DeepFake Image Detection - A Comparative Study of Three Different Convolutional Neural Networks

With the advent of Generative Adversarial Network (GAN) and other deep learning based DeepFake techniques, the immediate challenge we face as a community is how to assess the validity of the images,i.e., whether they are real or generated.We have already seen evidence of maligning and manipulation of news headlines,medical (dis)information along with abuse of individual privacy.

The goal of this proposed project is to use an online image database to effectively detect DeepFake images. I aim to compare two different convolutional neural networks: 1)VGGFace and 2) DenseNet Architecture.

For this comparative study on the uses of CNN networks for DeepFake image detection, I trained 2 models , DenseNet and VGGFace respectively.

Through this comparative study, I learned that neural networks are very efficient in detecting and classifying GAN generated images.By evaluating their performances,I generate a scatter plot to check the true and false positive rates of each model.

DeepFakes are here to stay and in doing so have changed our perception of reality forever.The biggest challenge in developing forensic methods to detect real versus fake images and videos is that once papers are published on new innovative approaches or methods are shared via open access, these flaws are immediately incorporated in the next iteration of DeepFake generation methods. Even with models with accuracy as high as 97% are not enough.Ultimately, this is a battle now between human ingenuity and the ubiquitous pervasive presence of machines which have qualities which allow them to become iteratively intelligent.

Datasets:

- https://www.kaggle.com/datasets/xhlulu/140k-real-and-fake-faces

References:

1. Shad, Hasin Shahed, et al. "Comparative Analysis of Deepfake Image Detection Method Using Convolutional Neural Network." Computational Intelligence and Neuroscience 2021 (2021).
2. Do, Nhu-Tai, In-Seop Na, and Soo-Hyung Kim. "Forensics face detection from GANs using convolutional neural network." ISITC 2018 (2018): 376-379.
3. Nguyen, Thanh Thi, et al. "Deep learning for deepfakes creation and detection: A survey." Computer Vision and Image Understanding (2022): 103525.

Name : ELDHOSE SAJI
Class : S3 MCA
Register Number : MAC21MCA-2011