CS5824/ECE5424: Advanced Machine Learning
Project Proposal

Background:

The convolutional neural network (CNN) is widely used in classification. When classifying an image, it behaves as object detectors to find out the features that represent the important information of the object. We are interested in visualizing the CNN to understand how it classifies the objects. Hence, we have chosen three papers that are related to CNN network and feature localization to reproduce.

Plan:

1. Paper:
    - Grad-CAM: Visual Explanations from Deep Network via Gradient-based Location

    Relevant papers:
    - Learning Deep Features for Discriminative Localization
    - Network in Network

2. We plan to use the shared code from github https://github.com/Ankush96/grad-cam.tensorflow to reproduce this work. We will do the debugging by Python in PyCharm. We will use the dataset from kaggle Zoo-Animal-Classification to train and test the model. To make an easy start, we will choose four kinds of animals from overall seven kinds in the dataset.

3. To evaluate our model, we will output the heatmap and superpose it onto the original input image to check whether the heatmap highlights the significant features of objects, e.g., long nose of elephant, sharp beak of birds. We plan to reproduce the heatmap that highlights the object features based on the Grad-CAM algorithm. We will test the performance of classification among different animals from the same kind, such as chub and catfish; as well as animals from different kinds, like fish and birds.

Tasks:
Environment test and dataset configuration: Yu Guo
Main code debugging: Ruihao Wang
Training model optimization: Liujun Zhang
Result evaluation: Yijie Zhou