**1. Explanation of the Roles of the Generator and Discriminator in a GAN**

A **Generative Adversarial Network (GAN)** is a deep learning model composed of two main components:

* **Generator**: The goal of the generator is to create fake data that looks as realistic as possible. It starts by taking a random noise vector (latent space) and transforms it into a data sample, such as an image, audio, or text.
* **Discriminator**: The discriminator's role is to distinguish between real data (from the training dataset) and fake data (generated by the generator). It functions as a binary classifier and helps train the generator by providing feedback on the quality of the generated data.

A GAN operates based on the competition between these two components. The generator continuously improves to create increasingly realistic fake data, while the discriminator improves to better distinguish between real and fake data. This adversarial process helps the model generate highly realistic outputs over time.