

Identifying Specific Breed of a Bird using Deep Learning

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Abstract:- Convolution neural networks are a particular kind of neural network that deals with the applications involving image processing and visual representation. Feature extraction and classification based on those characteristics, such as image recognition and object detection, are some of CNN's best uses. These days, there is a serious problem with bird behaviour and population patterns. Birds' quick responses to ecological changes enable humans to recognise the various living forms that exist on Earth. Convolutional neural networks (CNN) technology is utilised in the experimental setting. For image recognition, feature extraction is used. To extract features and classify photos, the method utilised is adequate. The primary objective of the study is to identify the specific bird type an species based on the image of the bird.

Keywords:- Convolution Neural Networks, Deep Learning, Bird Species, Bird Species Identification, Image Recognition

I. INTRODUCTION

Today, bird behaviour and population trends are significant issues. The environment changes are observed by the birds and they tend to quickly react to it. The bird's responses can lead to detection of many environmental changes. The knowledge gathered on birds is backed by human efforts and the manual process is very expensive. Development of a dependable system that can analyse bird data on a wide scale helps to identify the bird species quickly and act as an useful tool for researchers and governmental organizations. In order to determine the species of bird using a particular image of it belongs to, bird species identification is crucial. Bird species identification is determining which category a particular species of bird falls under using a photograph. Identification is possible. Deep learning is the number of neurons connected to the layers or a type of machine learning based on artificial neural networks in which multiple layers of processing are used to extract progressively higher level information from data.

Convolution neural networks refers to particular class of neural network that excels at tasks requiring advanced image processing and visual representation. The finest use of CNN is the classification of a particular aspect based on the characteristics, such as image recognition and object CNN is made of different kinds of convolutional layers . After these convolutional layers, there are fully connected (FC) layers, which resemble the multilayer neural network.

CNN is constructed based on the 2D input image. This task is achieved along with several pooling approaches that convert the input data into invariant features with the help of many local ties and connected weights. CNN has the flexibility in processing and development of the system..

II. REVIEW OF LITERATURE

Using a mobile application called the Internet of Birds (IoB), D.Arunal et al. (2022) has created a deep learning platform to help users identify 27 species of birds that are peculiar to Taiwan. A convolutional neural network (CNN) was trained on bird photos to identify key features. To fine-tune the sizes and hues of the object granularities, we first developed and generated a bounded zone of interest, after which we balanced the distribution of bird species. The outputs of the prior and subsequent layers were then linearly combined using the skip connection approach to enhance feature extraction. The softmax function was then used to obtain a probability distribution of bird feature probabilities. The submitted photographs were identified using the learned criteria of bird traits.

Suleyman A et al. (2021) conducted research on a database that includes 4340 photographs that the paper's author had acquired from Jordan. Layers 6 and 7 as well as statistical operations combining the two layers, such as average, minimum, maximum, and combine of both layers, were subjected to the Principal Component Analysis. Artificial neural networks, K-Nearest Neighbour, Random Forest, Naive Bayes, and Decision Tree were used to classify the datasets. While the metrics that each classifier uses are F-Measure, recall, accuracy, and precision. The investigation's findings include, but are not limited to, the following: The PCA applied on the deep features not only reduces the dimensionality, which greatly shortens training and testing time, but also enables raising the identification rate.

In order to create an image identification using tensor flow, Parhlab Gaveli (2019) employed the deep convolutional neural network (DCNN) technique on an image that had been transformed to grey scale. The testing dataset is compared to these various nodes, and a score sheet is generated as a result. The required bird species can be predicted by utilising the highest score once the score sheet has been analysed. Caltech-UCSD Birds 200 [CUB-200-2011] dataset experimental study reveals that algorithm achieves an accuracy of bird recognition between 80% and 90%. Using the Ubuntu 16.04 operating system and the

Tensor flow library, an experimental investigation was conducted.

III. OBJECTIVE

The main objective is to identify the species of the birds with the bird details by analyzing an image. Some professionals, such as ornithologists, struggled to accurately identify a bird's species from an image. Even though subject specialists can categorise birds manually, the amount of data available makes this procedure increasingly laborious and time-consuming. Therefore, developing a reliable system that identify the species of bird quickly is the main purpose of this research.

IV. SYSTEM ANALYSIS

➤ Existing System

There are a variety of websites and applications that use various technologies to identify different bird species. But the outcomes are incorrect. Input for bird identification on webpages and Android apps returns several answers rather than just the name of the species. It displays all bird names that share similar traits. Consequently, there is a gap that must be filled by creating software to generate better and more accurate outcomes. Convolutional Neural Networks are employed to categorise the many bird species in order to do this.

➤ Proposed System

To classify an image, the suggested approach uses a training dataset. Test results plus learned results make up the trained dataset. To increase recognition accuracy, the dataset needs to be retrained using a specific file from Google Collab. The training dataset is constructed using 50000 steps, with the understanding that the accuracy increases as the number of steps increases. The training dataset's accuracy is 93%. The testing dataset has an accuracy of 80% and contains around 1000 photos. To improve the system's performance, the dataset is validated with a 75% accuracy. A user's input file is briefly saved in the database every time they upload it to a website. Once fed, this input file is used by

V. FEASIBILITY STUDY

An activity focused on management is the feasibility study. It is an assessment and study of the study's potential that is based on in-depth inquiry and research to fully reassure the decision makers. Finding out whether an information system study can be implemented and offering potential alternatives are the two main goals of the feasibility study. It is meant to be a quick evaluation of the facts to determine whether moving on to the analytical phase is warranted. The feasibility analysis is the main tool used by system analysts to determine whether to move the study forward or stop it altogether. An alternate search is carefully considered. There are three parts in feasibility study.

- *Technical Feasibility*
- *Operational Feasibility*
- *Economical Feasibility*

➤ *Technical Feasibility*

This study was created in the convenient, all-around Python environment. The only platform required for this scenario is Windows. It can be readily developed using python and is technically sound in the Windows environment. The study is therefore technically possible.

➤ *Operational Feasibility*

The proposed system is technically possible since it was created in a way that even a user with no prior knowledge can use it with ease. It produces higher accuracy and makes excellent decisions about patient blood glucose levels. The user may quickly grasp without requiring much learning because the entire system is user-friendly and was created with them in mind.

➤ *Economical Feasibility*

This study is being done to see what kind of financial impact the system will have on the company. The corporation has a finite amount of money to invest in the system's research and development. The costs must be supported by evidence. As a result, the developed system came in under budget, which was made possible by the fact that most of the technologies were free to use.

VI. SYSTEM MODEL

Agile Model is used as the base for system development.

Agile is a term that means quick or adaptable. The phrase "Agile process model" describes a method of developing software that is iterative in nature. Agile study management techniques divide work into smaller iterations or pieces without directly including long-term planning. The study's requirements and scope are established at the start of the development phase. Plans for the quantity, length, and scope of each iteration are spelt out in detail in advance.

In the Agile process model, each iteration is viewed as a brief time "frame" that typically lasts one to four weeks. The study risk is reduced and the overall study delivery time requirements are lowered thanks to the study's breakdown into smaller components. During each iteration, a team works through a

VII. MODULE AND ITS DESCRIPTION

The process of defining the architecture, modules, interfaces, and data for a system to meet predetermined requirements is known as system design. The disciplines for specifying the computer system's hardware and software architecture, parts, modules, interfaces, and data to meet predetermined requirements overlap to some extent.

❖ *Modules:*

A. *System Modules:*

- *Image Dataset*
- *Pre-processing*
- *Training*
- *Classification*

➤ *Image Dataset*

The Caltech-UCSD Birds 200 [CUB-200-2011] dataset containing images of the 400 Bird Species to be classified and split into training and testing dataset with the test size of 80-20%.

➤ *Pre-processing*

There are a few procedures to be adhered during the preprocessing:

- Take an input of an image.
- Use preprocessing techniques to draw attention to the key elements.
- Perform Image scaling and cropping.
- Perform data cleansing and black image removal.
- Image rotation and mirroring to restore balance to an unbalanced dataset.
- Perform Array conversion to NumPy.

Now use for training or testing. Training

Use the pre-processed training dataset is used to train model using Deep learning algorithm.

➤ *Classification*

The results of model is to Identify the Bird Species with the details of that bird

B. *User Modules:*

Upload Image

The user has to upload an image which needs to be classified.

➤ *View Results*

The classified image results are viewed by user.

➤ *Input Design*

The input design establishes a connection between the user and the information system. In order to transform transaction data into a format that can be processed, it includes developing requirements and methods for data preparation. User can enter the data directly into the system to accomplish this, or the computer can read the data from a written or printed document. The input process is created with a view towards decreasing the amount of input required, minimising errors, delays, and additional phases, as well as maintaining a clear workflow. The data is entered in a way that ensures its security, usability, and privacy. These factors were taken into account through input design.

What data it should be given as input?

- How the data it should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

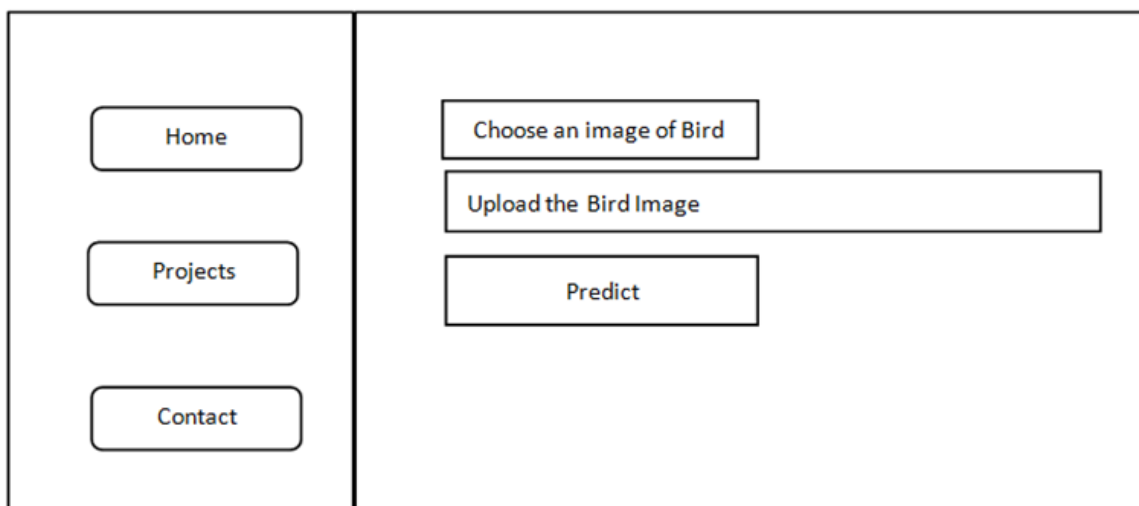


Fig 1 Input Image

➤ *Output Design*

A quality output is one that meets the needs of the end user and clearly displays the information. The way processing results are communicated to users and other systems is through the outputs of each system. How information will be displaced for both immediate demand

and the hard copy output is taken during output design. It is the most important and direct source of information for the user. A system's ability to engage with tools that support user decision-making is enhanced by effective and intelligent output design.

The process of creating computer output should be organised and well-thought out; the proper output must be created while ensuring that each output component is structured in a way that will make the system usable by people quickly and efficiently. When analysing computer-generated output, one should pinpoint the precise output that is required to satisfy the specifications. Select methods for presenting information.

- Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- ✓ Convey information about past activities, current status or studyions of the Future.
- ✓ Signal important events, opportunities, problems, or warnings.
- ✓ Trigger an action.
- ✓ Confirm an action.

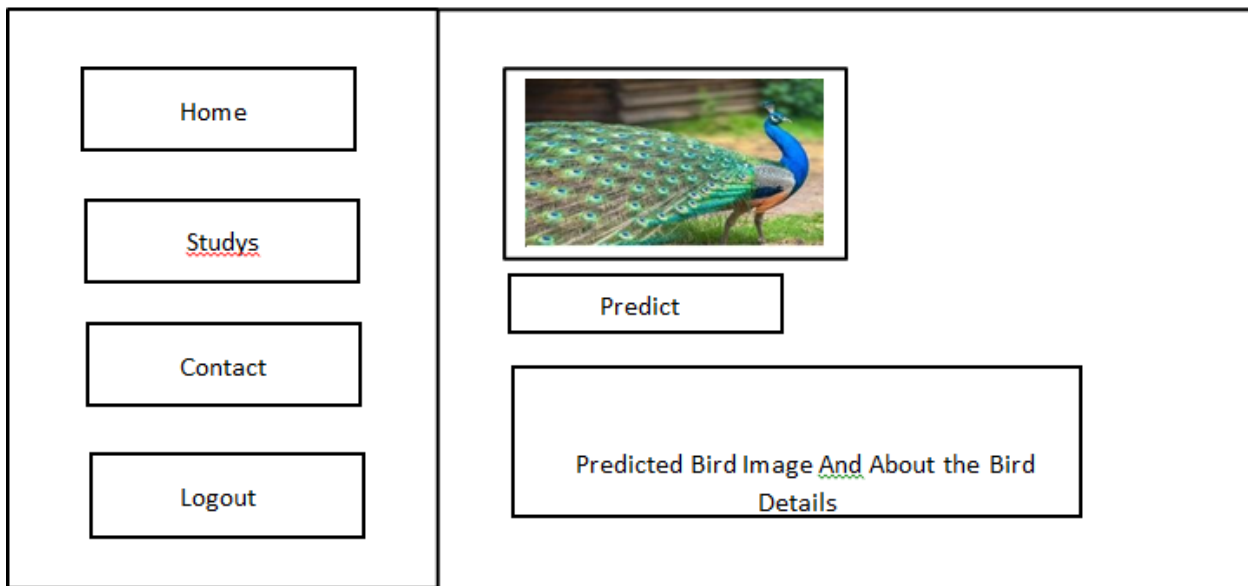


Fig 2 Output Design

VIII. CONCLUSION

- The main idea behind developing the identification website is to build awareness regarding bird-watching, bird and their identification, especially birds found in India. It also meets the requirement to make bird-watching simpler by streamlining the identifying procedure.
- 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 main objective of specified system development is to identify the bird species from an image given as input by the user. CNN is used as it is suitable for implementing advanced algorithms and gives good numerical precision accuracy. It is also general-purpose and scientific. The accuracy of 85%-90% is achieved.
- This research extends a great deal of scope in wildlife research and monitoring, This system can be implemented in-camera traps to maintain the record of wildlife movement in specific habitat and behavior of any species

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