Variational Autoencoder

In this experiment, we trained a Variational Autoencoder (VAE) to evaluate the impact of different epochs, latent space dimensions, and dataset quality on model performance. We conducted multiple runs, varying these parameters, and tracked the changes in loss and accuracy using Weights & Biases.

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Number of Epochs:

Initially, we trained the model for 10 epochs. Later, we increased it to 50 epochs, leading to improved results.

Latent Space Dimensionality:

We experimented with 50, 128, and other dimensions. The best results were achieved with a latent dimension of 128, which provided better reconstructions while avoiding overfitting.

Data set cleaning

Initially, we used 700 images per class, which included some lower-quality images.Later, we filtered the dataset to retain only 150 high-quality images per class. This reduction in dataset size led to more stable training and better reconstructions, as the model was learning from cleaner inputs.

- Latent Dim = 50:

The model was able to capture general structures but struggled with finer details. Reconstructions appeared blurrier and lacked sharpness.

- Latent Dim = 128:

This setting provided the best balance between compression and reconstruction quality. The latent space was expressive enough to capture fine-grained image details.

Section 1