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Investigation of Training Accuracy in Cut Out Images Using Convolution Neural Network

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1. Introduction

In recent years, wild animals such as deer and boars are rapidly increasing in Japanese forests. So, agricultural crops damaged in nearby farms. However, effective control is limited. By using the camera loaded in the drone, it is effective for the detection and monitoring of wild animals in the forests. In order to realize this, it is important to recognize animals in images captured in the forests.

In this study, we recognize images by using convolution neural network (CNN). We compare with digitally processed images which are similar color cut out images and original images for deep learning.

2. Proposed system

CNN used for image recognition consists of input layers, convolutional layers, pooling layers, fully connected layers and output layers. There are two layers in convolutional layers, pooling layers, fully connected layers for each one. Its function is to progressively reduce the spatial size and length output from convolutional layers and reduce the amount of parameters and calculation in the network. Especially, Spatial Pyramid Pooling(SPP) can obtain fixed length output regardless of input image size. In addition, it is possible to improve the accuracy of CNN of various structures by using SPP in the pooling layer [1].

We prepare data set like Figs. 1 and 2 for learning and test. Figure 2 shows the threshold processing of Fig. 1 and cutting out the background (green). We learned these by using CNN and investigate the accuracy of color cut out images and original images.

Figure 1: Original image.

Figure 2: Processed image.

3. Simulation results

We define as the learning steps = 100, the number of learning data sets = 200. Learning data contain 100 images with the object and 100 images without the object. Figure 3 shows the learning accuracy and step on CNN. When step is 0 to 40, the training accuracy of digitally processed images reached 1 earlier than images before processing. In addition, digitally processed images obtains a little bit better test accuracy than images before processing when we learned images of two patterns (Table 1). However, test accuracy is not good. It is necessary to increase accuracy when data sets increased.

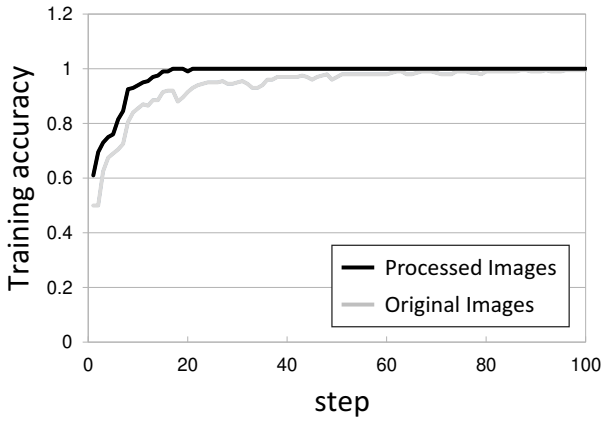

Figure 3: Training accuracy of two pattern.

Table 1: Average of training and test accuracies.

	Original images	Processed images
Training accuracy	0.99	1.0
Test accuracy	0.42	0.48

4. Conclusion

In this study, we compared with digitally processed images which are similar color cut out images and original images for deep learning. We investigated learning accuracy of color cut out images and original images. We succeeded in cutting the green background in images used for learning. Therefore, we considered that the object becomes clear and increases the accuracy.

As our future works, we improve a pooling layer in CNN and would like to obtain better test accuracy.

5. Reference

[1] Kaiming He, Xiangyu Zhang, Shaoqing Ren, and Jian Sun, “Spatial Pyramid Pooling in Deep Convolutional Networks for Visual Recognition”, Computer Vision ECCV, 13th European Conference, Zurich, Switzerland, September 6-12, 2014, proceedings, Part, pp.346-361.