MACHINE LEARNING II - PROJECT PROPOSAL

Face Mask Detection

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Proposal

One from amongst other advantageous areas of Deep Neural Networks (DNNs) is computer vision, which is the ability for a computer to see and understand and interpret accurately what is seen. Wikipedia [1] noted that, Computer vision is an interdisciplinary scientific field that deals with how computers can gain high-level understanding from digital images or videos.

Over the decades, big companies like Microsoft and others have created deep learning models which can be re-used as transfer learning. Noting that these models have different performance/accuracy, what if we could ensemble various high accuracy models to have more accurate results than relying on one model? Hence this project.

Problem

With the eruption of Coronavirus disease 2019 (COVID-19)[2] in Wuhan, China, in December 2019; the world has not remained the same. Who could have imagined a virus, this deadly shake the whole world?

The importance of face masks[3] became mandatory to dampen the spread through the human respiratory channels (e.g. nose, mouth).

The problem will be effectively wearing a face mask. Hence, we will use a pre-trained model(s) to detect a person:

- with mask,
- without mask,
- mask worn incorrectly.

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[1] Wikipedia- "Computer Vision", https://en.wikipedia.org/wiki/Computer_vision

[2] Wikipedia- "COVID-19", https://en.wikipedia.org/wiki/COVID-19

[3] Centers for Disease Control and Prevention (5 April 2020). "What to Do if You Are Sick". U.S. Centers for Disease Control and Prevention (CDC). Archived from the original on 14 February 2020. Retrieved 24 April 2020.

Dataset

The dataset is from kaggle, titled Face Mask Detection with 853 images belonging to 3 classes as well as their bounding boxes with the face mask's location.

Method/Framework

A pre-trained model, Xception[4] will be utilized as part of transfer learning in Deep Neural Networks. Francois Chollet[5] described Xception- "in short, the Xception architecture is a linear stack of depthwise separable convolution layers with residual connections."

PyTorch will be our framework for deploying this model all things working together, else TensorFlow framework.

Reference

The Xception paper by Francois Chollet will give us a good background knowledge and make-up in the Xception pre-trained model.

Network's Performance

The network's performance will be judged using accuracy score.

Timeline

This project between both participants should roughly be concluded within *four weeks.*

Where:

- week 1- get and preprocess data,
- week 2: train model with Xception,
- week 3: testing model(s),
- week 4: conclude/reporting.

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[4] Computer Vision and Pattern Recognition, arXiv:1610.02357

[5] Xception: Deep Learning with Depthwise Separable Convolutions, https://arxiv.org/pdf/1610.02357.pdf