Hair Segmentation
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CS 4990 Final project

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Introduction/Abstract

The purpose of this program is to take in images with their corresponding masks. The model is then to train on the data and allow for new images without masks to be able to generate new mask images.

References/Acknowledgments

-Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow by Aurlien Geron

-https://www.kaggle.com/keegil/keras-u-net-starter-lb-0-277?scriptVersionId=2164855/code U-net model example/tutorial

Dr. Hao Ji

The book provided some insight to the basics when I needed a little more help.

The U-net example provided much of the ground work especially with python syntax and library availability.

Dr. Hao Ji for providing lectures, lecture material both power point and board work. Also for providing and setting up all assignments including Kaggle competitions that had links to all the sources we would need.

Method

The method used in this project is a U-Net based fully convolutional model. Training images are taken as input and a 3 layered mask file consisting of hair, skin and background are the output. Call backs were used to prevent over training and save the best version if there was no increase in performance. Dropout layers were also used to prevent overfitting of data.

Testing data was then input into the model which produced the 3-layered output. This output was then converted to the single layer of hair segmentation, then put through the encoder to produce the proper submission files.

Results

This model produced much higher results than training with only hair masks. The model saw an increase of over 8% accuracy on the Kaggle competition website with just the mask change alone.

Conclusion

Overall this project demonstrated the potential of using different types of training on the same model. This model still has several options to increase performance such as image augmentation using generators or other loss options such as the dice coefficient to name a couple. During this winter break I'd like to further improve these models since more time will be available to me and apply these methods to different types of models using Kaggle. This type of learning is very crucial to the field today, as it can further advance many domains of research and application in areas such as medical imaging detection, or self driving cars for detecting objects of importance.

Links

Link to Images used with Masks from CelebA

https://drive.google.com/open?id=1_H1N39Yr4rVU8rFWorD_2SULDnefuxM-

Link to model and code

https://drive.google.com/drive/folders/11cl8OjLl5SARVGWd9LGTAn6WgZHn1CS9?usp=sharing