

Leangseu Kim

01494526

leangseu_kim@student.uml.edu

Computer Graphics

Literature Review #1

Object recognition is one of the problems in computer vision. There are a lot of methods and approaches mechanism out there that utilized Machine Learning and Deep Learning for this problem. There are multiple studies and researches on the topics. There are also tons of algorithm and techniques that people are making and improving everyday.

The first paper raise the concern toward the rise in the amount of identity classes. It affects the amount of classes confusion and increase the error in identifying objects. In this paper, the propose the reordering of hierarchy of class identification. As they also prove that the order or classifications can affect the learning behaviors of Convolutional Neural Networks(CNN).

The first approach that they propose was reordering the classification based on the erroneous. In order to do that, they generated the confusion matrices. In traditional case, the layer of classifier could be in any order. This increase the erroneous in confusion matrix increase as the amount of classification classes increase. In this paper, they propose the reordering of the classification step in the CNN process. For example, instead of identifying between just anything, they just separate between natural objects and artifact objects. By this identify this, they can eliminate the possibilities of confusing Red Strawberry to a Red Door with polka dot. It

is better illustrated in figure 1(b) of the paper, where the bottom red box represent artifact objects and the group of the top boxes represent natural objects. Thus, this would be more efficient and less erroneous for the final result.

On the contrary, the second paper propose a different method for training. Instead of using dividing images into tensors before processing with labeling like traditional CNN. Instead, they feed the training set with global and local features for labeling. This prove to increase the performance and accuracy. Since they are using both global and local features, they received higher erroneous in the training sets. They would start with the low level features process. Then they extract it and combine mid level features and high level features. This where global features come into play. They compute and fuse the layer to classify the object.

Both of the paper's approaches toward object classifications were good. There are increase in performance and accuracy in each cases. However, they also has some draw. The first proposal only improve the existed algorithm. In addition, there is no guarantee the best training order outcome without human intervention. Similarly, the second paper also have some draw back. Due to the required process of feeding both global and local features, it lost the flexibility toward to real use case. Since global and local features data feeding is difficult to use, it do not work well with difference solutions.

References

```
@article{
  Bilal2018, doi = {10.1109/tvcg.2017.2744683},
  url = {https://doi.org/10.1109/tvcg.2017.2744683},
  year = {2018},
  month = {jan},
  publisher = {Institute of Electrical and Electronics Engineers ({IEEE})},
  volume = {24},
  number = {1},
  pages = {152--162},
  author = {Alsallakh Bilal and Amin Jourabloo and Mao Ye and Xiaoming Liu and Liu
  Ren},
  title = {Do Convolutional Neural Networks Learn Class Hierarchy?},
  journal = {{IEEE} Transactions on Visualization and Computer Graphics}
}

@article{
  Iizuka:2016:LCJ:2897824.2925974,
  author = {Iizuka, Satoshi and Simo-Serra,
  Edgar and Ishikawa, Hiroshi},
  title = {Let There Be Color!: Joint End-to-end Learning of Global and Local Image Priors
  for Automatic Image Colorization with Simultaneous Classification},
  journal = {ACM Trans. Graph.},
  issue_date = {July 2016},
  volume = {35},
  number = {4},
  month = jul,
  year = {2016},
  issn = {0730-0301},
  pages = {110:1--110:11},
  articleno = {110},
  numpages = {11},
  url = {http://doi.acm.org/10.1145/2897824.2925974},
  doi = {10.1145/2897824.2925974},
  acmid = {2925974},
  publisher = {ACM},
  address = {New York, NY, USA},
  keywords = {colorization, convolutional neural network},
}
```