Introduction to Artificial Intelligence Final Report – Butterfly Classification

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Abstract

1. Introduction

When writing your introduction, please think about the following questions:

- What is the problem the paper is trying to tackle?
  We use MobilenetV2 as the baseline. MobilenetV2 is a kind of CNN algorithm but use **Depthwise Separable Convolution** to separate the conventional convolution to **Depthwise convolution** and **1×1 convolution (pointwise convolution)** . So we hope to use it to compare with VGG16 by implementing the butterfly classification.

- Why this is an important problem?
  Our motivation came from GREEN-WORLD. We hope to implement a dynamic encyclopedia to help tourists to understand the butterfly species and the corresponding knowledge immediately.

- Why the problem is challenging?
  We are not that familiar with those algorithm, so we have to understand the principle behind them and choose the most suitable method to implement. We have to take the time, the cost of calculation and their structure into consideration.

- What are the existing approaches?
  For the classification, there are many different algorithm such as K-Nearest Neighbor algorithm (KNN), Support Vector Machine (SVM) algorithm, Ensemble Learning algorithm, Multi-layer Perceptron (MLP), Convolutional neural networks (CNNs), etc.

- What are the limitations of the existing approaches?
  Any model may have the trade-off. For example, VGG16 have more layers to get the higher accuracy, but its model will be very large and the time of calculation will cost a lot.

- What is the proposal of this paper?
  Like the answer stated in the first question, we want to implement a butterfly classifier. We use MobilenetV2 and VGG16 to observe the performance. We want to compare them by the accuracy after training. And we hope that they can reach up to 80 percent.

- How you prove your proposal is effective?
  We analysis the cost of the time of the result.

These questions are essential for readers to understand the motivation of the authors. Please think deeply before writing your final report.

2. Related Work

- VGG16 vs MobileNetV2: Image Classification [1]
- Butterfly-species-classifier [2]

We have browsed the internet to get some sample model for MobilenetV2 and VGG16. We use MobilenetV2 as our baselines, and we revise some parameters for the layers of VGG16. Since we initially found that VGG16's accuracy was not better than MobilenetV2's, so we want to do some meaningful revision to enhance its performance.

3. Methodology

In the final project, we use two CNN algorithm, MobilenetV2 and VGG16. Since these two methods are CNN but have some revision separately, we compare their performance by checking the accuracy rate of the result and analysis the cost of the time.

4. Experiments

See Table 1.

5. Github Link

https://github.com/MadError/curly-parakeet

Table 1. Comparison of VGG16 and MobilenetV2 with accuracy and time.

Algorithm	Accuracy (10 th Epoch)	Time
MobilenetV2	0.7475	495s
VGG16	0.5531	2106s
VGG16 (Revision)	0.9608	2456s

6. Contribution of each member

兆琪：MobilenetV2, final report and video
明祺：VGG16, final report and video
祥蓉：Code summarizing, final report and video

References

[1] ARNAVR. Vgg16 vs mobilenetv2: Image classification. Available at https://www.kaggle.com/code/arnavr10880/vgg16-vs-mobilenetv2-image-classification/notebook (2020). 1

[2] rajats. Butterfly-species-classifier. Available at https://github.com/rajats/Butterfly-species-classifier (2016/9/20). 1