

DeepFaking Masks on Unmasked Images using Deep Learning

Problem Description:

In this project, we will be using deep learning techniques to build a pipeline that automatically and accurately places masks on the faces of unmasked people in images.

Significance

As the pandemic of 2020 hit us, our lives changed in many ways. One of the significant life changes that we had to adopt was wearing face masks whenever we go out. Although the masks shield us from the contagious virus, wearing masks has made it difficult to identify people easily. [1] Using unmasked images, the most accurate algorithms fail to authenticate a person about 0.3% of the time. Masked images raised even these top algorithms' failure rate to about 5%, while many otherwise competent algorithms failed between 20% to 50% of the time (even iPhones are failing :'). And removing masks to identify an individual even briefly increases the risk of spreading the virus.

Wearing masks also gives an additional element of disguise to people which has increased the crime rates such as robberies and break-ins [2].

When we achieve our project objective, it can address two scopes:

1. The generated dataset of pairs of images in which the individual is wearing as well as not wearing a mask can aid in building robust modern Face Recognition Models in which an individual does not have to remove his mask to be identified.
2. This will have numerous and significant applications such as, but not restricted to, identifying individuals from their masked videos or images in surveillance footage.

Proposed AI methodology

- Clean and curate the original dataset of masked and unmasked individuals to get the images for training and testing.
- We will be feeding pairs of masked and unmasked faces to the network so that both generator and the discriminator networks compete against each other so that the generator can learn to generate realistic face masked images.
- We will be GANs (will explore out a few such as SimGAN, CycleGAN, StyleGAN, etc) to create realistic pictures of faces with facemasks.

The data sources that will be used

- <https://github.com/cabani/MaskedFace-Net> (for face masked images) - Most of the images in this dataset are not well masked. We will be only selecting the images which are properly masked.
- <https://github.com/NVlabs/ffhq-dataset> (for unmasked images) - Flickr-Faces-HQ (FFHQ) is a high-quality image dataset of 70,000 high-quality PNG images at 1024x1024 resolution of human faces.

References

1. <https://www.nist.gov/news-events/news/2020/07/nist-launches-studies-masks-effect-face-recognition-software>
 - 1.1 <https://nvlpubs.nist.gov/nistpubs/ir/2020/NIST.IR.8311.pdf>
 - 1.2 <https://rebrand.ly/2evam9o>
2. <https://rebrand.ly/4mkrvh3>
 - 2.2 <https://rebrand.ly/adkjheo12neg>
 - 2.3 <https://rebrand.ly/arobz3b>

Team members: Gaurav Bhosale, Rahul Allam, Abhishek Shivdeo