Read Me

Starting from Jan 2024, I have also been invited to take an independent study with Dr. Alexey Prokudin to work with him on his project at **Jefferson Lab**, with the intention of strengthening nuclear physics research. My role involves researching and writing code for generative models, including GANs, diffusion models, and normalizing flows, to generate nuclear physics data and images. This represents an intersection between deep learning and physics, and I am posting the innovative models I have designed and coded here.

The first model is **Tabular-GAN**, a redesigned model based on Generative Adversarial Networks (GANs). Similar to GANs, it can capture the distribution of real data and generate synthetic data. However, unlike traditional GANs which generate images, I modified it into Tabular-GAN to specifically generate three columns of data relevant to nuclear physics.

To achieve this, I designed and implemented both the generator and discriminator, along with the loss function, optimization algorithm, and training process. The resulting synthetic data effectively captures the patterns within the real data and can be used for further research.