Machine learning for processing image data for disaster management

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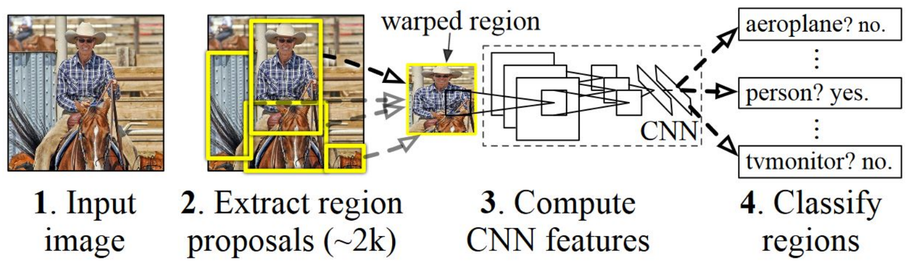
Abstract

Natural disasters are an important global problem affecting many different countries. In Japan, a public website was made available to provide a variety of data from different sensors throughout the country. This data includes information about water levels rainfall levels, and snowfall levels. Moreover, this information includes CCTV cameras positioned along the river, which provide photos of the river conditions in real-time. This provides users with information on the current status of the river, but does not provide any additional information. Thus the user has to process the information manually and makes decisions. Thus the goal of this project is to improve the usability of this CCTV image data image processing with machine learning. Finally we will do snow detection by using Convolution Neuron Network with transfers learning.

Background

Dataset : All of the dataset download from open website which show image along the river
Method : Machine learning with transfer learning by VGG19 model
CNN : Convolutional Neural Network is a class of deep, feed-forward artificial neural networks, most commonly applied to analyze visual imagery.



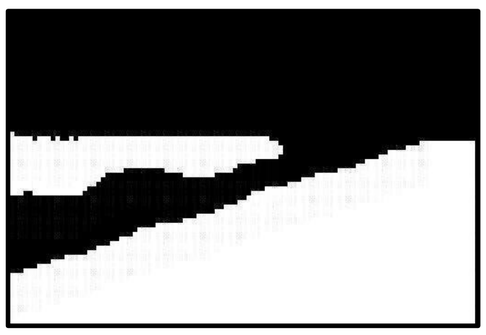
Technical tools

Hardware : - CPU intel core i7-6700K with
- GPU Nvidia Gefroce GTX 1080Ti
Software : - Nvidia CUDA and CUDNN
- Python with Anaconda 3
- TensorFlow with Keras for Convolution Neural Network

Results

The final result is input the image from CCTV camera into the program and the program will label snow area by itself.

The accuracy is around 70-90 % when compare between human label and computer label



Conclusion

This work applies Image processing and Machine learning to make a computer inform the user about the area of the snow by showing in black and white area. That means if we apply this program to all CCTV camera along the river, it can tell the user about the snow condition in that area.

References

1. Images, www.river.go.jp/kawabou/ipTopGaikyo.do
2. CUDNN, developer.nvidia.com/cudnn
3. Python, www.python.org/

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