**DL Lab 07\_Q6**

**Observe the model performance improvements between the Image De-noising AE and the Vanilla CNN AE.**

**1. Training Both Models:**

* Train both the Image De-noising AE and the Vanilla CNN AE on the same dataset. For the De-noising AE, add noise to the input images and then train the model to denoise them.
* The Vanilla CNN AE will learn to encode and reconstruct images without dealing with any noise.

**2. Evaluation Metrics:**

You can use the following metrics to compare the performance:

* **Reconstruction Loss (MSE or MAE):** Measure the difference between the input and reconstructed image.
* **PSNR (Peak Signal-to-Noise Ratio):** A higher PSNR value indicates better image reconstruction quality.
* **SSIM (Structural Similarity Index):** Measures the perceptual difference between the input and reconstructed images.

**3. Visual Comparison:**

* **Reconstructed Images:** Compare the reconstructed images from both models. The De-noising AE should be better at removing noise and providing clearer images, while the Vanilla AE may perform worse with noisy inputs.

**4. Learning Curves:**

* Plot the **loss curves** during training for both models. Observe if the De-noising AE converges faster or achieves lower loss compared to the Vanilla AE.

**5. Handling Noisy Inputs:**

* **Noisy Input Handling:** Apply the same noise level to both models and see how well they can reconstruct the original image. The De-noising AE should excel here, demonstrating its noise-robust capabilities, while the Vanilla AE may struggle with noise.