**Consolidated Project Charter**

**Title: Generative Adversarial Network (GAN) for MNIST Digit Generation Projects**

This charter represents a compilation of four sequential projects focused on harnessing the power of Generative Adversarial Networks (GANs) to generate realistic handwritten digits akin to those in the MNIST dataset. Each project delves deeper into the nuances of GAN architectures and adversarial training, aiming to synthesize high-quality MNIST digit images.

**Project 1: Basic GAN for MNIST Digit Generation**

* **Goal**: Establish a foundation by implementing a basic GAN to generate satisfactory handwritten digits.
* **Tech Stack**: PyTorch, MNIST Dataset, CUDA (optional for GPU acceleration).
* **Duration**: Approx. 2-3 weeks.
* **Team**: Developed by an individual.
* **Project Link**: <https://github.com/heathbrew/Build-Basic-Generative-Adversarial-Networks-GANs-/blob/main/1.C1W1_Your_First_GAN.ipynb>

**Project 2: Advanced GAN for Improved Digit Generation**

* **Goal**: Enhance the GAN model to produce high-quality digit images that are visually comparable to real handwritten digits.
* **Tech Stack**: PyTorch, torchvision, Matplotlib.
* **Duration**: (Specify the duration, e.g., 2 months).
* **Team**: Developed by an individual.
* **Project Link**: <https://github.com/heathbrew/Build-Basic-Generative-Adversarial-Networks-GANs-/blob/main/2.C1_W2_Assignment.ipynb>

**Project 3: Wasserstein GAN with Gradient Penalty (WGAN-GP) for MNIST Digit Generation**

* **Goal**: Implement a WGAN-GP to generate high-quality digit images, ensuring stable training and improved results compared to previous implementations.
* **Tech Stack**: Python, PyTorch, torchvision, matplotlib.
* **Duration**: (Specify the duration, e.g., 3 months).
* **Team**: Developed by an individual.
* **Project Link**: <https://github.com/heathbrew/Build-Basic-Generative-Adversarial-Networks-GANs-/blob/main/3.C1W3_WGAN_GP.ipynb>

**Project 4: Conditional GAN for MNIST Digit Generation**

* Goal : Develop a Conditional GAN to generate high-quality digit images that are visually indistinguishable from real handwritten digits.
* Tech Stack : PyTorch, torchvision, tqdm ,matplotlib
* Duration: 1 week
* Team : Indivisual
* Project Link: <https://github.com/heathbrew/Build-Basic-Generative-Adversarial-Networks-GANs-/blob/main/4.C1W4A_Build_a_Conditional_GAN.ipynb>)

**Organization/Institution**

* Name: Bennett University

**Mentors with Designation**

* (Mohd Mohsin), (Proffessor)

**Observations**

Across these projects, significant insights were gained regarding adversarial training dynamics, model improvements, and the iterative process of GAN development. The quality of generated images evolved noticeably through the projects, reflecting the growing expertise and refined models. This journey has enriched the understanding and practical skills in deploying GANs for realistic image generation, setting a solid ground for further exploration in generative modeling.