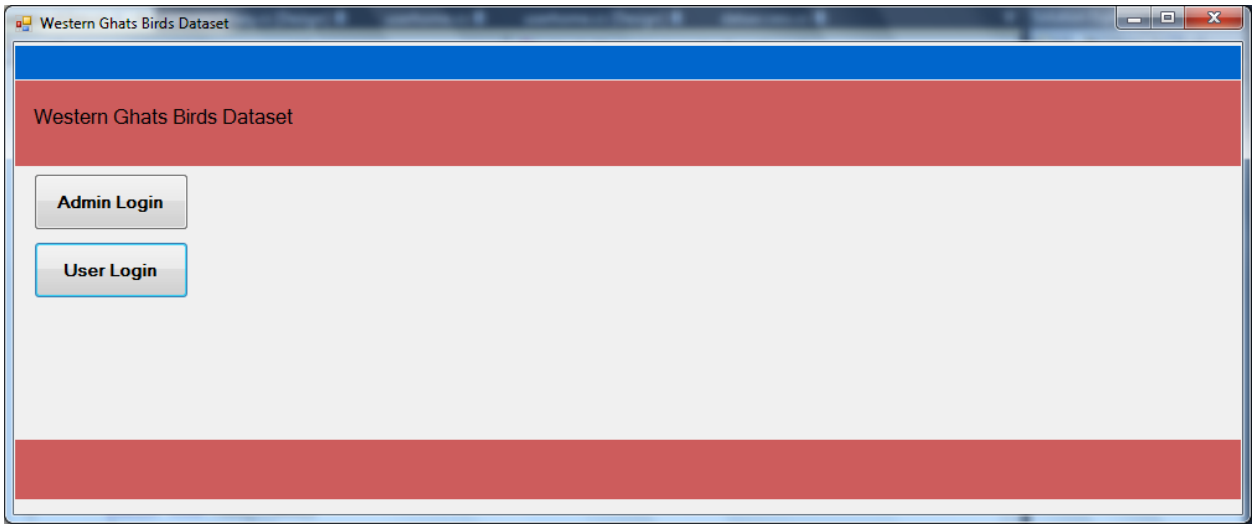
The system has used Visual Studio.Net framework and C#.Net has been used for developing front end and SQL Server for back end. The reason for using C#.Net is its flexibility. For the experimental purpose, Intel Core i3 GHz processor with 4 GB RAM is used to measure the execution time and detection speed.

Table 5.1 software specification

Operating System	Windows 10
Front End	**C# .NET**
Back End	**MS SQL Server**

5.2 Result and Discussion

This form is used for login purpose. Based on the form action page will navigate either to user / admin page.



Dataset Upload

After successful login through admin account, admin can upload complete Western Ghats train dataset.These extracted features are maintained in separate table and this data will be use for classification and prediction using CNN.

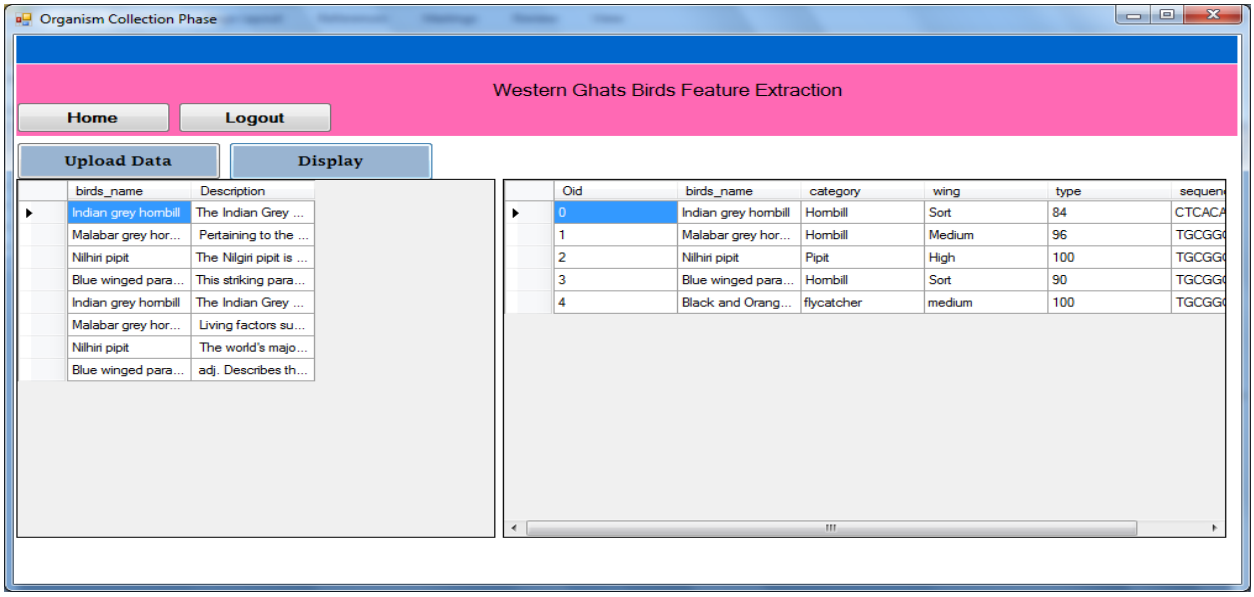
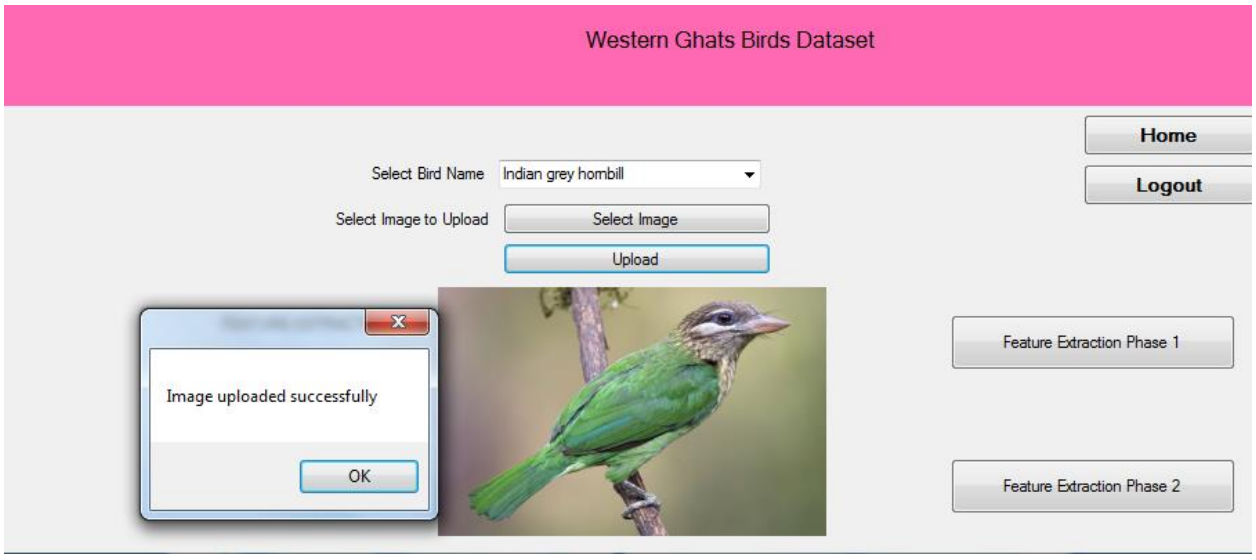


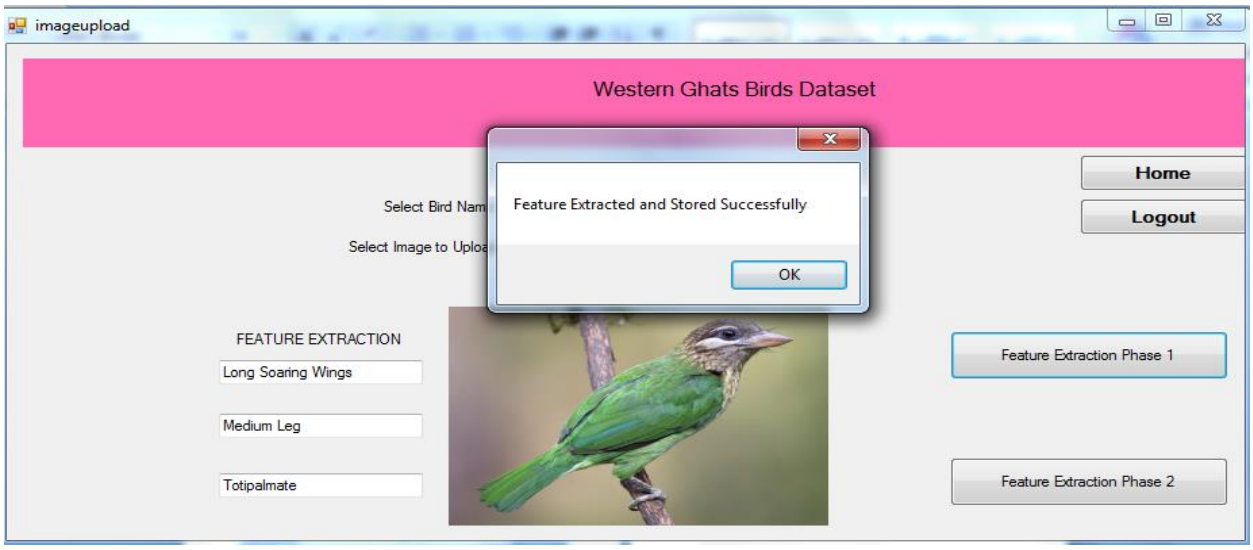
Image upload

After successful user login, user can browse for Western Ghats Birds image input file, and upload it for feature extraction and classification using CNN.



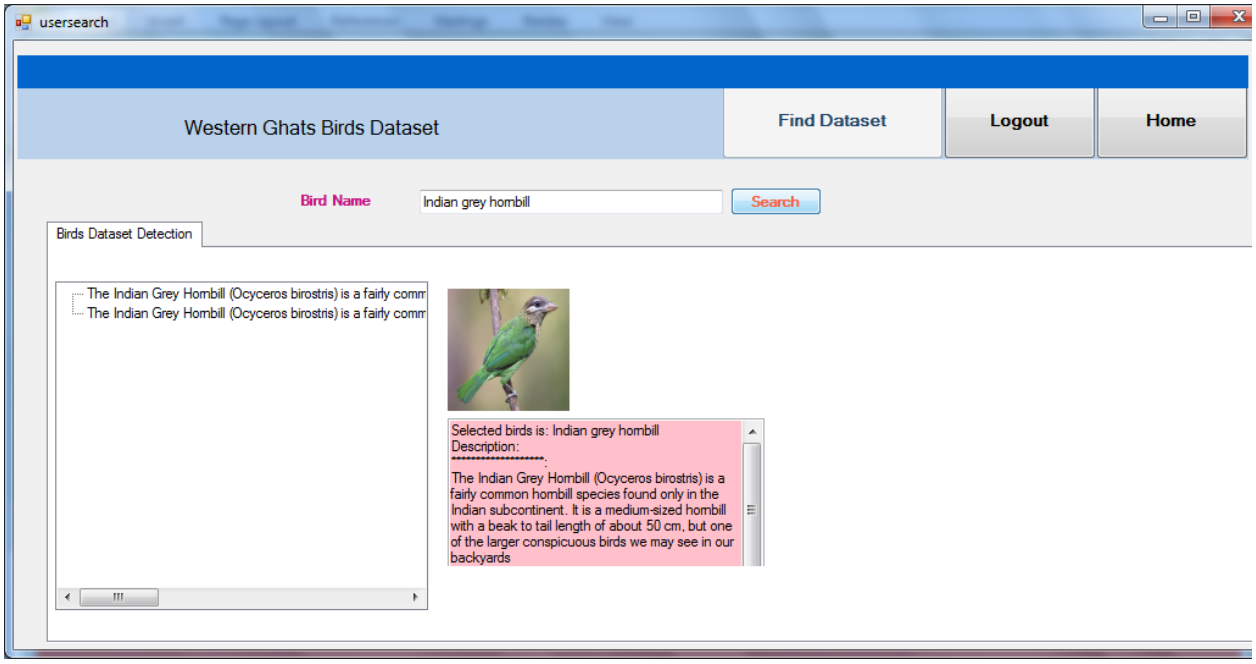
Feature Extraction process

In this form if the user clicks the feature extraction data tab, CNN effectively extract Western Ghats birds features such as wing type, wing pattern, shape, edge tail, legs, etcand stores it in database.



Dataset Information search process

This search form helps the user to search with different Western Ghats Birds name. Based on search match these applications automatically extract complete birds information effectively**.**



6. Conclusion

Every application has its own merits and demerits. This motive of the proposed workis to develop an automated model which has capability of extracting bird's features such as wing type, wing pattern, shape, edge tail, legs, etc from birds' image and store information in databases. This tool helps the user to extract the different type of features from bird's images and prepare datasets in an effective manner. The proposedtool helps the user to browse bird's image and process with new feature extraction.CNN

has been used to extract features from the input image and store in database. The application was tested very well and the errors were properly debugged. Testing was also concluded and it was found that the performance of the system is satisfactory.

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