BIRDS SPECIES IDENTIFICATION USING DEEP LEARNING

1 G. Sirisha,Assistant Professor,Department Of Information Technology,Vignan Institute of Technology and Science, Hyderabad, India, sirishag428@gmail.com
2 P. Anusha,UG Scholar,Department Of Information Technology,Vignan Institute of Technology and Science, Hyderabad, India,anushagoud1307@gmail.com
3 B. Dhanya Sree,UG Scholar,Department Of Information Technology,Vignan Institute of Technology and Science, Hyderabad, India,sree21347@gmail.com
4 S.Srinidhi Alse,UG Scholar,Department Of Information Technology,Vignan Institute of Technology and Science, Hyderabad, India.Srinidhialse50@gmail.com
5 K. Nithish Reddy,UG Scholar,Department Of Information Technology,Vignan Institute of Technology and Science, Hyderabad, India,nithishkandakatla@gmail.com

ABSTRACT:

There are more than 9000 distinct species of birds. It might be challenging to foresee the appearance of newly discovered bird species. We've created a quick and easy system for categorising various bird species according to features in order to solve this problem.
Additionally, people comprehend visual representations of birds more effectively than they can voice recognition. We used models of convolutional neural networks (CNN). A powerful family of machine learning techniques called CNNs has shown effectiveness in picture analysis. This article describes the Caltech-UCSD Birds 200 [CUB-200-2011] set as a tool for creating and assessing a CNN system for categorising bird species. In practical situations, this strategy has shown to be effective. The object's scientific name may be immediately determined They may discover comprehensive information on a specific bird using this technique.

INTRODUCTION:

Recently, there has been a significant concern with the lifestyle and demographic trends of birds. Humans can discern between a wide range of terrestrial living forms because to birds' fast reactions to ecological changes. However, gathering and acquiring knowledge about bird species takes a great deal of human labour and turns out to be a very costly strategy. A solid structure that will allow for the bulk processing of bird data and act as a useful tool for scientists, governmental organizations, etc. is required in such a circumstance. In this regard, figuring out which bird species a given photograph belongs to plays a significant part in figuring out which categories the image falls under. The process of identifying a species of bird involves examining a picture to ascertain which category the species falls into.

Images, noises, & recordings may be used to identify various bird species. By listening to different noises, birds may be identified owing to an audio processing technique. However, maintaining such data is becoming more and more challenging due to the environment's jumbled sounds, such as creepy crawlies, common items, and so on. Images typically provide greater help for information seeking than voice or music. Therefore, utilising a photograph rather than audio or video to categorise birds is preferable. It can be difficult to identify a bird's species, both for humans and automatically running computer software.

This study examines whether it is more difficult to recognise an excessive variety of kinds under same class that of birds than an excessive variety of independent categories. Bird identification is more difficult than other categories due to the close resemblance of the classifications. The fact that birds are pseudo-rigid animals with a variety of deformations allows for a great deal of variation within classes. A small number of classifications or verbal interactions were the main topics of earlier studies on bird identification.

LITERATURE SURVEY:

It was discovered that ecologists pay special attention to them in order to help manage and conserve endangered species and to pinpoint the reasons of genetic variation. The many studies that have been conducted to count the various bird species were briefly mentioned. A relatively small but growing number of researchers have investigated the use of artificial intelligence (AI) to track various bird species, it was found.

The research used to monitor and classify the species listed in prior articles are reviewed in this chapter. It especially focuses on examining the various bird species' categorization schemes while also taking into account the motion traits that this research intends to investigate. We looked at the first single-picture categorization techniques. They were examined independently in order to determine which ones were coupled with other species, most notably bats, to categorise bird species in addition to ones were utilised alone.

Survey of different classification methods:

- John Martinsson et al (2017), presented the CNN algorithm and deep residual neural networks to detect an image in two ways i.e., based on feature extraction and signal classification. They did an experimental analysis for datasets consisting of different images. But their work didn't consider the background species. In Order to identify the background species larger volumes of training data are required, which may not be available.
- Based on the study of visual attributes, Li Jian, Zhang Lei, and colleagues (2014) suggested an efficient automatic bird species identification method. Using the similarity comparison method and the library of common photos
- A software programmer created by Madhuri A. Tayal, Atharva Magrulkar, et al. (2018) makes it easier to identify birds. This software for identifying birds uses a picture as a source of input and outputs the bird's name. Switch knowledge and MATLAB, which are the technologies utilised in the identifying procedure.
- In 2013, Mario Lasseck et al. published research on deep convolutional deep neural networks and data augmentation techniques for sound-based bird species identification. The audio recordings of many bird species from the Xeno Canto collection were used in this study.

Existing System:

There are several websites that identify the various bird species using a variety of methods. However, the outcomes are untrue. Let's assume, for the sake of illustration, that when we enter information into these websites and Android applications, we get more than just the name of the bird. Each bird species with comparable traits is listed. Consequently, our goal was to create a research that would produce better and more accurate results. Convolutional neural networks were employed to classify the many bird species in order to achieve this.

Proposed System:

The convolution neural network (CNN) technique uses a perceptron with multiple layers with a particular design for classifying two-dimensional visual input. Its four levels include the experimental level, a convolution layer, an input layer, and an output layer. In a deep neural network architecture, the testing layers and the layer of convolution may both have a minimum of one. Contrary to the Boltzmann machine, which necessitates that each neuron sense the layer of neurons in the surrounding layer for all connections, convolution neural network approaches only demand that each neuron sense the local region of the visual instead of the full image. Additionally, the weight sharing and convolution kernels utilised to perform deconvolution of each neuron's output are changed to be the same.

The local receptive field, weight sharing, and employing subsamples is the crucial era of CNN. a reduction in training size by extracting features over time or space parameters. The benefit of the CNN algorithm is that it learns intuitively from training data rather than explicitly extracting features. The same neuron weighs on the outside of by using the feature mapping, the network may learn in parallel and become less complicated. adopting a sub-sampling structure based on deformation displacement, size, and temporal resilience. Network topology and input data may go well together. It offers special benefits for picture processing. These actions are a part of the Convolution Neural Network.

SYSTEM ARCHITECTURE:

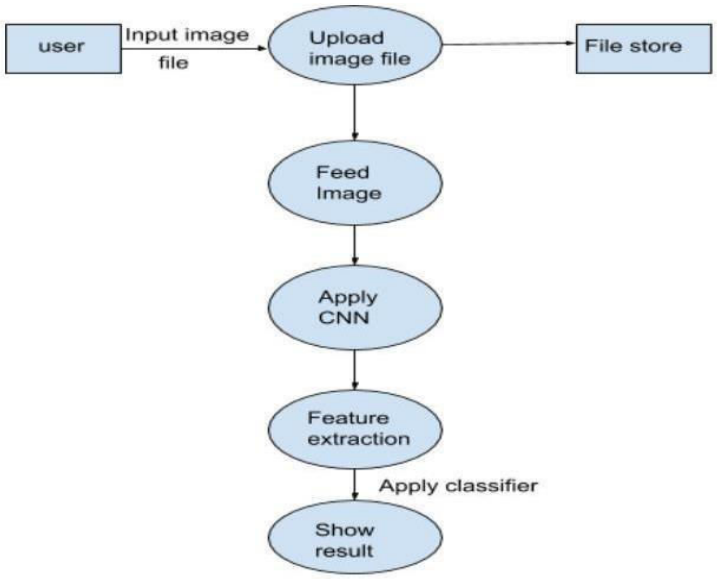


Fig: Block diagram

ALGORITHMS:

Convolution neural network algorithm(CNN):

A convolutional neural network, often known as an, is a Deep Learning technique that can take in an input image, make assumptions about various features and objects in the image, and be able to differentiate between them. In comparison to other classification methods, a Conv Net requires significantly less setup. Contrary to fundamental approaches, where filters must be hand-engineered, Conv Nets are able to acquire these filters and attributes.
CNN has three layers

- Convolution layer
- Pooling layer
- Fully connected layer

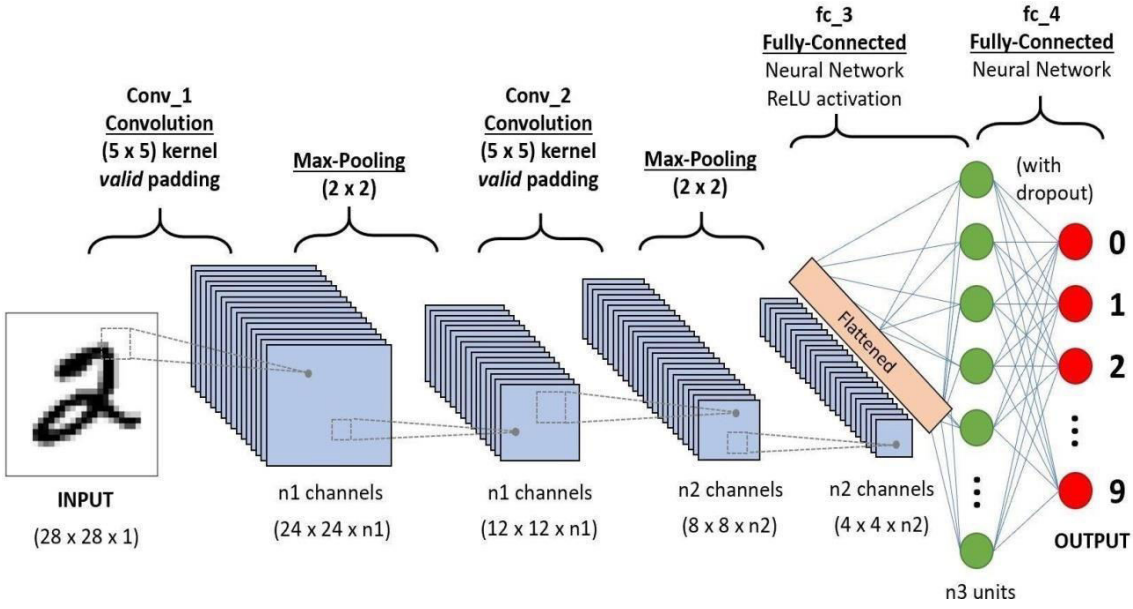


Fig: CNN Architecture

Convolution layer:

The foundational element of a CNN is the convolutional layer. A group that includes autonomous feature detectors make up the convolution layer. Images are separately convolved with each Feature map.

Pooling layer:

The purpose of the pooling layer's feature is to gradually shrink the illustration's spatial dimension in order to lessen the network's extensive range of parameters and calculation. On each function map, the pooling layer functions separately. The methods utilised in pooling are as follows:

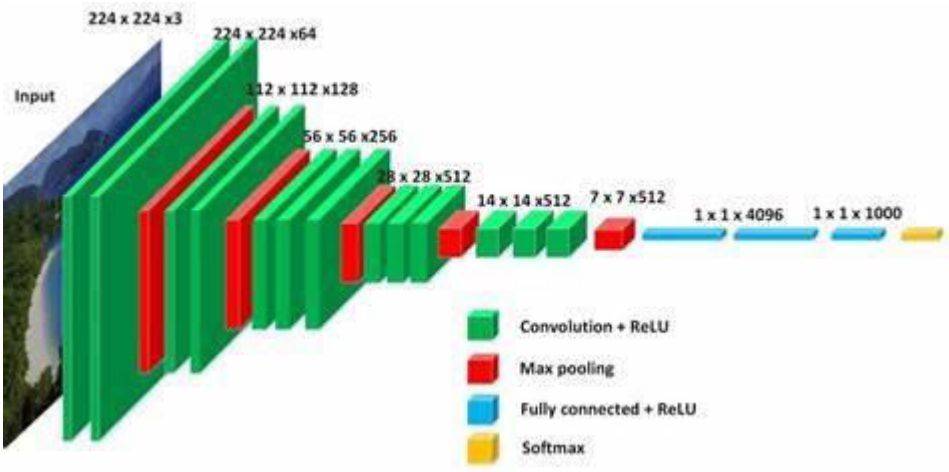
- Max Pooling
- Mean Pooling
- Sum Pooling

Fully connected layer:

All activations happening in the layer below are entirely interconnected to all neurons in the completely linked layer. This process is comparable with an artificial neural network (ANN) model in that it converts the output of max pooling into an array with a single dimension appropriate for the input layer.

VGG-16:

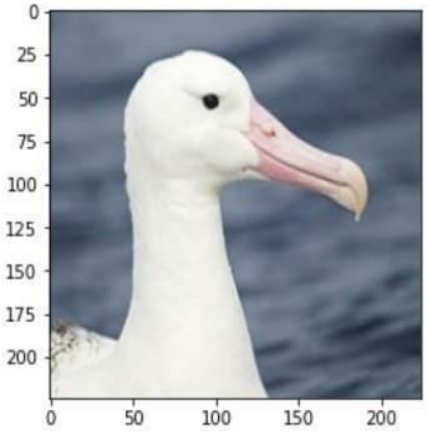
The Image Network Massive-scale Visual Recognition Challenge (ILSVRC) is a yearly contest for computer vision. Every year, groups take on two challenges. Object localization, the initialstage, is locating objects in a photo that fall within 200 classifications. The second method includes classifying every image onto one of a thousand groups. Karen Simonyan and Andrew Zisserman introduced VGG 16 in the 2014 book "VERY DEEP CONVOLUTIONAL NETWORKS FOR LARGE-SCALE IMAGE RECOGNITION" from the Visual GeometryGroup Lab at Oxford University. This model won first and second place in the aforementionedcompetition sections of the 2014 ILSVRC.



RESULTS:
OUTPUT SCREENS

```
In [24]: img = 'valid/ALBATROSS/4.jpg'
         pic = load_img(img, target_size = (224, 224, 3))
         plt.imshow(pic)
         output(img)
```

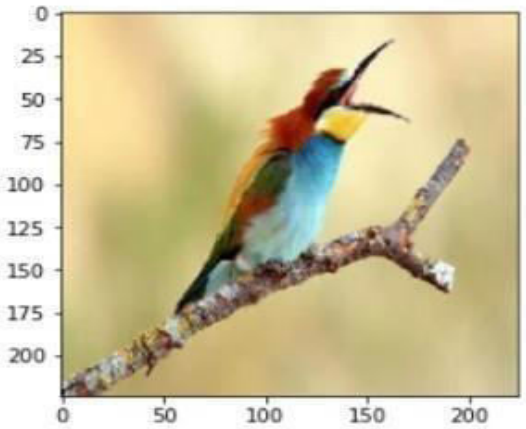
```
Out[24]: 'ALBATROSS'
```




```
In [27]: img = 'C:/Users/ANUSHA/Desktop/B2.jpg'
         pic = load_img(img, target_size = (224, 224, 3))
         plt.imshow(pic)
         output(img)
```

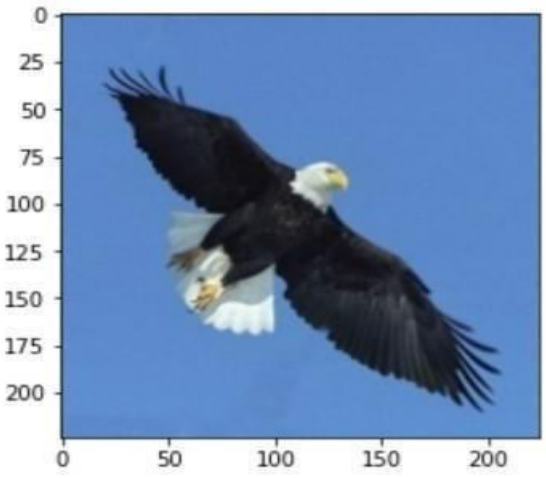
```
1/1 [==============================] - 0s 172ms/step
```

```
Out[27]: 'PARUS MAJOR'
```



In [23]:
```
img = 'valid/BALD EAGLE/2.jpg'
pic = load_img(img, target_size = (224, 224, 3))
plt.imshow(pic)
output(img)
```

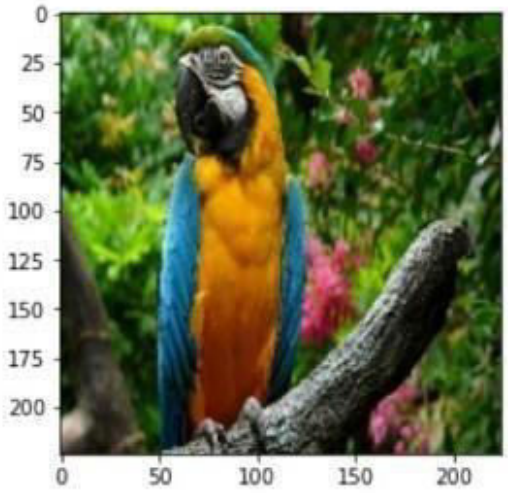
Out[23]: 'BALD EAGLE'



In [25]:
```
img = "C:/Users/ANUSHA/Desktop/R.png"
pic = load_img(img, target_size = (224, 224, 3))
plt.imshow(pic)
output(img)
```

```
1/1 [==============================] - 0s 172ms/step
```

Out[25]: 'HAWAIIAN GOOSE'



CONCLUSION:

The major goal of creating the recognition webpage is to increase public knowledge of bird-watching, identification, and particularly the identification of species occurring in India. It also meets the requirement to make bird viewing simpler by streamlining the identification procedure for birds. Convolutional Neural Networks (CNN) technology is utilised in the experimental setup. It recognises images using feature extraction. The technique employed is adequate for feature extraction and picture classification.

The project's main goal is to identify the types of birds from a photograph that the user provides as input. Because CNN offers strong numerical precise accuracy and is suited for developing complex algorithms, we employed it. It is also scientific and all-purpose. Our accuracy was between 85% and 90%. As the aim is met, we think this project's reach has greatly expanded. This idea may be used in video traps for animals studies and tracking to keep track of animal movement in a particular environment including behaviors for any species.

REFERENCES:

- Indian Birds [Online] https://play.google.com /store /apps /details ?id = com.kokanes.birds info & hl = en
- Bird Watching Apps: Five Useful Apps to Get Started With Birding [Online] https://gadgets.ndtv.com/apps/features/bird-watching-apps-five-useful-apps-to-getstarted-with-birding-1640679
- Transfer learning using Alex Net [Online] https://in.mathworks.com /help /nnet /examples / transfer-learning-using- alexnet.html
- Feature extraction using AlexNet [Online] https://in.mathworks.com /help /nnet /examples / feature-extraction-using-alexnet.html # d119e4167
- Dipta Das, Sourya & Kumar, Akash" An Exploration of Computer Vision Techniques for Bird Species Classification", December 15, 2017.
- N. Dalal and B. Triggs, "Histograms of oriented gradients for human detection," IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR), San Diego, CA, 2005.
- Tóth, B.P. and Czeba, B., 2016, September. Convolutional Neural Networks for Large-Scale Bird Song Classification in Noisy Environment. In CLEF (Working Notes) (pp. 560-568).