DeepFake Detection Report

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1 Introduction

This report details the work on deepfake detection using state-of-the-art deep learning architectures including Convolutional Neural Networks (CNNs), MesoNet, Residual Networks (ResNets), and ResNeXts. The objective was to effectively detect deepfakes using a comprehensive dataset and robust model training techniques.

2 Literature Review

Extensive literature was studied on the usage of CNNs, MesoNet, Residual Networks (ResNets), and ResNeXts in deepfake detection. These architectures have shown promise in learning intricate features that help distinguish natural from manipulated images.

3 Dataset

A comprehensive dataset of over 10,000 natural and manipulated face images was compiled from multiple sources. The dataset was curated to cover a wide range of manipulation techniques to ensure robustness of the detection model.

4 Data Augmentation

To reduce overfitting, various data augmentation techniques were utilized using **torchvision.transform**, including:

- Flipping
- Rotation
- Scaling
- Brightness Change

These augmentations helped improve the generalization capability of the deep learning model.

5 Model Implementation

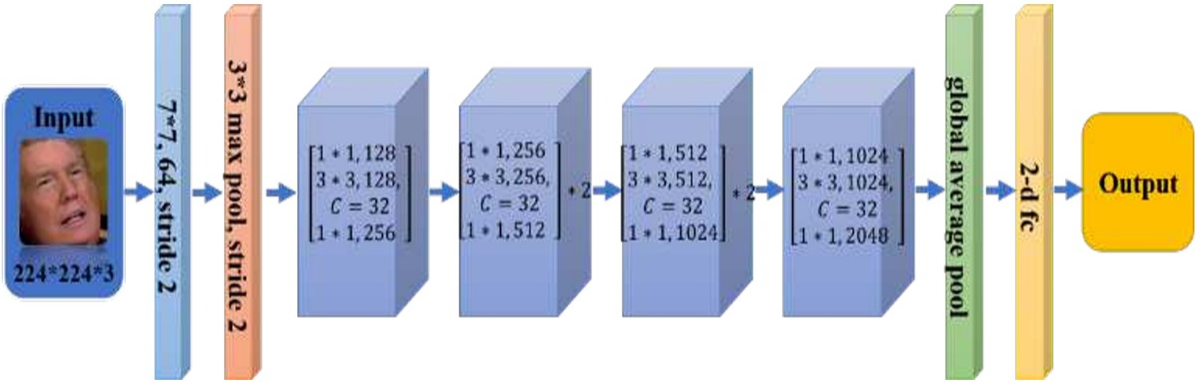
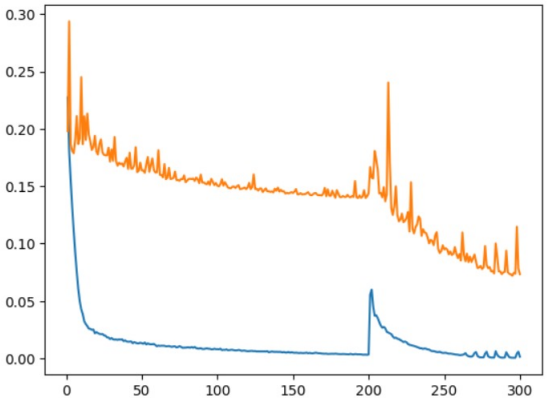
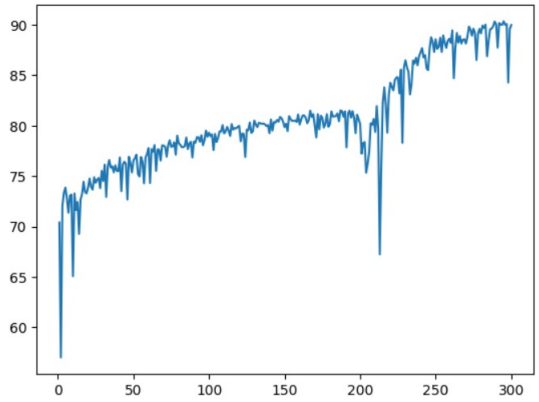


Fig. 3. DeepfakeNet Architecture.

DeepFakeNet was implemented using PyTorch on the dataset of over 10,000 images. The integration of CNNs and ResNeXts allowed the model to learn complex features effectively. The training resulted in a validation accuracy of 93%, demonstrating the model's effectiveness in deepfake detection. The model has also been deployed at Streamlit Application for easier usage. Also see GitHub Repository - DeepfakeDetectionBCS Following are the Loss Plots and Accuracy plots of Training:



Losses



Accuracy

6 Conclusion

The study successfully demonstrated that advanced neural architectures combined with comprehensive data collection and augmentation can achieve high accuracy in deepfake detection. Future work can extend this study by exploring additional architectures and other transfer learning techniques.