# HAIR SEGMENTATION

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## ABSTRACT

Human hair contains diverse colour and texture information which can be significantly varied from case to case depending on different hair styles and environmental lighting conditions. However, the publicly available hair segmentation datasets are relatively small. As a result, hair segmentation can be easily interfered by the cluttered background in practical use. .I have used U-net model for hair segmentation


## INTRODUCTION

The classification of the image at the pixel level, to determine each with a label, is the purpose of semantic image segmentation. Human hair exceptionally portrays one part of our facial appearance, with its significance highlighted in present-day innovations, for example, professional image editing, avatar creation for the video games, and mobile applications for hairdo beautification. By segmentation of hair pixels in a given facial picture, a binary mask can be created that features the foreground pixels of the original image classified as hair, while the rest of the area is labelled as background.

U-net is well known in the biomedical field, which is valuable to perform segmentation tasks when training datasets are limited. It gives global to local information patches. This symmetric structure contains numerous up sampling layers in contrast with the first FCN engineering, utilizing a concatenation operation to collect accurate outputs.

## METHOD

The dataset from the Kaggle used for the mini competition has training set of 1500 examples and the corresponding 1500 training masks. I constructed a U-NET model, which implies it's an end-to-end fully convolutional network (FCN), i.e. it contains only Convolutional layers and does not contain any Dense layer, therefore can accept image of any size. We use Keras callbacks ModelCheckpoint for saving the model after every epoch.The network is compiled using Adam optimizer which uses a variable learning rate. Used *binary_crossentropy* as the loss function. The hyper parameters defined for fitting the model are: epochs=16, batch_size=50

After, the model is trained, the model is saved along with its weights, which is then loaded and used on test dataset to receive the final prediction. Then the final prediction is saved in csv file, which is submitted to Kaggle mini-competition for prediction. The libraries used in the program are keras, numpy and sklearn.

## LINK TO MODEL/CODE

https://colab.research.google.com/drive/1-tYqCe99ACQ2F8dK6EQd71MYmjY1E__d

## LINK TO CELEBA IMAGES

https://colab.research.google.com/drive/1cECLiAdVqtPNzPPwMb1xXZ2jUKv8izwF

## RESULTS

A csv submission file is got on executing the code. This code is submitted to Kaggle to score the prediction. For the CelebA dataset, I downloaded a small set of images from the Kaggle CelebA dataset (https://www.kaggle.com/jessicali9530/celeba-dataset). Below are the screenshots for the dataset provided for Kaggle mini-competition and The CelebA dataset respectively.

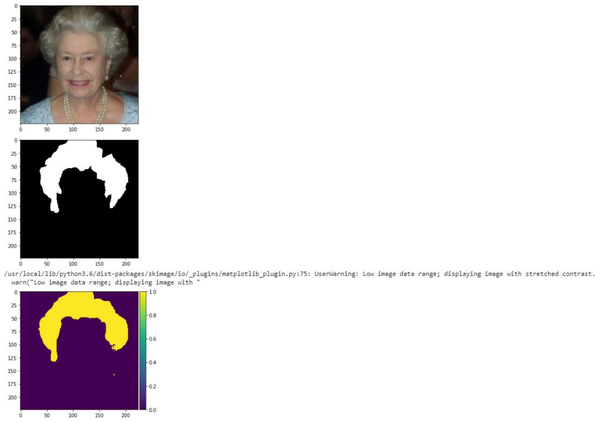

Fig. 1. Results for mini competition dataset

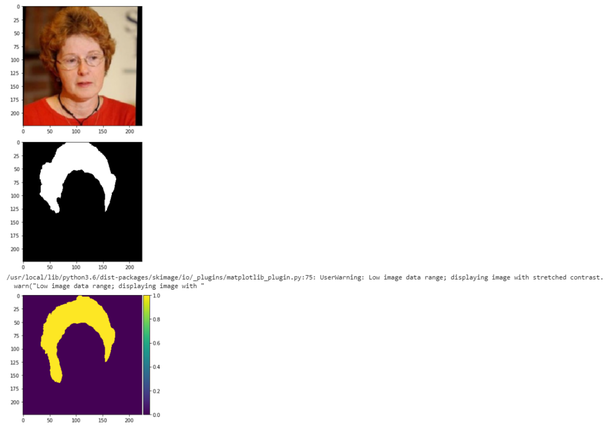

Fig. 2. Results for CelebA dataset

## CONCLUSIONS

I used a U-net model for training the dataset provided by the Kaggle mini-competition and for testing it on CelebA dataset. In the future, better models can be used for the hair segmentation like U-net models with VGG structure for better accuracy

## REFERENCES


- https://www.kaggle.com/keegil/keras-u-net-starter-lb-0-277?scriptVersionId=2164855/code
- https://github.com/jocicmarko/ultrasound-nerve-segmentation
- https://arxiv.org/pdf/1505.04597.pdf


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