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# code= https://drive.google.com/drive/folders/1jHGbiNB\_fordHDtPoEzJBQ3ZWRN-OPCt?usp=sharing

# Introduction

This report presents a gender classification task on CelebA dataset of 30,000 images. Models main function is facial recognition gives is persons gender. Transfer learning with VGG16 was used for feature extraction from the pre-trained model for a better ability of the binary classification model to predict new unseen data. Also, the model was optimized by fine-tuning with hyper-parameters such as the learning rate, and number of epochs. Finally the model was evaluated using the Test set.

# Dataset

The dataset consists of 30,000 labeled images of various celebrities. As the first step, an exploratory data analysis (EDA) was performed using pandas, seaborn, Matplotlib libraries . gender column have binary values where the predictions performs name=Male column .

also other columns are 'image\_id', 'Male', 'Blond\_Hair', 'Eyeglasses', 'Wearing\_Earrings','Bangs', 'Young', 'Smiling', 'Heavy\_Makeup','Straight\_Hair','Black\_Hair'

# Methodology

The VGG16 architecture for image classification was used for feature extraction. initializes the optimizer. The optimizer use different learning rate In this case, it uses Stochastic Gradient Descent (SGD) as the optimization algorithm, with the best learning rate specified as learning rate equal to 0.001. also, loss used for binary classification. Then evaluation metric to be used during training. Epoc stands for times the model will iterate over the training data equal to 10 batch size also 10. Additionally callbacks=early\_stopping\_callback gives functionality as early stopping based on validation metrics.

# Experiments

The experiment included three different learning rates applying batch size of 10. Best results were obtained using a learning rate of 0.001 with a batch size of 10, and using 10 epochs shows the change in the loss function after each epoch.

The training and validation loss, and accuracy results for the best model selected according to the validation results are : Epoch 9/10

Model Accuracy

Test 58.53%

Train 97.6%

Validation 94.2%

# Conclusion

we applied transfer learning on CelebA dataset using VGG16 architecture to efficiently extract the features for gender classification with satisfactory results. The binary classifier showed good performance, with 97.6%accuracy on training data and 94.2% accuracy on validation data after fine-tuning hyper-parameters such as the learning rate, and number of epochs. The best model was then evaluated on test data yielding a test accuracy of 58.53%, which indicates some level of overfitting. The main areas of improvement are applying regularization techniques, and exploring more complex models.