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AI POWERED WILDLIFE IMAGE CLASSIFICATIONS USING CNN ALGORITHM

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Abstract:

AI powered wildlife prediction app is an expert nature guide that fits in our pocket. It's basically tool that turns your phone into a high tech magnifying glass for the outdoors. This works in a very specific way where it recognizes what we see .The app has a "digital eye" that has looked at millions of pictures so when we snap a photo of a bird or a bug, the app notices small details like the pattern on a feather or the shape of an ear and instantly tells you exactly what it is, just like an expert. It gives you the "inside scoop" of an animal or bird. Instead of just giving you a name, it tells you the animal's life story completely like Names: Its common name and its official scientific name, Daily Life: What it eats, where it hides, and where it lives on the globe, Safety: Whether the animal is doing great or if it needs our help to survive etc,. It makes nature feel like a game and easily understandable. To make sure it's not just a boring encyclopedia, the creators added fun features. That is, the interesting Factor which means every animal you find gets saved to your own personal collection. It also has games where we can take mini quizzes and learn information facts. It also has a daily discovery side where it suggests a new "animal of the day" to learn about. It actually works as the goal is to turn a regular walk in the park into an adventure. It's built to help you notice the wildlife right in your backyard so that you'll feel more connected to nature and want to help protecting it. This project demonstrates how artificial intelligence can be integrated into a simple, accessible web platform to promote biodiversity awareness, assist in wildlife learning, and contribute to citizen science.

Keywords: Wildlife Identification, Deep Learning, Convolutional Neural Network, SpeciesNet, Image Classification, Biodiversity Monitoring, Artificial Intelligence

1. Introduction

Wildlife biodiversity has been regarded as an essential component for maintaining a balance and promoting environmental sustainability. The identification and monitoring of different species of animals and birds have become a critical component for wildlife conservation and environmental management. The identification of species has been helpful for researchers to track and monitor different species of animals and birds. However, it has been observed that species identification has mostly been carried out by relying on expert knowledge and observation, which has become a critical challenge and has been found to be prone to human error. In many cases, it has been found that the absence of experts and reliable sources has become a critical challenge for wildlife monitoring activities**.**

Artificial intelligence, machine learning, and computer vision have been advancing rapidly in the last few years. Because of this, it's not only possible but also happening right now to automate tricky visual recognition tasks. The secret behind it is the success of Convolutional Neural Networks, or CNNs, in image classification and

detection by finding features such as edges, textures, shapes, and patterns in the images without having to explicitly define what to look for in the images. As a result, it's not just happening in the labs; people are using it everywhere, such as in reading medical images, driving self-driving cars, monitoring video feeds, and even tracking animals.

In the context of wildlife monitoring, CNN-based image recognition technology can be used for improving the efficiency of animal recognition. This technology can be used for recognizing animals and birds based on images obtained from camera traps, mobile cameras, and surveillance cameras. The intelligent system can be used for improving the efficiency of data analysis for wildlife researchers.

The article introduces an online tool for the identification of wildlife species using artificial intelligence. The tool requires users to upload pictures or videos of animals or birds, and after analyzing the media, the tool will immediately tell you the species of the animal you have uploaded. After identifying the species, the tool will also provide information on the habitat, diet, behavior, location, and status of the species. Therefore, it's not just a tool for naming the species of the animal you have uploaded. The tool will also promote awareness on biodiversity and the environment in a way that anyone can access. The tool will also be useful in documenting animal species in their natural habitat, which will greatly promote their conservation.

2. Literature Review

Wildlife monitoring has really taken off in recent times, especially because of the artificial intelligence and computer vision boom. The traditional method of using camera traps, watching the video, and relying on experts to do the job was effective, but it had its own disadvantages. It was quite costly, and people often got things wrong. However, deep learning has changed everything. The tools have really simplified the process of spotting and recognizing wildlife in real time, just like that.

There has been a rush of researchers from all over the world to utilize deep learning for wildlife monitoring. Convolutional Neural Networks, or CNNs, have been particularly effective in spotting features in images and recognizing the animal in them. There's also object detection, including YOLO, Faster R-CNN, and SSD. The tools have really raised the bar for wildlife monitoring by helping us locate wildlife immediately in images and videos. This has been a huge help for anyone working in the field of wildlife conservation.

Researchers keep stressing how these systems need to get tougher, especially when they're dealing with tricky situations—like dense forests, bad lighting, or backgrounds that never sit still. Take the YOLO model. Newer versions have definitely made these systems faster at spotting objects. The models have been deployed in edge devices as well as IoT-based systems to track animals in remote areas of the forest. The systems have been helpful in monitoring endangered species, detecting illegal activities such as poaching, as well as understanding the behavior patterns of animals.

In addition to the detection accuracy of the systems, the availability of datasets has also been identified as a significant factor that impacts the efficiency of the wildlife monitoring systems Several datasets of wildlife images have been utilized to develop the classification models of the species using deep learning techniques. However, the datasets may not be sufficiently balanced, the quality of the images may not be the same, and the environmental factors may also affect the performance of the models. Such factors need to be addressed by the researchers to improve the performance of the models.

Yes, wildlife monitoring systems have come a long way, and we now have better systems, but we still seem to face roadblocks, especially in scaling them up, and sometimes we find that we cannot easily bend them to accommodate new needs, and then there are the extreme conditions that just throw everything into chaos. That is why there is a real need to design better and more adaptive systems that make use of the latest in deep learning technologies. The system that is on the table seems to address all the problems that we have been facing with the current systems, and it is doing this by incorporating real-time monitoring and the latest in deep learning technologies.

3. Proposed System

The proposed system is an artificial intelligence-based wildlife species identification system designed to classify animal and bird species using artificial intelligence techniques like deep learning. The main purpose of the proposed system is to develop an efficient and userfriendly platform that can help users identify wildlife species through images or videos without requiring any technical knowledge. The proposed platform is designed to be implemented as a web application that allows users to upload images or short video clips using an intuitive interface. After uploading the media file, the proposed system processes the media file and uses a trained Convolutional Neural Network (CNN)-based model named SpeciesNet to analyze the media file for wildlife species classification.

The overall system architecture is composed of a number of functional modules that collectively contribute to the identification of the species. The first module is the image and video upload module, where the user is able to upload wildlife image and video data via the web interface. The uploaded data is then processed by the second module, known as the preprocessing module, where the images are processed for analysis. The processing operations involve resizing images to a specific resolution, normalization, noise removal, and enhancement operations, among others, that enhance the quality and consistency of the input data for analysis by the deep learning model.

The feature extraction module takes the preprocessed images after they have been processed. This module utilizes different convolutional and pooling layers of the CNN model, referred to as SpeciesNet, to extract key visual features of the images, such as edges, shapes, colors, and textures. Intricate patterns can be learned by the model from the data set, and visual features are unique characteristics used to distinguish different species of animals and birds. The final layer utilizes the Softmax function to determine the probability and possible species found in an image after visual features are sent to a fully connected layer.

After completing this classification process, prediction results and confidence scores are generated. The results are visualized by the result visualization module and presented to the user via a web interface. Along with species identification, additional information related to the identified species is also obtained from a database. This information can include habitat, food habits, behavioral characteristics, geographical distribution, and conservation status of a species. This additional information can increase the educational value of the project and enable users to learn more about biodiversity and conservation.

In order to enable a system administrator to effectively manage the data set and ensure that the system performs well, it is also proposed that an administrative component be included in the suggested platform. This component can be used, for example, to enhance the precision and effectiveness of the classification system by retraining the SpeciesNet model and adding new species images to the data set. This component is also essential to ensure that the system can eventually adapt to different species categories. Additionally, different users such as students,

researchers, wildlife enthusiasts, and conservationists can effectively utilize the proposed system without requiring technical expertise because it has an interactive interface. Therefore, it can be concluded that the proposed system can effectively identify different species of wildlife because it utilizes a technology known as deep learning.

4. Case and Methodology

The system of wildlife species identification makes use of technology to identify what kind of animal or bird it is. This system can be used, for example, if we are out somewhere in the wilderness, if we want to know about animals, if we want to protect the environment, or if we are on a nature tour.

If people want to use this system, they can upload their pictures of animals or birds, and then the system will look at the picture of the animal or bird so that it can identify what kind of animal or bird it is. If people upload their pictures of animals or birds, then the system will take the pictures, making them clear so that it can get a good look at the animal or bird.

The species classification system takes a look at all the characteristics of a species. Using these characteristics, it is able to determine what kind of species it is looking at. This is done by a type of math that is referred to as the Softmax function. This function helps the species classification system understand what kind of species it is looking at.

After it has determined what kind of species it is looking at, it goes to a database to retrieve information about the species. The information it is able to retrieve includes information about where it lives, what it eats, and where it can be found in the world.Finally, it presents to the user all of the information it has been able to retrieve about the species.

This is done in a way that is easy for people to understand. This is done by a website that a person can look at to get information about the species that it is looking at. This species classification system is a great asset to a lot of people, such as researchers, students, and anyone who is curious about wildlife and the environment. It is a great aid in helping you identify different species and providing you with quick access to all sorts of facts and information regarding them.

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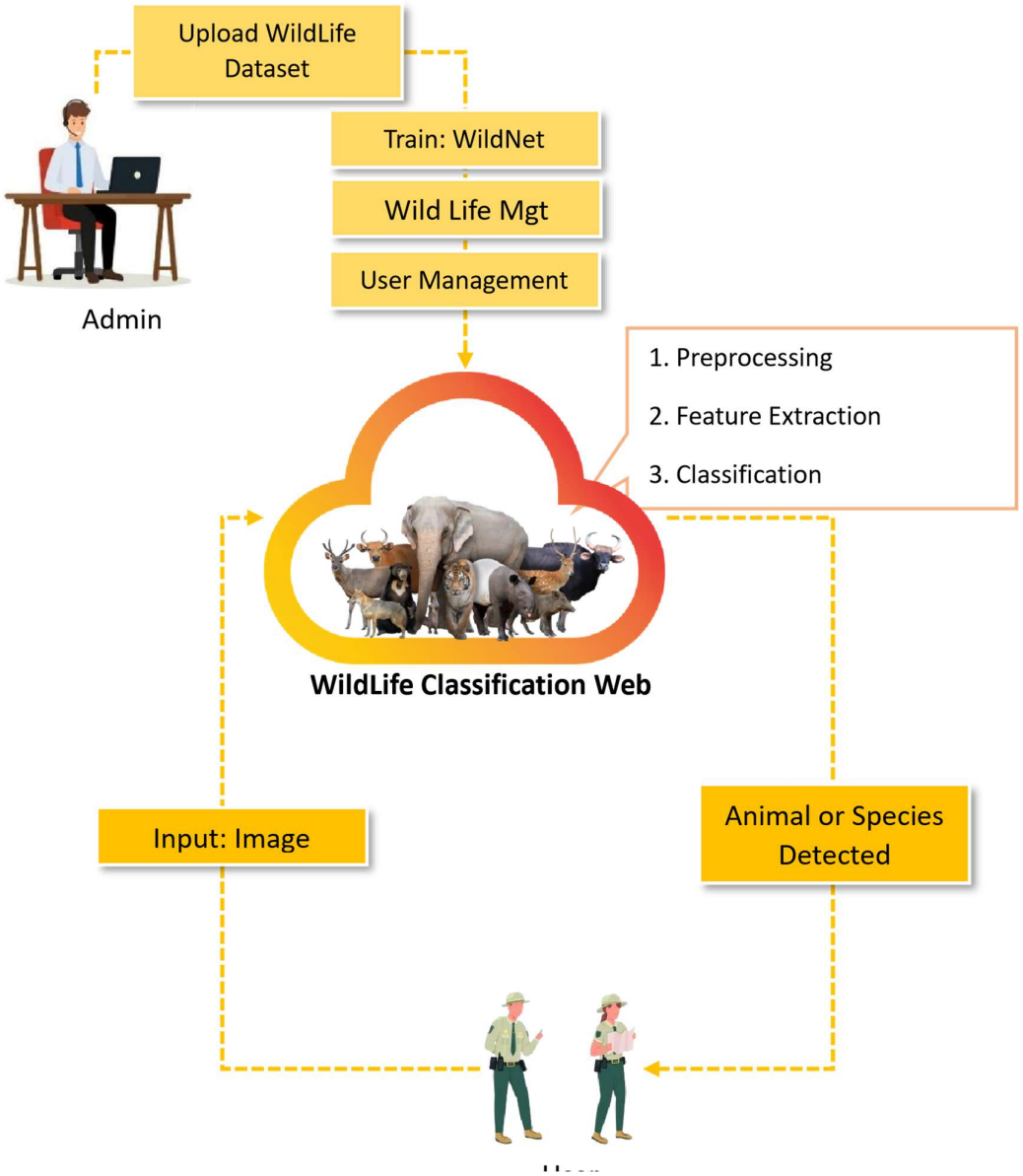
If you are curious about wildlife and the environment, this is the resource that you should turn to if you want to delve deeper into the data that is available regarding specific wildlife, how you can organize that data, and how you can make sense of it all. Honestly, if you are curious about wildlife and the environment, or if you want to learn more about specific species and how things are changing, you will find a ton of value in the species classification system. It is basically the backbone of anything that is related to the environment and wildlife.


Upload WildLife Dataset
Train: WildNet
Wild Life Mgt
User Management
Admin
1. Preprocessing
2. Feature Extraction
3. Classification
WildLife Classification Web
Input: Image
Animal or Species Detected

5. Results & Analysis

We checked how well the SpeciesNet model works by looking at things like accuracy, precision, recall, and F1 score. These numbers show us how good the model is at actually figuring out which species show up in the images. They help us see where the model gets it right—and where it slips up. Accuracy measures the effectiveness of the model in correctly predicting the species of animals by comparing the number of correctly predicted species to the total number of predictions made by the model. A higher value of accuracy indicates that the model can effectively classify the species of animals in the images provided to it. However, the accuracy of the model may not be completely representative of the results when the model is required to classify different species of animals.

Precision and recall were thus used to give a detailed analysis of the classification results. Precision is calculated as the number of correct positive predictions divided by the total number of positive predictions made by the model, giving an idea of how accurate the predictions made by the model are for a given species class. On the other hand, recall gives the number of correct positive predictions divided by all the observations in the data set, giving an idea of how well the model performs in predicting all observations for a given species class. The F1-score gives a balanced analysis of how well the model performs in making predictions by considering all false positives and false negatives.

Apart from these parameters, we also used the confusion matrix to check how well the model had performed in predicting the species. "Confusion matrix basically just matches up the actual species with the ones we predicted, so you can see where we got it right and where we got it wrong. The confusion matrix not only tells you how well you've done, but it also tells you what you got wrong and what you did wrong on it, and whether you made the same mistake on more than one species."

The experimental evaluation has shown that the proposed SpeciesNet model can work effectively in the classification of different species of wildlife. The model can effectively retrieve meaningful visual features from the images and classify the species correctly for different classes of species. The results have also shown that the deep learning model can work effectively in the classification of different species of wildlife by maintaining the same level of performance for different images of species that may have different lighting conditions, background, and pose of the animals.

In addition, the proposed SpeciesNet model can work effectively in the development of a real-time application by incorporating the model into the web-based application. The results have confirmed that the proposed system can work effectively in the identification of different species of wildlife, thus providing a reliable solution to the problem of automated identification of different species of wildlife.

6. Conclusion

In this paper, the researchers proposed an AI-based system for the identification of wildlife species using images and videos, and it can identify different species of animals using Convolutional Neural Networks. The proposed system has harnessed the power of deep learning and the power of the internet.

The system has demonstrated excellent performance in species classification, providing a user friendly interface for the learning of wildlife species. The application of AI, image processing, and web technologies in the proposed system has provided a potential opportunity for the development of a system that can be utilized as a tool in the field of wildlife education and research, where citizens can contribute to the field of wildlife research and science.

The potential extensions of the proposed system in the future can be real-time camera support, species data, and mobile application support for the identification of species in the field.

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