CPSC532M Project Proposal: 2019 ICLR Reproducibility Challenge

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I. Project Overview

In this project, we plan to do a reproducibility challenge of the 2019 ICLR paper: **Stacked U-Net: A No-Frills Approach to Natural Image Segmentation.** The link of the paper is as follows: https://openreview.net/pdf?id=BJgFcj0qKX.

In this paper, the authors proposed stacked u-nets (SUNets), aiming at achieving higher-resolution pixel-level outputs in semantic segmentation and object detection tasks. SUNets expands the power of u-nets by stacking u-net blocks into deep architectures and iteratively combine features from different resolution scales while maintaining resolution. Specifically, the authors in this paper first introduces the implementation of u-net module. Then, they employ the u-net module in their proposed SUNets for ImageNet classification, and extend SUNet to segmentation by removing a global average pooling layer. The experiments are performed to evaluate SUNet architectures on ILSVRC-2012 classification dataset, PASCAL VOC 2012 semantic segmentation benchmark and urban scene understanding Cityscape datasets.

The project consists of three parts. The first part is the literature review of image classification and segmentation, u-nets and some other related techniques. The second part is the implementation of the challenged paper in tensorflow to identify the reproducibility. The third part is the comparison of our implementation results some other related approaches. Based on the comparison, we try to obtain some extra results and conclusions, and discuss the possibility of extending the works to enhance the performance.

II. Timeline of the Project

- From Oct. 12 to Oct. 21: We will do literature review to obtain deep understanding of the area and the challenged paper.
- From Oct. 22 to Oct. 25: We will familiarize tensorflow and the big picture of how to implement the paper in tensorflow.
- From Oct. 26 to Dec 5: We will implement the experiments in the challenged paper based on tensorflow, and identify of the reproducibility of the challenged paper.
- We will compare the results with related approaches and obtain extra results beyond the results in the challenged paper. We will also discuss the possibility and direction of extending the works.

III. Contribution

The contributions of this project are as follows:

- We challenge the reproducibility of the paper **"Stacked U-Net: A No-Frills Approach to Natural Image Segmentation"** based on tensorflow.
- We discuss the possibility and direction of extending the works in the challenged paper.
- The SUNets in the paper is claimed to be written in pytorch. We are the first team to make it a tensorflow version. We plan to add the tensorflow version of SUNets as a lib for tensorflow community,