A Report on

INTELLIGENT ALERT SYSTEM FOR FOREST TRIBAL PEOPLE

Submitted by

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We thank SMARTBRIDGE for providing this platform to explore.

Thanking You

Yours sincerely,

Team-19(May4th-Rsip2020)

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1)INTRODUCTION

1.1 OVERVIEW:

Deep learning is a subset of machine learning. In deep learning, a convolutional neural network (CNN) is a class of deep neural networks, most commonly applied to analyzing visual imagery. One of the applications of the deep learning technique called Convolutional Neural Network is animal detection. Observing wild animals in their natural environments is a main task. By human action, the forest land has been transformed to resides. More seriously, many wild species are introduced into new areas where they can disrupt both natural and human systems. Monitoring wild animals is essential as it provides safety to people who lives in forest. The purpose of animal detection is to prevent or reduce the number of human-wildlife conflict. These systems are specifically aimed at the wild animals that can cause human death, injury and property damage. This model detects the wild animals entering the village and alerts the people around.

1.2 PURPOSE:

Human–wildlife conflict is a serious challenge undermining the protection of tribal regions. Developing effective human–wildlife conflict mitigation strategies requires an understanding of the conflict patterns, species involved and attitudes of local people living along protected area boundaries. We hypothesized that

a. There was a high level of human–wildlife conflict
b. The local people would have less favourable attitudes towards problematic wild animals.

The major types of human−wildlife conflict are crop raiding, livestock predation, increased risk of livestock diseases and direct threats to human life. Active measures are to be implemented to mitigate these problems and safeguard the future of the wildlife. Hence we came up with this “**Intelligent Alert System**”.

2)LITERATURE SURVEY

2.1 EXISTING PROBLEM:

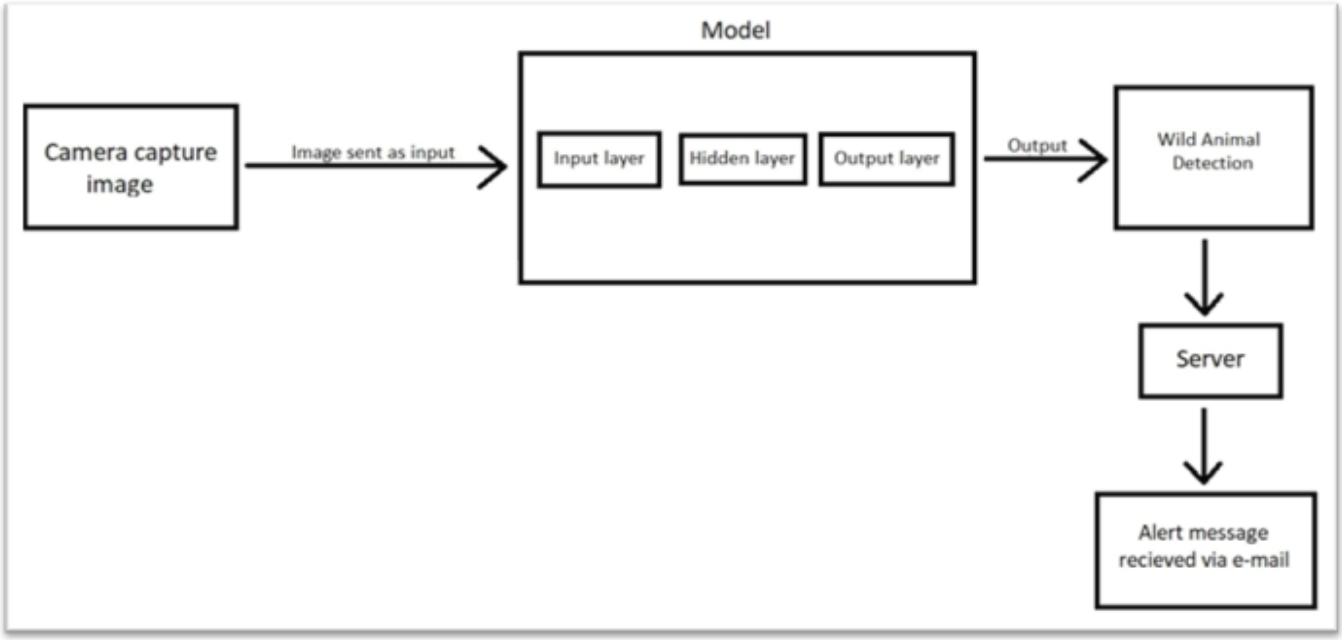
All the tribal populations of India were traditionally closely associated with forests, and there are some who even today spend the greater part of their lives in the proximity of trees and villages or clans near to forest. If any dangerous predators when entered into a village or clan may lead to loss of resources or in extreme cases leads to loss of life.

2.2 PROPOSED SOLUTION:

The proposed Intelligent alert system for forest tribal people model is based on neural networks (CNN) incorporated with an alerting system. This system will monitor the entire villages of surrounding forests at regular intervals through a camera. Once any dangerous animal is detected then it will send information to the people in the village and it will produce an appropriate sound or alarm in the village to alert the people.

3)THEORITICAL ANALYSIS

3.1 BLOCK DIAGRAM:



3.2 SOFTWARE/HARDWARE DESIGNING:

SOFTWARE:

1.Anaconda

- Jupyter notebook

2.Python web frameworks

HARDWARE:

1. Cameras
2. Laptop

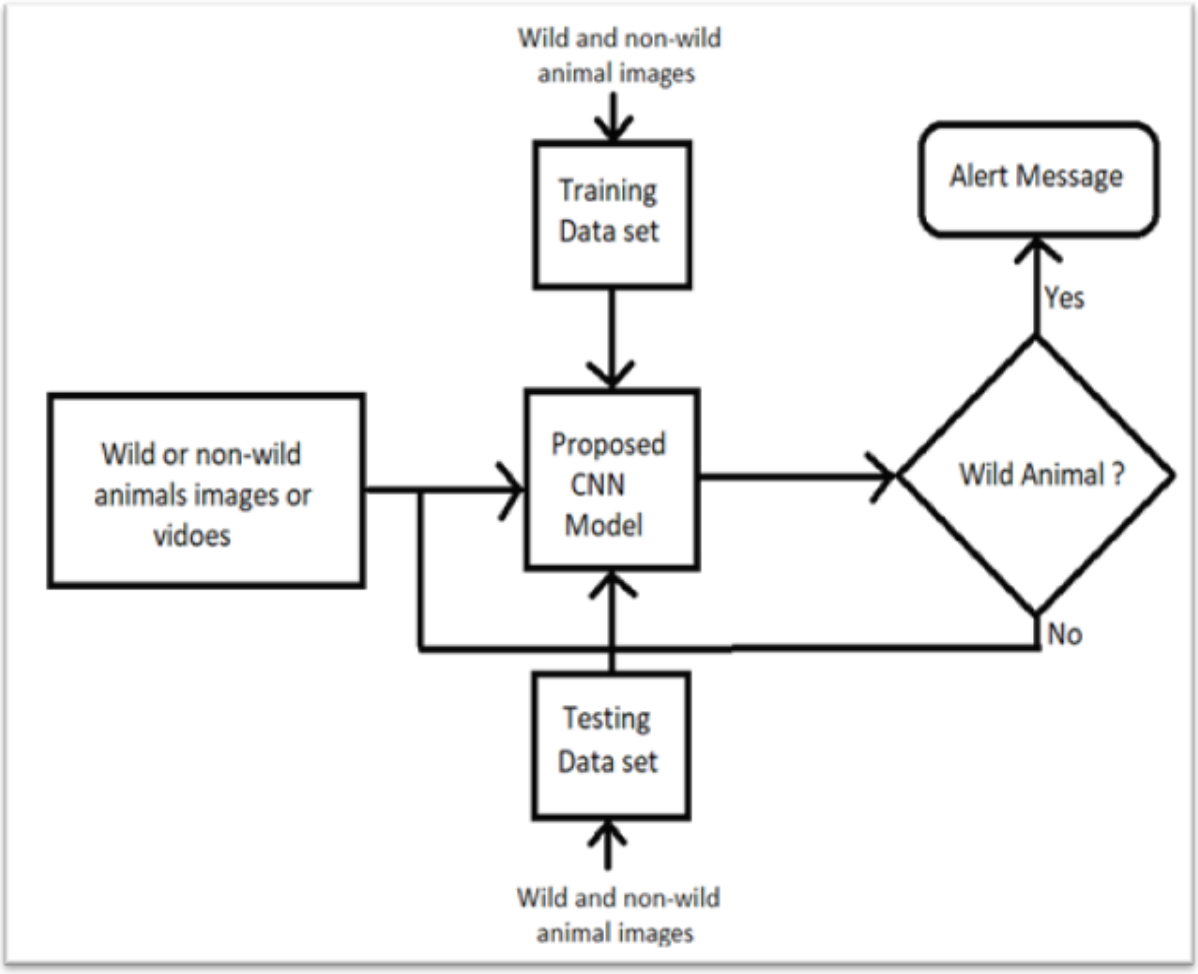
4)EXPERIMENTAL INVESTIGATIONS:

Deforestation is one of the most pressing environmental issues that the world is facing currently. It is the conversion of forested land to non-forested land by humans. Deforestation occurs when a land dominated by naturally occurring trees is converted to provide certain services in response to the human demand. Senseless mining in hills and forests has resulted in wild animals entering human habitations in search of food and water. The drying up of water sources in the summer is also to be blamed for it. Due to squeezing of forest area, wild animals are losing their habitat. The animals are facing food and water scarcity due to massive deforestation. Hence many times wild animals come out of forest areas and enter human habitats in search of food and water. Though this isn't entirely their fault tribal people and those who live near the forests suffer the most since the most vulnerable to these attacks and our model aims to help those people.

Convolutional Neural Networks (CNN) are everywhere. It is arguably the most popular deep learning architecture. The recent surge of interest in deep learning is due to the immense popularity and effectiveness of convnets. CNN is now the go-to model on every image related problem. In terms of accuracy they

blow competition out of the water. It is also successfully applied to recommender systems, natural language processing and more. The main advantage of CNN compared to its predecessors is that it automatically detects the important features without any human supervision. CNN is also computationally efficient. It uses special convolution and pooling operations and performs parameter sharing. This enables CNN models to run on any device, making them universally attractive. Using CNN our model accurately determines and alerts the villagers about the presence of a dangerous animal giving them ample time to prepare and save their lives.

5)FLOWCHART:



6)RESULT:

After training and validation of CNNs for predicting and detecting wild animals, the results show that the proposed algorithm achieves good detection rates and hence is accurate. To measure the performance of our proposed model, we have tested our model by providing various wild and domestic animal images collected. We provided 700 images each of wild and domestic animals to train and test the model. It predicts whether it is a wild animal or domestic, moreover an alerting mail is sent to people around to be cautious about the entering wild animal. Moreover since not everyone will have access to devices our model also alerts the people around with a loud alarm. These results indicate the efficient performance of the proposed method in wild animal detection, prediction and alerting.

7)ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Low cost
- No need for manual guarding
- Can ensure
    a. no crop raiding
    b. no loss of domestic life due to livestock predation
    c. decrease the risk of livestock diseases
- Safeguarding human life and wildlife as well.

DISADVANTAGES:

- Blurred detections may not work properly.
- Not everyone may have facility to access mobile/device.
- Limited sample size.
- Disturbance effects.
- Technical failures.

8)APPLICATIONS:

In this busy world, this **Intelligent Alert System**will definitely find its best applications in many areas without manual guarding.
The surveillance on wild animals,

- Helps forest department with prior intimation for conservation and hence maintain sustainable ecosystem.
- In busy cities, we can control animal vehicle accidents.
- From tribal regions to busy cities, this will always help in protection of human habitats.

9)CONCLUSION:

We conclude that if a machine could successfully pretend to be human to a knowledgeable observer then you certainly should consider it intelligent. The computing world has a lot to gain from neural networks as it offers more natural interaction with the real world. Artificial intelligence has an important links with many fields such as math, psychology, biology and philosophy and many others. Our ability to combine knowledge from all these fields will ultimately benefit our progress in the quest of creating an intelligent artificial being.

Biodiversity is our life. If the Biodiversity got lost at this rate then in near future, the survival of human being will be threatened. Hence the world needs many more applications like this with evolving technologies for human safety and to conserve biodiversity.

10)FUTURE SCOPE:

To be sure advances in hardware (high resolution cameras), storage, parallel processing architectures will enable even greater leaps in the functionality of this **Intelligent Alert System** thereby reducing human-wildlife conflict.

However the field of Artificial Intelligence will remains in its infancy.

11)BIBILOGRAPHY:

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Model Building [Online]. - https://thesmartbridge.com/documents/spsaimldocs/CNNflow.pdf.

OpenCV for video processing [Online]. - https://opencv-python-tutroals.readthedocs.io/en/latest/py_tutorials/py_gui/py_video_display/py_video_display.html. and mentor guidance

Alerting through Email- Mentor guidance

SOURCE CODE:

CNN CODE FOR TRAINING THE MODEL WITH WILD AND NON-WILD ANIMAL DATASET

```
#CNN CODE FOR TRAINING THE MODEL
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
from keras.preprocessing.image import ImageDataGenerator

train_datagen = ImageDataGenerator(rescale = 1./255,shear_range = 0.2,zoom_range = 0.2,horizontal_flip = True)
test_datagen = ImageDataGenerator(rescale = 1./255)

#splitting into train and test sets
x_train = train_datagen.flow_from_directory(r'E:\project\dataset\trainset',target_size = (64,64),batch_size = 32 , class_mode = 'categorical')
x_test = test_datagen.flow_from_directory(r'E:\project\dataset\testset',target_size = (64,64),batch_size = 32 , class_mode = 'categorical')
print(x_train.class_indices)

#adding CNN layers
model = Sequential()
model.add(Convolution2D(32,(3,3), input_shape = (64,64,3),activation = "relu"))
model.add(MaxPooling2D(pool_size = (2,2)))

model.add(Flatten())
model.add(Dense(units = 128,init = "random_uniform",activation = "relu"))
model.add(Dense(units =2,init = "random_uniform",activation = "softmax"))

#compiling and training the model
model.compile(loss = "categorical_crossentropy",optimizer = "adam",metrics = ["accuracy"])
model.fit_generator(x_train , steps_per_epoch = 30 , epochs = 25, validation_data = x_test, validation_steps =13)

#saving the model
model.save("animals.h5")
```

PREDICTION CODE

```
import numpy as np
from keras.preprocessing import image
from tkinter import *
from PIL import ImageTk, Image
from tkinter import filedialog
import os
from keras.models import load_model
classifier = load_model('animals.h5')
classifier.compile(optimizer='adam', loss = 'categorical_crossentropy',
metrics = ['accuracy'])
root = Tk()
root.geometry("550x300+300+150")
root.resizable(width=True, height=True)

def openfn():
    filename = filedialog.askopenfilename(title='open')
    return filename
def open_img():
    x = openfn()
    test_image = image.load_img(x, target_size = (64,64))
    test_image = image.img_to_array(test_image)
    test_image = np.expand_dims(test_image, axis = 0)
    result = classifier.predict_classes(test_image)
    print(result[0])
    index=['domestic_animal','wild_animal']
    label = Label( root, text="Prediction : "+index[result[0]])
    label.pack()
    img = Image.open(x)
    img = img.resize((250, 250), Image.ANTIALIAS)
    img = ImageTk.PhotoImage(img)
    panel = Label(root, image=img)
    panel.image = img
    panel.pack()
btn = Button(root, text='open', command=open_img).pack()
root.mainloop()
```

CODE FOR DETECTING THROUGH CAMERA AND SENDING AN ALERT EMAIL AND ALARM IF ITS A WILD ANIMAL

```
 from keras.models import load_model
from keras.preprocessing import image
import numpy as np
import cv2
import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.text import MIMEText
```

```
from email.mime.base import MIMEBase
from email import encoders
from keras.preprocessing import image
from keras.models  import load_model
from playsound import playsound
from tkinter import *
from tkinter import messagebox
import time
#loading the model
def predict_animal(model,x):
     pred = model.predict_classes(x)
     return pred[0]
def email():
    gmail_user = 'chandanaareddy11'#email id without@gmail.com
    gmail_password = 'chandu@123'
    #to and from addresses
    sent_from = gmail_user
    to = ['chandanaareddy11@gmail.com']

    #email properties
    msg=MIMEMultipart()
    msg['Subject']='Alert!!'
    Subject = 'Alert!!'
    body = """Alert for Wild Animal detection, stay safe"""
    msg.attach(MIMEText(body,'plain'))

    server = smtplib.SMTP_SSL('smtp.gmail.com', 465)
    server.ehlo()
    server.login(gmail_user, gmail_password)
    server.sendmail(sent_from, to, msg.as_string())
    server.close()
    print("email sent")
    return

model = load_model('animals.h5')
video = cv2.VideoCapture(0)
name = ['domestic_animal','wild_animal']
count=0
while(1):
    success, frame = video.read()
    cv2.imwrite("image.jpg",frame)
    img = image.load_img("image.jpg",target_size = (64,64))
    x  = image.img_to_array(img)
    x = np.expand_dims(x,axis = 0)
    p=predict_animal(model,x)
    print(name[p])
```

```
    flag=0
    if p==1:
        email()
        #alerting by playing alarm
        playsound(r'C:\Users\CHANDANAREDDY\Downloads\danger.mp3')
        flag=1
    cv2.imshow("image",frame)
    if cv2.waitKey(1) & 0xFF == ord('a'):
        break
    if flag==1:
        continue
video.release()
cv2.destroyAllWindows()
```