AGE ESTIMATION FROM FACIAL IMAGES USING TRANSFER LEARNING

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ABSTRACT

Age estimation based on the human face remains a significant problem in computer vision. In order to accurately estimate age from a facial image, most of the existing algorithms require huge amounts of face data while training models from scratch. In our project, we develop an age estimation model using transfer learning. A technique used by employing a pre-trained machine or deep learning model The ResNext101 model, an extension of Resnet that allows extremely deep neural network training of 150+ layers compared to other models like VGG16, was the model used in the project.
The aim is to build a model capable of identifying faces and accurately estimating the age of individuals using photos or live video from a webcam feed.

PROBLEM STATEMENT

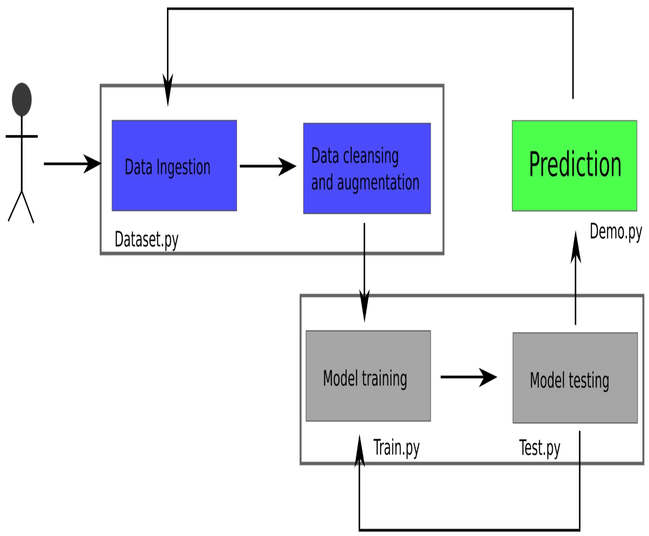
- The Black Maidens of Ghana, as it stands, will not be competing in the next two editions of the U-17 championships because of age fraud.
- Over the last two decades, most countries have increasingly utilized criminal courts to punish people for immigration violations.
- Young people are especially vulnerable to falsely confessing under the pressure of deception because the parts of the brain that are responsible for future planning, judgment, and decision-making are not fully developed until a person reaches their mid-twenties.

METHODOLOGY

In our technique, we modified the last layer of se_resnext101 to have a fully connected layer of 101 outputs to match the output of the last bottleneck block of 2048 as an output. The input layer of our fully connected layer takes 2048 into its input channel. This is due to the fact that we have 101 classes for our classification. The original model is modified by replacing the last layer by using the last_linear variable from the pre-trained model library. Model tuning or hyperparameter optimization, is done during the training of the model to improve the model's accuracy and generate acceptable outcomes.

TRAINING PIPELINE

Using ResNext101 as a base for our transfer learning model. We trained our model on the APPA REAL dataset with 7591 sample images using the adam optimizer with a training epoch of 80 and LR of 0.001. Our generalized pipeline for model training:
Dataset -> Preprocessing -> Training -> Evaluation -> Prediction

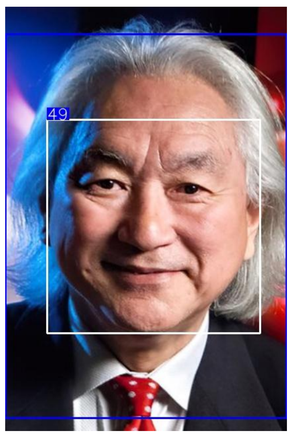


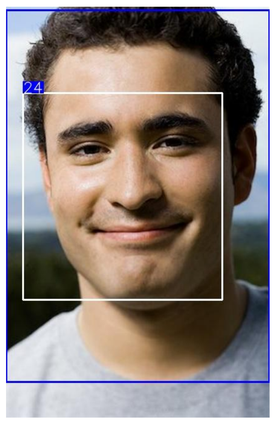
RESULTS


```
[26]
      print("=> start testing")
      _, _, test_mae = validate(test_loader, model, None, 0, device)
      print(f"test mae: {test_mae:.3f}")


      if __name__ == '__main__':
          main()
```

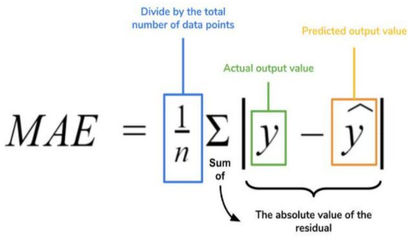
```
Writing test.py
```

```
!python test.py --data_dir data_dir/appa-real-release/ --resume checkpoint/epoch072_0.03446_7.5562.pth

=> creating model 'se_resnext101_32x4d'
=> loading checkpoint 'checkpoint/epoch072_0.03446_7.5562.pth'
=> loaded checkpoint 'checkpoint/epoch072_0.03446_7.5562.pth'
=> start testing
100% 16/16 [00:21<00:00,  1.35s/it]
test mae: 8.914
```





EVALUATION METRIC



Performance metric for assessing the mean of the magnitude between predicted and actual value.

CONCLUSION

We have studied different age estimation techniques during the project's development. An example of such a technique is the use of skeletons and teeth, which are good examples of age markers for age estimation. Lab reports from these methods take forever. Our model not only produces quick results, but we achieved impressive results in our model testing. During model development, to cap the age limit, we used 101 features as our output classes. From our training results, we achieved an evaluation of 7.579 on the validation dataset and 8.914 on the testing dataset using MAE as a metric.

REFERENCE

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