Image classification on the cifar10 dataset using Tensorflow"

Working Paper for CS4487 Machine Learning

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***Abstract*—Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam ac enim vulputate ipsum pellentesque bibendum imperdiet id nibh. Mauris non varius odio. Pellentesque eu libero porta, porttitor lectus ut, dictum neque. Curabitur maximus, justo non faucibus tristique, tellus turpis ornare elit, et sagittis dui justo convallis ex. Pellentesque a libero dui. In vel lobortis nunc. dui. Vivamus congue nulla.**

***Index Terms*—cifar10, machine learning, data science, image classification**

1. Problem Description

In our course Machine Learning at the City University of Hong Kong, Dr Kede teched us the fundamental mathematical knowledge to solve machine learning tasks. Furthermore, we improved our ability to use this knowledge while working on Jupyter Notebook Tutorials, which were provided by Dr Kede and his assistant PhD students. To proof our learning progress in the theoretical and practical field, we are going to work on a Group Project. To solve an image classification task, we use the widely used dataset "cifar10". The original dataset consists of 60000 coloured images of objects from 10 classes, with 6000 images per category. There are 50, 000 training images and 10, 000 test images. To compare our work with other groups, we are using the following evaluation criteria:

$$Acc(f, D) = \frac{1}{m} \sum_{m}^{i=1} \mathbb{I}\left[y^{(i)} = f(x^{()i)})\right] \tag{1}$$

We can choose the Tensorflow Framework from Google and the Facebook pendant Pytorch. To have a quick start, we got two tutorials which are focusing on bothe frameworks and how to use them while solving an image classification task. Because of the broader Community and after a first evaluation based on the provided evaluation criteria, the group decided to use Tensorflow instead of Pytorch.

2. Literature Survey

3. Technical Details

3.1 Preprocessing

3.1.a Data Augmentation:

3.1.b Z Scoring:

3.1.c Categorical Output:

3.2 Model

3.2.a Convolutional Layers:

3.2.b Kernel Regularization:

3.2.c Batch Normalization:

3.2.d Activation Functions:

3.2.e Max Pooling:

3.2.f Flatten:

3.2.g Dense Layer:

4. Result Analysis

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