

Intelligent Alert System for Tribal People

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Abstract

Using artificial intelligence, this project aims to alert tribal members of wildlife predation and save their lives. 8.6% of the country's population is tribal, and the majority of them live in villages or clans near the forest or in close proximity to trees for the majority of their lives. These people face a variety of challenges, one of which is human-wildlife conflict, which undermines tribal region protection. Conflict between humans and wild animals is when wild animals interact with humans and cause harm to people, animals, resources, and habitats. Crop stealing, livestock predation, an increased risk of livestock diseases, and direct threats to human life are the main forms of human-wildlife conflict in the area. Therefore, active measures will be taken to mitigate these issues and ensure the wildlife's future. As a result, we developed the "Intelligent Alert System" Project. By notifying the wild animal predation before it enters the clan, this ensures the complete safety of humans who live near forests. Through a camera, the system will regularly keep an eye on all the villages in the forests nearby. Any dangerous animal that is found will notify the residents of the village by sending them a message with an image of the animal

1. Introduction

The proposed Intelligent alert system for forest tribal people model is based on neural networks(CNN) incorporated with an alerting system. Several million of areas of forest destroyed every year due to they facing forest fire then we will notified and we can detect forest tribal people like wild animals. Forest is fire one of the major causes to the tribal people then we use this method to save wild animals with help of alerting to the higher authorities. There are so many problem faced by these people out of which human-wildlife is a serious problem. Hence early and effective testing and detection of wild animals can save forest tribal people. The main purpose of this project to save the lives of tribal people by notifying about wildlife predation with help Deep learning. Forest survey of higher authorities has been alerting when forest are detected and wild animals are in danger places.

Foe this we used to based on Convolution Neural Network (CNN) and Artificial Neural Network(ANN) of concepts. Deep learning is a branch of machine learning which is completely based on artificial neural network, as neural network is going to mimic the human brain so deep learning is also a kind of mimic of human brain. In deep learning, we don't need to explicitly program everything.

The concept of deep learning is not new. It has been around for a couple of years now. It's on hype nowadays because earlier we did not have that much processing power and a lot of

data. As in the last 20 years, the processing power increases exponentially, deep learning and machine learning came in the picture. A formal definition of deep learning is- neurons. In human brain approximately 100 billion neurons all together this is a picture of an individual neuron and each neuron is connected through thousand of their neighbours. The question here is how do we recreate these neurons in a computer. So, we create an artificial structure called an artificial neural net where we have nodes or neurons. We have some neurons for input value and some for output value and in between, there may be lots of neurons interconnected in the hidden layer

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal. A subset of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn from and adapt to new data without being assisted by humans. Deep learning techniques enable this automatic learning through the absorption of huge amounts of unstructured data such as text, images, or video.

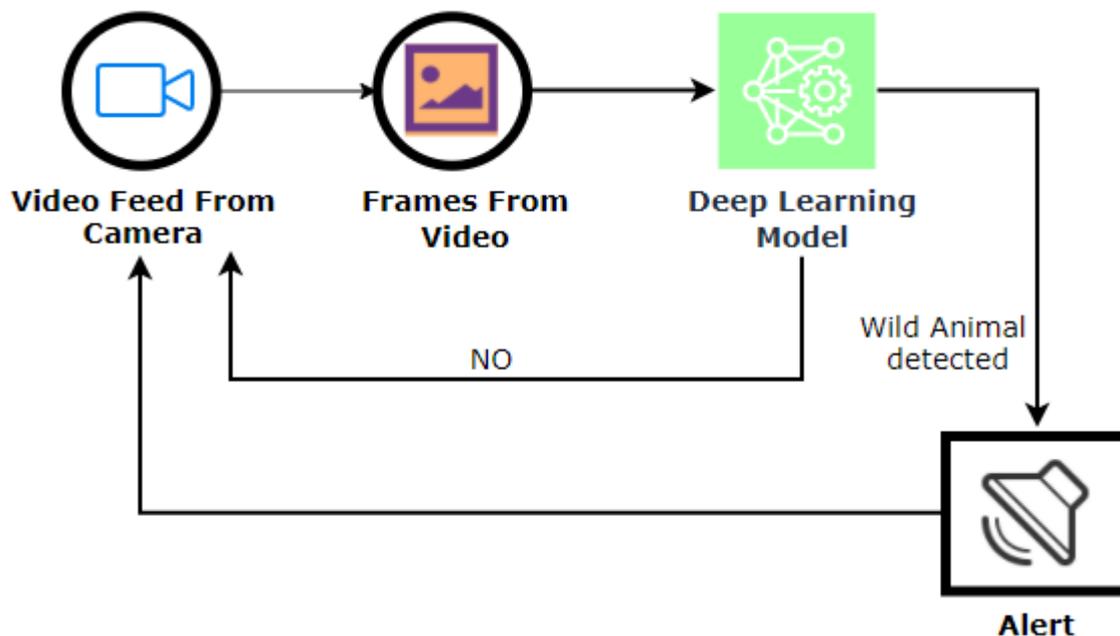


Fig.1 Architecture

2. Literature Review

Machine learning is a subset of artificial intelligence (AI). It is focused on teaching computers to learn from data and to improve with experience – instead of being explicitly

programmed to do so. In machine learning, algorithms are trained to find patterns and correlations in large data sets and to make the best decisions and predictions based on that analysis. Machine learning applications improve with use and become more accurate the more data they have access to. Applications of machine learning are all around us –in our homes, our shopping carts, our entertainment media, and our healthcare.

Machine learning – and its components of deep learning and neural networks – all fit as concentric subsets of AI. AI processes data to make decisions and predictions. Convolution neural networks (CNN) have the ability to automatically extract features and learn filters. Wild animal detection is a sub-field under object detection that needs to manage the issue of precision and speed because of the profound dynamic and complex nature of videos acquired from camera traps. This system was implemented utilizing CNN architecture. Camera traps are easy to operate and generate high-resolution imagery, but typically collect many unwanted frames due to false camera triggering. CNNs have shown considerable ability to detect objects of interest, such as birds and mammals, from these sources. We propose a novel deep learning model-based technique for automatically identifying alert messages to us for the tribal people. Deep neural networks are the collection of algorithms that have placed new records in precision for several vital problems. Convolutional neural network (CNN) is a type of deep neural networks, most generally applied for investigating visual images. Checking of wild animals in their common environment is crucial. This proposed work develops an algorithm to detect the animals in wild life. This architecture can be achieved by applying effective deep learning.

Anaconda is a distribution of the Python and R programming languages for scientific computing, that aims to simplify package management and deployment. The distribution includes data-science packages suitable for Windows, Linux, and macOS. It is developed and maintained by Anaconda, Inc., which was founded by Peter Wang and Travis Oliphant in 2012. As an Anaconda, Inc. product, it is also known as Anaconda Distribution or Anaconda Individual Edition, while other products from the company are Anaconda Team Edition and Anaconda Enterprise Edition, both of which are not free.

Package versions in Anaconda are managed by the package management system conda. This package manager was spun out as a separate open-source package as it ended up being useful on its own and for other things than Python. There is also a small, bootstrap version of Anaconda called Miniconda, which includes only conda, Python, the packages they depend on, and a small number of other packages.

Anaconda distribution comes with over 250 packages automatically installed, and over 7,500 additional open-source packages can be installed from PyPI as well as the conda package and virtual environment manager. It also includes a GUI, Anaconda Navigator, as a graphical alternative to the command line interface (CLI). The default installation of Anaconda2 includes Python 2.7 and Anaconda3 includes Python 3.7

```
#Define the parameters /arguments for ImageDataGenerator class  
train_datagen=ImageDataGenerator(rescale=1./255, shear_range=0.2,  
                                rotation_range=180, zoom_range=0.2, horizontal_flip=True)  
  
test_datagen=ImageDataGenerator(rescale=1./255)
```

Fig.2 Parameter

3. Proposed System

Data augmentation is a method for using your dataset's existing data to expand or enlarge it. In order to assist in better training our model with a large dataset, we employ a variety of methods to expand our dataset. If you use a small dataset to train your model and overfit the data, or if you have a small dataset. Therefore, in order to train our model and improve its capabilities and performance, or in order to make it more applicable to other situations, we require a suitable dataset. This is made possible by Data Augmentation.

One of the methods we can use to expand our image dataset without overfitting and improve our model's generalizability is image augmentation. Similar to Image Data Augmentation, Image Data Augmentation is a method in which modified versions of images already in our training dataset are used to expand our training dataset. Keep in mind that these newly altered images are also in the same category as the original. Our training data become more diverse and larger as a result of augmentation, which reduces the likelihood that the model will overfit. It needs to be done with care. A horizontal flip of a dog photo, on the other hand, will make sense because the photo can be taken from either the left or right. The goal of using data augmentation is to make the model more generalizable. Dataset generation and expansion are the two components of data augmentation. A less common type of data augmentation is this one.

The specific data you need for your ML project is called a dataset. The type of AI you need to train determines the type of data you need. There are basically two datasets:

These pre-trained networks were trained on a huge amount of data; Take a look at the Open Images dataset, which contains over 15 million images divided into 600 categories and labeled with bounding boxes! A network that has been trained on this dataset will already be pretty good at identifying objects. So that we can utilize it to draw some bounding boxes around the images' objects. Because we only need to categorize the items in the boxes, this reduces the amount of work we have to do by half! In addition, this pre-trained network has 600 categories, so some of the objects you want to detect and classify may already be detected with high accuracy. The ImageDataGenerator class in Keras is used to implement image augmentation. The ability to perform real-time image augmentation is the Keras ImageDataGenerator class's primary feature. This simply means that it can dynamically generate augmented images during the model's training, improving the model's overall robustness and accuracy.

Image data augmentation is a method that can be used to alter images in a training dataset in

order to artificially increase its size. The ImageDataGenerator class in the Keras deep learning neural network library lets you use image data augmentation to fit models.

For image data specifically, there are five main types of data augmentation techniques:

The arguments `width_shift_range` and `height_shift_range` allow for image shifts.

The arguments `horizontal_flip` and `vertical_flip` enable image flipping.

The brightness is controlled by the `brightness_range` argument, and the image is rotated using the `rotation_range` argument.

using the argument `zoom_range` to zoom the image.

It is possible to construct an instance of the ImageDataGenerator class.

Let's use the `flow_from_directory` function for Trainingset to apply ImageDataGenerator functionality to Trainset and Testset.

This function will return batches of images from the subdirectories `Infected` and `uninfected`, along with the labels 0 and 1 (with 0 denoting `Infected` and 1 denoting `Uninfected`). In deep learning, the class of deep neural networks known as Convolutional Neural Networks (CNN) is most often used to analyze visual imagery. As we work with images, CNN is utilized in this instance.

CNN's first and most fundamental layer is the convolutional layer. It is used to extract important features from an image and is one of the components of a CNN. A feature map will be produced by convolving the input image with the feature detectors and filters during the Convolution operation. The feature detector's primary function is to extract features from the image. A feature layer is the collection of feature maps.

We provided arguments in the `convolution2D` function such as `32,(3,3)`, indicating that we are employing 32 filters consisting of a 3x3 matrix filter. `input_shape` is the shape of the input image in RGB, where 256x256 is the size and 3 is the channel, RGB color images.

Refer to the link <https://towardsdatascience.com/basics-of-the-classic-cnn-a3dce1225add> for information on CNN layers. We are adding a convolution layer with a small filter and an activation function known as "relu."

size (3,3) and number of filters (16) followed by a max pooling layer.

Maxpool layer is used to downsample the input. Pooling reduces the dimensionality of images by reducing the number of pixels in the output from the previous convolutional layer. It keeps only the necessary details. Pooling is a technique in CNN that helps us to avoid overfitting of data, spatial invariance, and distortion. After applying max-pooling we will get another feature map called Pooled Feature Map.

Dropout layer is used to deactivate the neurons randomly. `Dropout(0.2)` indicates that 20 % of the neurons are deactivated

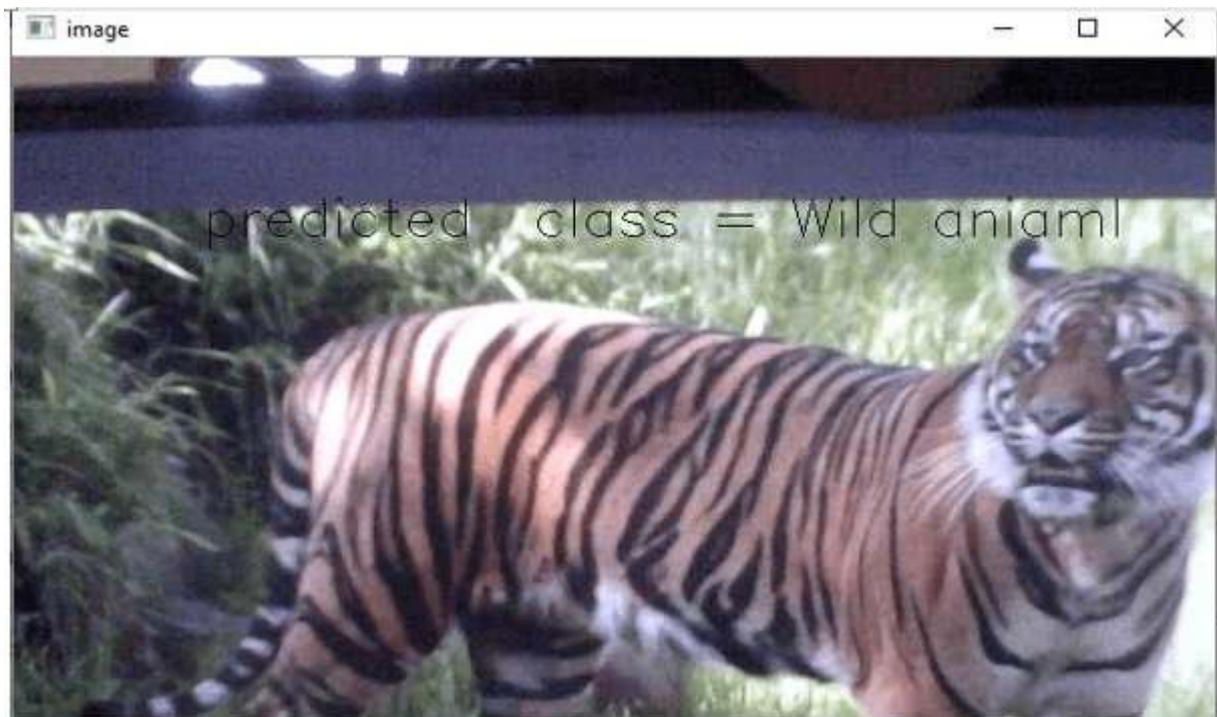


Fig.3 Proposed Method

4. Conclusion

Implementation of Neural network as described in this project was successful. We were able to build a network to save forest tribal people. Detection of wild animal was functional. Data Transmission through the network was efficient and reliable. The villages and the authorities is getting alerted via SMS. The Sms software programs for the network proved to be accurate. It captures the image data and sends alerts to higher authorities. This system detects the wild animals and sends warning messages to the authorities and the villagers has been implemented. Wildlife is a precious gift of God to this planet. The term 'wildlife' not only caters to wild animals but also takes into account all undomesticated lifeforms including birds, insects, plants, fungi and even microscopic organisms. For maintaining a healthy ecological balance on this earth, animals, plants and marine species are as important as humans. Each organism on this earth has a unique place in food chain that helps contribute to the ecosystem in its own special way.

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