
DpicNet: A Transfer Learning Approach Towards Intel Multiclass Image Classification Dataset

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Abstract

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1 Introduction

1.1 Transfer Learning

1.2 Xception

1.3 Dataset

The dataset that we are targeting is located at Intel Multi-class Image Classification containing images of natural scenes around the world. Originally, this dataset was used to host a image classification challenge by Intel. There are 25,000 images of size 150 x 150 pixels within 6 categories: buildings, forest, glacier, mountain, sea, and street. They are splitted into roughly 14,000 images for training, 3,000 images for testing, and 7,000 images for prediction. Images will be preprocessed to match the input requirement of the Xception model.

2 Prior Works

3 DpicNet

3.1 Structure 1

In this structure, we designed the top parts of DpicNet to have 2 hidden layers with 512 and 128 nodes, respectively. All hidden layers are incorporated with a bias term, but no regularization is applied to either the weight or the bias term.

3.2 Structure 2

In this structure, we increased the number of nodes of 2 hidden layers from Structure 1 to be 2048 and 1024 nodes, respectively. All hidden layers are incorporated with a bias term, but no regularization is applied to either the weight or the bias term.

3.3 Structure 3

In this structure, we decreased the number of nodes of 2 hidden layers from Structure 1 to be 256 and 32 nodes, respectively. All hidden layers are incorporated with a bias term, but no regularization is applied to either the weight or the bias term.

Epoch	Loss	Accuracy
1	0.7697	0.781
2	0.3522	0.8758
3	0.2424	0.9120
4	0.1798	0.9362
5	0.1248	0.9557
6	0.1135	0.9608
7	0.1253	0.9589
8	0.0786	0.9734
9	0.0696	0.9786
10	0.0713	0.9784

Structure 1

Epoch	Loss	Accuracy
1	1.0170	0.7748
2	0.3853	0.8619
3	0.2634	0.9043
4	0.1818	0.9348
5	0.1483	0.9479
6	0.1179	0.9577
7	0.0871	0.9701
8	0.1059	0.9672
9	0.0648	0.9800
10	0.0526	0.9838

Structure 2

Epoch	Loss	Accuracy
1	0.8542	0.7265
2	0.4299	0.8413
3	0.3207	0.8776
4	0.2548	0.9020
5	0.1937	0.9251
6	0.1589	0.9362
7	0.1552	0.9416
8	0.1301	0.9535
9	0.1012	0.9653
10	0.1114	0.9612

Structure 3

3.4 Structure 4

In this structure, we increased the number of nodes of 2 hidden layers from Structure 1 to be 8192 and 1024 nodes, respectively. All hidden layers are incorporated with a bias term, but no regularization is applied to either the weight or the bias term.

4 Performance

Loss function used is categorical cross-entropy loss function. The batch size for all experiments is 32.

4.1 Training Data

Each epoch contains 439 steps

4.2 Testing Data

Structure 1: Loss 1.1420924395639847, Accuracy 0.828

Structure 2: Loss 1.5726730382822929, Accuracy 0.808

Structure 3: Loss 0.7388046497994281, Accuracy 0.8196667

4.3 Prediction Data

5 Conclusion