Sowmika 07-12-2023

# TASK REPORT

*Generating AI Task*

Generating Brain Tumor MRI images for Data Augmentation using Generative Adversarial Networks

## Introduction:

### Choice of Generative Model

The chosen generative model for image generation is a Generative Adversarial Network (GAN). This model consists of two neural networks, a generator, and a discriminator, trained in a competitive manner. The generator creates images from random noise, while the discriminator learns to distinguish between real and generated images. This adversarial training process leads to the generation of realistic images.

### Training Process Overview

1. **Dataset**: The model was trained on a dataset containing grayscale images of size 128x128 pixels.
2. **Data Preparation**: Images were preprocessed by resizing to 128x128 pixels and normalization to the range [-1, 1].
3. **Model Architecture**:
    - **Generator**: Comprised Dense and Conv2DTranspose layers, aiming to generate realistic images from random noise vectors.

- **Discriminator**: Consisted of Conv2D layers followed by a Dense layer, distinguishing between real and generated images.

4. **Optimization**: Adam optimizer with a learning rate of 0.0002 was utilized for both generator and discriminator.
5. **Training**: The GAN was trained for 10 epochs with a batch size of 4 and 50 steps per epoch.

## Assessment of Output Quality

1. **Visual Evaluation**:
    - Generated images showed promise in resembling real images with respect to sharpness and structural features.
    - However, occasional issues like blurriness or lack of diversity were observed in certain generated samples.
2. **Image Comparison**:
    - A comparison plot displayed the distribution of real and generated images using a density plot.
    - Real images were characterized by a distinct distribution, while the generated images showed overlapping but discernible differences.

## Conclusion

The GAN model demonstrated potential in generating images that exhibit realistic features. Despite overall success, there

were limitations in achieving consistent image quality and diversity. Further improvements in network architectures, training strategies, and diversity enhancement methods could enhance the model's performance for generating more diverse and high-quality images.