**Introduction to Machine Learning and Pattern Recognition**

**Project Proposal for “*Detecting AI Generated Faces using Machine Learning and Pattern Recognition*”**

**Problem Statement**

With the growing usage of AI and its tools, the need to know the difference between real and AI generated has become necessary. Generative and diffusion models like GANs (Generative Adversarial Networks) and Stable Diffusion are now capable of creating hyper-realistic human faces that are indistinguishable from the real images to the human eye. This creates significant risk in fields like politics, social media, digital forensics where misinformation and identity theft play a major role. We aim to create a system that can detect whether a given facial image is real or generated by AI using techniques like machine learning and pattern recognition.

**Team Members:**

1. **Chanulee:** Responsible for preprocessing of the dataset and handling the training and testing splits.
2. **Vani Seth:** Responsible for implementing and training the neural network architecture like CNN network
3. **Pari Patel:** Responsible for handling the performance evaluation and visualization of results

**Dataset Description:**

We will be using the 140K Real and Fake Faces Dataset from Kaggle [1]. The dataset contains

1. 70,000 real faces from the Flickr dataset [2] collected by Nvidia and 70,000 fake faces generated by StyleGAN [3].
2. Each image is in RGB format and is modified to the size of 128x128 pixels.

**Approach for the project**:

We plan to use supervised machine learning, particularly the Convolutional Neural Networks (CNNs) architecture for image classification. CNNs are widely used for pattern recognition tasks as they can detect and learn features from pixel data. Our pipeline includes:

1. Data collection
2. Data Preprocessing
3. CNN model training
4. Model Evaluation and Visualization
5. Experimenting with other models

**Procedure and Timeline:**

1. Week 1: Data collection, exploration, preprocessing, and augmentation
2. Week 2: Model training with CNNs
3. Week 3: Final testing against different benchmarks, followed by evaluation and visualization
4. Week 4: Documentation, presentation and submission

**References:**

[1] <https://www.kaggle.com/datasets/xhlulu/140k-real-and-fake-faces/data>

[2] <https://www.kaggle.com/datasets/dullaz/flickrfaces-dataset-nvidia-128x128>

[3] <https://www.kaggle.com/datasets/dullaz/1m-ai-generated-faces-128x128>