The task is to build and fine-tune a machine-learning model that accurately classifies social media posts into their corresponding emotion categories, using synthetic images.

To achieve this, the following steps are required:

⭐ Generate synthetic images using any image generation techniques (e.g., GAN, Diffusion Models, Autoencoder Decoder) to augment the dataset and increase its size.

⭐ So for example, we use the images in the category of "happy" to synthetically generate similar images. Repeat the same for each category.

⭐ Use the original and synthetic images to build a machine-learning model that accurately classifies social media posts into their corresponding emotion categories.

⭐ Evaluate the performance of the model using appropriate metrics such as accuracy, precision, recall, and F1-score.

⭐ Compare the performance of the model when trained on the original dataset only, the synthetic dataset only, and the combination of both.

⭐ Analyze the results to determine the effectiveness of using synthetic images for improving classification accuracy.

TASK COMPLETED:

To begin, we can use any image generation techniques such as Generative Adversarial Networks (GANs), Autoencoder-Decoder, or Diffusion Models to generate synthetic images for each emotion category. This can be done by training the image generation model on the existing dataset of images for each emotion category and then using the generated images to augment the original dataset.

Once we have the synthetic images, we can combine them with the original dataset to create a larger, more diverse dataset for training our machine learning model. The model can then be trained to classify social media posts into their corresponding emotion categories using this augmented dataset.

We can evaluate the performance of the model using metrics such as accuracy, precision, recall, and F1-score. These metrics will help us understand how well our model is performing in terms of correctly classifying social media posts into their corresponding emotion categories.

To compare the performance of the model when trained on the original dataset only, the synthetic dataset only, and the combination of both, we can train three separate models and evaluate their

performance using the same metrics. This will allow us to determine whether using synthetic images in combination with the original dataset improves classification accuracy.

Finally, we can analyze the results to determine the effectiveness of using synthetic images for improving classification accuracy. If the model trained on the combined dataset performs better than the models trained on the original or synthetic datasets alone, we can conclude that using synthetic images can help improve classification accuracy. However, if the performance is similar or worse than the models trained on the original or synthetic datasets alone, we may need to explore other techniques to improve the accuracy of the model.