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International Journal of Advanced Research in Computer Science Engineering and Information Technology

Volume: 6, Issue: 3,Special Issue: 1 ,Apr,2021 ,ISSN_NO: 2321-3337

SMART CROPS PROTECTION SYSTEM FROM ANIMALS USING IOT AND DEEP LEARNING

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Abstract

Agriculture is the primary source of livelihood for about 58% of India's population. Gross Value Added (GVA) by agriculture, forestry and fishing was estimated at Rs. 19.48 lakh crore (US$ 276.37 billion) in FY20 (PE). Growth in GVA in agriculture and allied sectors stood at 4% in FY20. It's starting to become common knowledge that animal agriculture is damaging our environment. While more people are switching to a vegan diet, and studies are being conducted that show the environmental impact, the world is waking up to the the link between environmental damage and animal agriculture. Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds etc. This leads to huge losses for the farmers. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it. We propose a deep learning method for animal detection and unknown person. In this project we will be developing a system to detect the wild animals trespassing agricultural fields. Animal detection and classification can help to prevent farmer land damage, trace animals and prevent loss of crop.

1. Introduction

Agricultural lands close to protected areas (PAs) often face crop raiding by wild herbivores, which can be a serious problem for farmers whose livelihoods depend on agricultural produce. In order to avoid economic loss, farmers apply a range of protective measures. They include manual guarding, various types of fences, trenches and other devices. However, these measures

often come with high associated costs and risks.

2. Literature Survey

A lot of interesting has been shown to object detection, recognition, and classification, etc. Visual monitoring in scenes, for animal, is currently one of the most active research topics in computer vision (CV).

To bridge this gap using AL and introduce a new criterion called Transfer Sampling (TS). TS uses Optimal Transport (OT) to find corresponding regions between the source and the target data sets in the space of CNN activations. The CNN scores in the source data set are used to rank the samples according to their likelihood of being animals, and this ranking is transferred to the target data set.

Interference of wildlife into habitat without prior knowledge is known to be destructive for both human beings and animals. Forest fire is an important hazard that occurs periodically due to the natural phenomena /human activities. The aim is to bring out this system based on IOT & wireless network with cloud updation. The motion of wild animals are captured by using sensors before entering into human range and alerted using cloud periodic notification. A network based wireless sensor is used to detect forest fire to achieve high verdict accuracy for the early detection without serious outcome. Alarming system is imposed to warn and notify nearby people.

3. System Design

On over years, the accuracy level of any algorithm for animal detection using a computer vision system is still practically unusable under uncontrolled environment. A lot of interesting has been shown to object detection, recognition, and classification, etc. Visual monitoring in scenes, for animal, is currently one of the most active research topics in computer vision (CV). In spite of there are a lot of research, intelligent, real-time, but the methods of dynamic object detection and recognition are still unavailable. This paper suggests using Deep Convolutional Neural Network (CNN) to detect and classify the animals (vertebrate classes) in digital images. Our dataset consists of 12000 different images, 9600 images for training stage, and the rest images (2400) for evaluation stage. After apply the proposed system, we found the best image size for this algorithm

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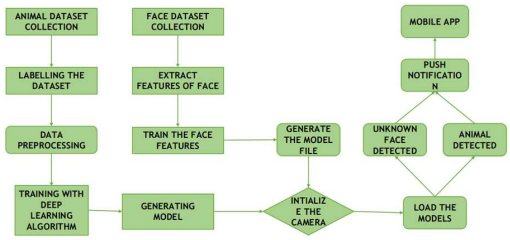
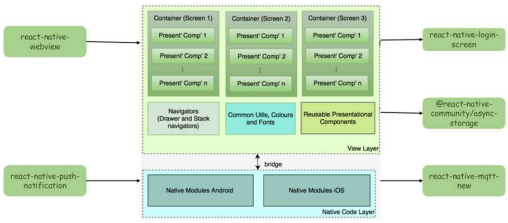
is 50x50 and the best number of epochs is 100. The total performance of the results reached to 97.5%. The experimental results reflected that the proposed algorithm has σ ect on overall animal classification performance positive. Agriculture is the primary source of livelihood for about 58% of India's population. Gross Value Added (GVA) by agriculture, forestry and fishing was estimated at Rs. 19.48 lakh crore (US$ 276.37 billion) in FY20 (PE). Growth in GVA in agriculture and allied sectors stood at 4% in FY20. It's starting to become common knowledge that animal agriculture is damaging our environment. While more people are switching to a vegan diet, and studies are being conducted that show the environmental impact, the world is waking up to the the link between environmental damage and animal agriculture.





- We proposed a deep learning method for animal detection and unknown person. In this project we will be developing a system to detect the wild animals trespassing agricultural fields. Animal detection and classification can help to prevent farmer land damage, trace animals and prevent loss of crop.We will be using face recognition technique to identify unknown person to prevent trespassing. A mobile application is developed using react native. When an unknown person or an animal enters into an agricultural land an alert is sent to the mobile application with a live streaming.

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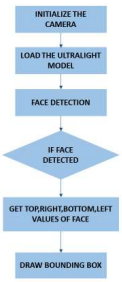
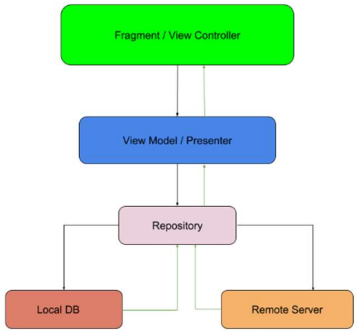


Input	Operator	t	c	n
$112^2 \times 3$	conv3x3	-	64	1
$56^2 \times 64$	depthwise conv3x3	-	64	1
$56^2 \times 64$	bottleneck	2	64	5
$28^2 \times 64$	bottleneck	4	128	1
$14^2 \times 128$	bottleneck	2	128	6
$14^2 \times 128$	bottleneck	4	128	1
$7^2 \times 128$	bottleneck	2	128	2
$7^2 \times 128$	conv1x1	-	512	1
$7^2 \times 512$	linear GDConv7x7	-	512	1
$1^2 \times 512$	linear conv1x1	-	128	1

112×96 or 96×96.

The researchers have used MobileNetV1, ShuffleNet, and MobileNetV2 as the baseline models. All MobileFaceNet models and baseline models are trained on CASIA-Webface dataset from scratch by ArcFace loss, for a fair performance comparison among them. The training is finished at 60K iterations.

To pursue further excellent performance, MobileFaceNet, MobileFaceNet (112×96), and MobileFaceNet (96×96) are also trained on the cleaned training set of MSCeleb-1M database with 3.8 million images from 85,000 subjects. The accuracy of our primary MobileFaceNet is boosted to 99.55 percent and 96.07 percent on LFW and AgeDB-30, respectively.



4. Implementation

The performance of deep learning neural networks often improves with the amount of data available.

The intent is to expand the training dataset with new, plausible examples. This means, variations of the training set images that are likely to be seen by the model. For example, a horizontal flip of a picture of a cat may make sense, because the photo could have been taken from the left or right. A vertical flip of the photo of a cat does not make sense and would probably not be appropriate given that the model is very unlikely to see a photo of an upside-down cat.

As such, it is clear that the The performance of deep learning neural

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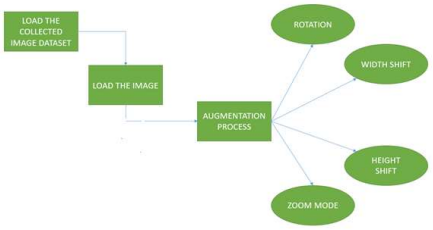
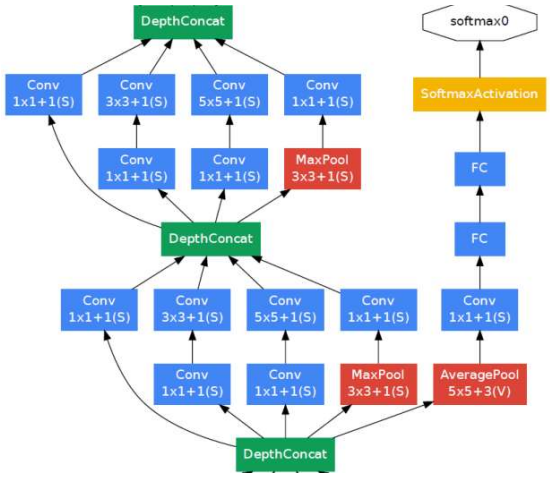
networks often improves with the amount of data available.

Data augmentation is a technique to artificially create new training data from existing training data. This is done by applying domain-specific techniques to examples from the training data that create new and different training examples.

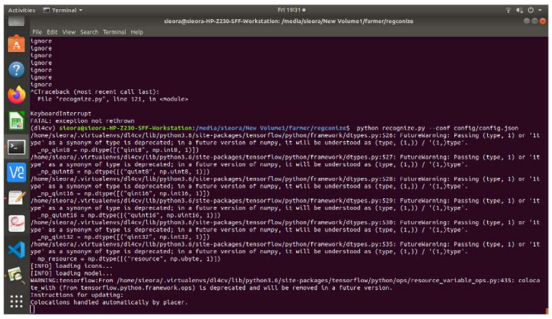


Google is a 22-layer deep convolutional neural network that's a variant of the Inception Network, a Deep Convolutional Neural Network developed by researchers at Google. The GoogLeNet architecture presented in the ImageNet Large-Scale Visual Recognition Challenge 2014(ILSVRC14) solved computer vision tasks such as image classification and object detection. Today GoogLeNet is used for other computer vision tasks such as face detection and recognition, adversarial training etc.

At its inception, the GoogLeNet architecture was designed to be a powerhouse with increased computational efficiency compared to some of its predecessors or similar networks created at the time. One method the GoogLeNet achieves efficiency is through reduction of the input image, whilst simultaneously retaining important spatial information.



Googlenet architecture



Training process

5. Conclusion and Future Enhancement

This project is used to identify animals or illengal tresspassers entering into agriculture fields. This also help in providing efficient protection in a most cheap way and eventually reduce losses incurred by farmers due to loss of crop. At present it is done manually which consumes more time and also In the coming future, we review the application of the animal detection technology in the agriculture field and it can promote for detecting tresspassers and animals entering into agriculture fields with good accuracy. In the field of agriculture there are more chance to develop or convert this project in many ways. Thus, this project has an efficient scope in coming future where manual predicting can be converted to computerized production in a cheap way.

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