

Graduate Certificate in Artificial Intelligence with Machine Learning
AIGC 5504 – Emerging Technologies in Artificial Intelligence

Lab 4 and 5: Hands-On with Generative Adversarial Networks (GANs)

Submission guidelines:

- For this lab, you will need to submit 1 PDF file.
 - Convert your codes to PDF.
 - Name the PDF as follows: `firstname_lastname_LAB4,5.pdf`
 - Go to the course Blackboard → Labs folder → Lab Exercises 4,5 and submit the pdf.
-

Lab goals:

- Understand the fundamental components of Networks GANs.
- Implement and train a GAN for generating synthetic 2D data.
- Explore the adversarial dynamics between the Generator and the Discriminator.
- Visualize and analyze the quality of generated data.

Part 1: Follow the tutorial code given in the lecture, then choose a real-life problem where GANs can be used as a full or part of the solution, then

1. Train a simple GAN

Steps:

2. Set up the Generator and Discriminator networks.
3. Train the GAN by alternating between the Generator and Discriminator updates.
4. Visualize the generated data alongside the real data at different epochs of training.

Deliverables:

5. Code implementation of the GAN.
6. Visualization of the Generator's output during training.

Part 2: Evaluating Generator Performance

- Analyze the Generator's progress by visualizing its ability to mimic the real data distribution.
- **Steps:**
 1. Generate synthetic data using the trained Generator.

2. Compare the generated data distribution with the original data distribution.
 3. Plot and interpret the loss curves for both the Generator and Discriminator.
- **Deliverables:**
 - Loss curves showing the adversarial training dynamics.
 - Plots comparing generated vs. real data distributions.

Enjoy!
