[Bird Identification from a Minimal Sample]
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Abstract

It is very difficult to identify the birds by human and computer because different variation of birds to control and analysis. We need to identify Birds that weigh over 1.8 pounds (0.816 kg) because these birds strike can cause lots of damage to the aircraft. In this research we have used Caltech-UCSD Birds-200-2011 Dataset. It is an extended version of the CUB-200 dataset. In this dataset there are 200 bird species category, In this research project we create handled device (android application). In this handled device we use transfer learning to train this model. We try to different model to get accuracy such as VGG16,VGG19, MobileNet,ResNet50,InceptionV3 and Xception.

Introduction

There are thousands of category of birds,It is a difficult task to identify a bird. Most of the model works on different approach such as: Landing ,Take off, Initial Ascent

The accident between bird and aircraft cost millions of dollar per year and it is significant threads to plan safety and caused hundreds of human casualty. Most accidents occur when birds collides with the windscreen or is sucked into the engines of aircraft. These caused millions of dollar, sometimes whole engine need to be change. Therefore we built a android application which identify a bird in a certain distance to avoid bird strike.

Fig.1. During Take off

Fig. 2. During Approach

Proposed Method

In this research project we create handled device (Android Application) to identify the images of the Birds. In this handled device we use transfer learning to train this model. As transfer learning is the most used methodology in Deep learning. We used ResNet50 architecture for training our model. ResNet50 is most suitable for mobile and embedded devices-based vision applications where there is a lack of computational power. The ResNet50 is high speed, good performing and low maintenance deep learning architecture.

Experimental Results and Discussion

Due to the limitations of dataset for birds it is difficult to get better testing score. We found that ResNet50 is the best fit pretrained model in Transfer learning. After training our model we got 98.33% accuracy and our model also performs well in testing.

Handheld devices lack of computational power so it is better to use quantized tflite mode for deployment in mobile and embedded devices.
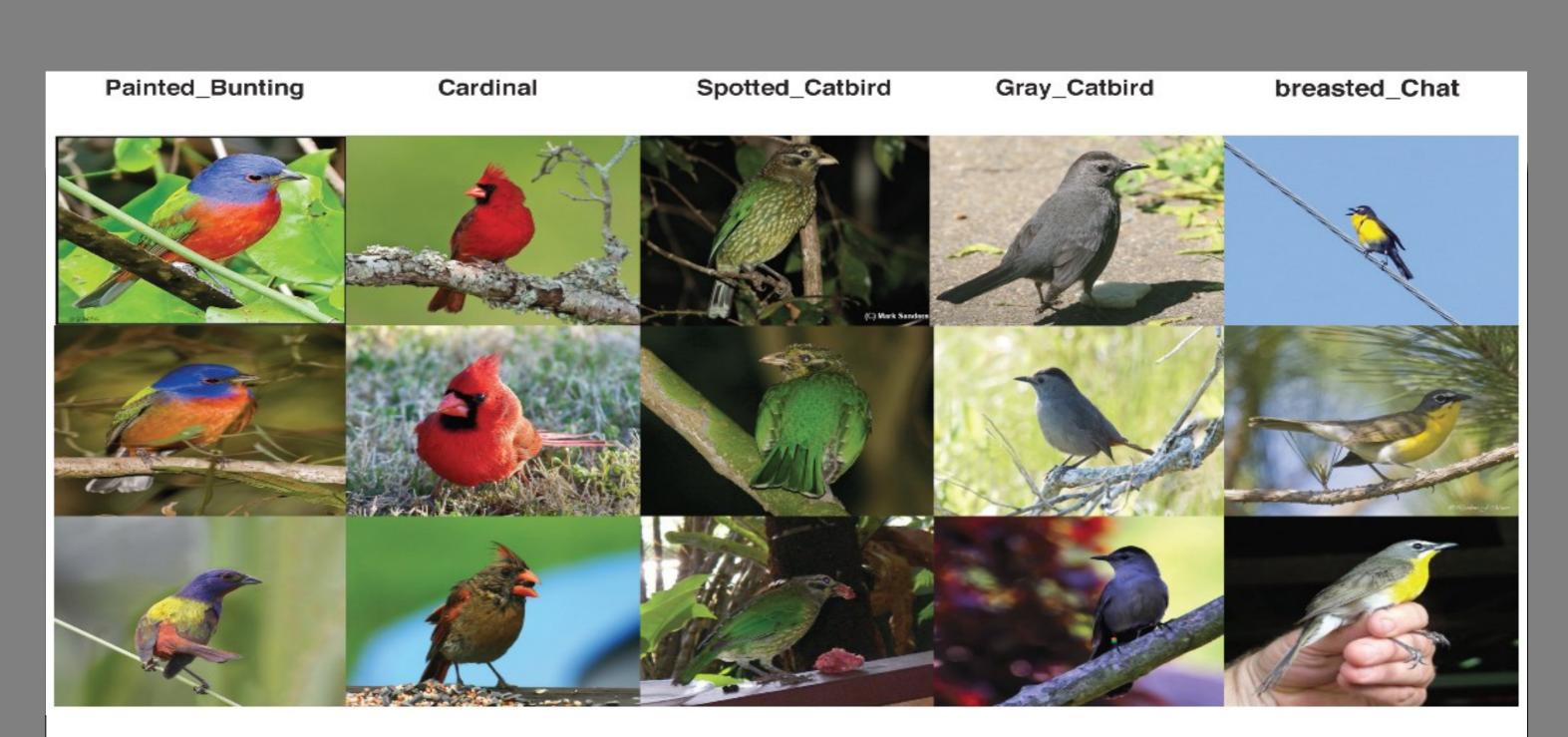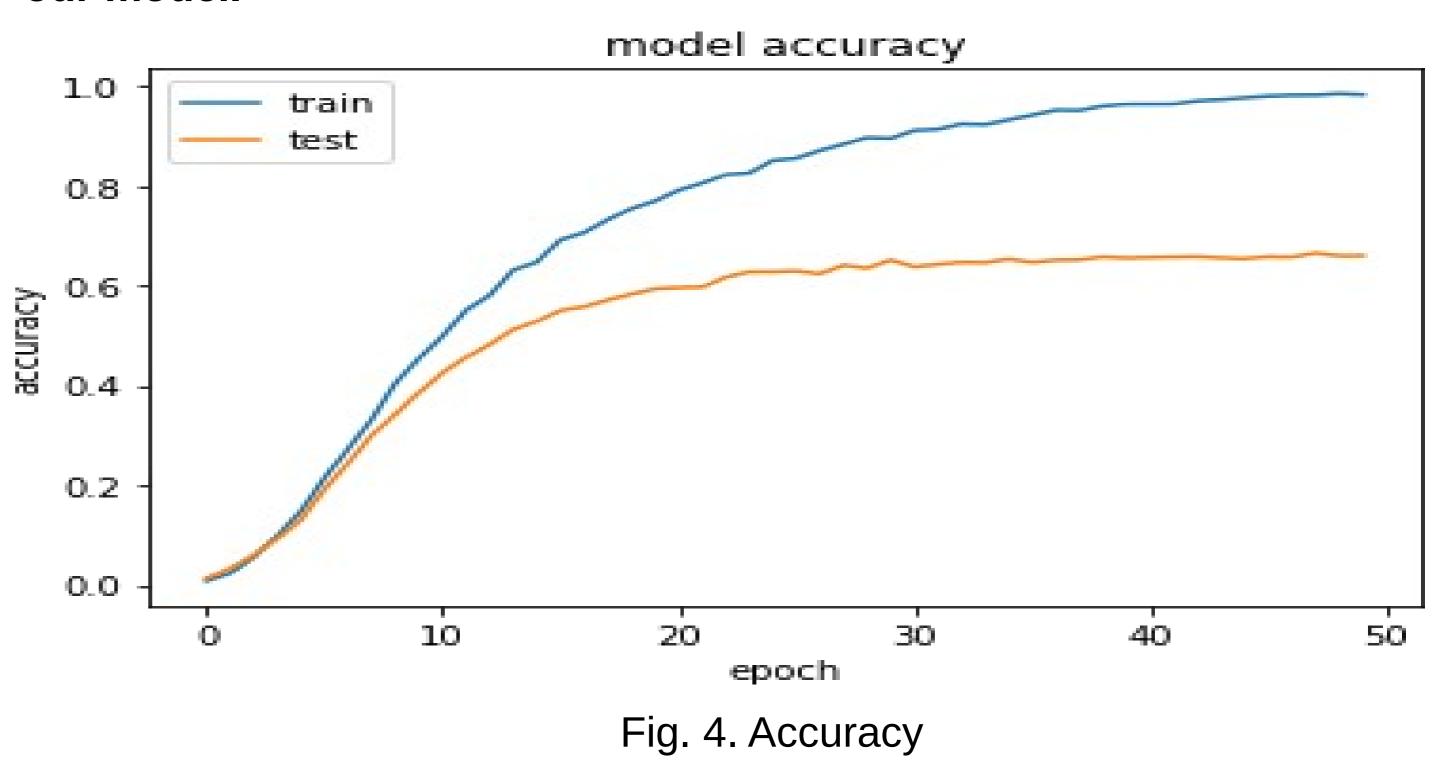

Fig. 3.Different Category of Birds

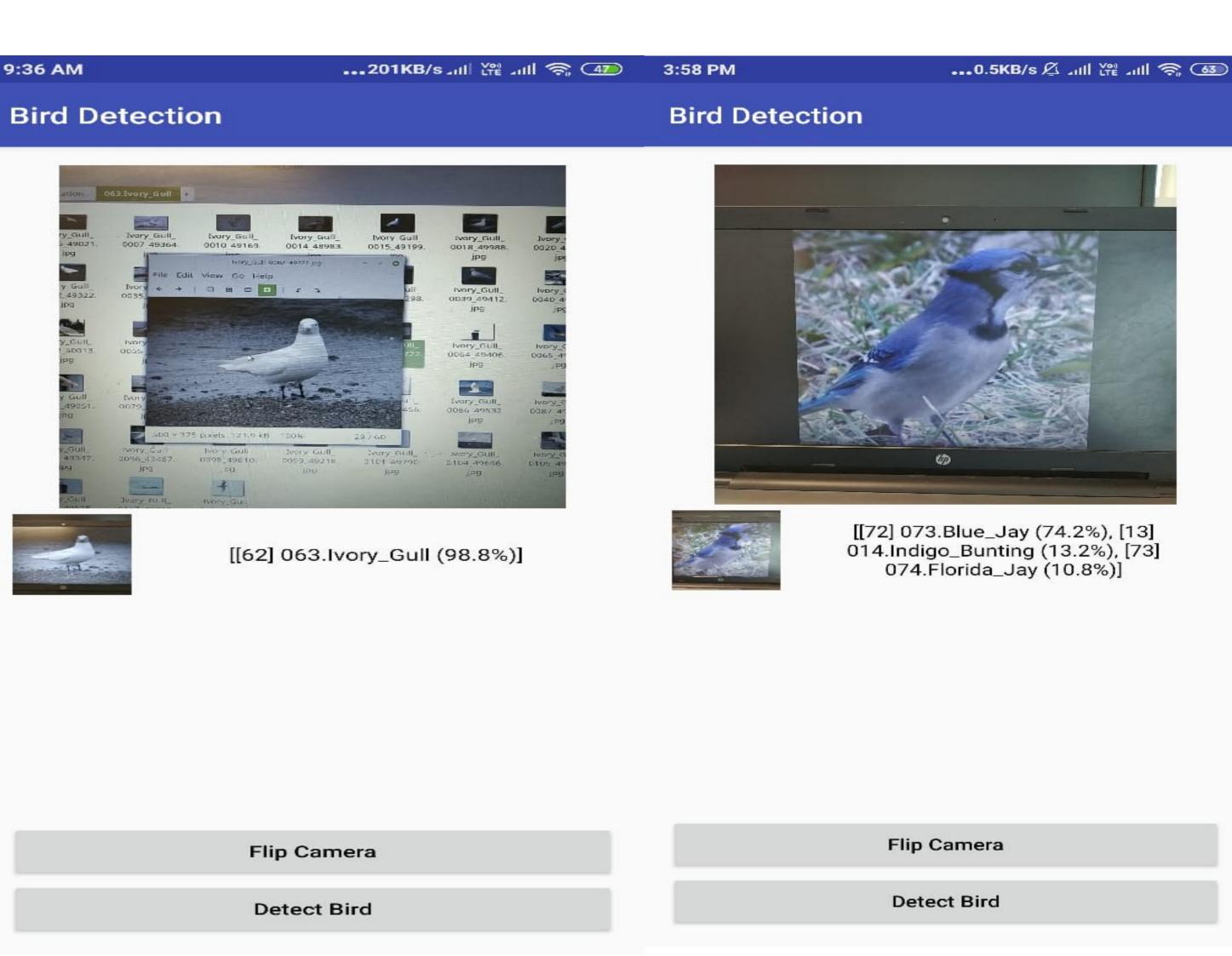**Highest accuracy achieved 98.33% with ResNet50 after fine tuning our model.**

Fig. 4. Accuracy

Fig. 5. Mobile App Demo

Conclusions

In this project with the help of Caltech-UCSD Birds-200-2011 we train a ResNet50 Model using transfer learning and save that model in a HDF5 file and convert it into tflite file and with the help of tflite file we develop a android application that can predict bird category with the probability and with the help of this mobile application we can easily find out the category of the dead bird so that we can easily get information of the birds that which bird can crash aircraft engine so that next time we can reduce the damage at the time of bird strike.

References

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