Implementation 1 - VAE-based Medical Image Generator

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1 Progress

During the reporting period, the following key milestones were achieved:

1. Git Repository and Folder Structure: A dedicated Git repository was created for the project, enabling version control and collaboration among team members. The repository was organized with a proper folder structure to ensure efficient management of code, data, and documentation
2. Dataloader Implementation: A dataloader was implemented to handle the Medmnist Dataset, a widely-used dataset for medical image analysis. The dataloader enabled efficient loading and preprocessing of the dataset, ensuring compatibility with the subsequent stages of the project. Furthermore, the dataset was visualized to gain a better understanding of the data types and characteristics
3. VAE Implementation: The initial implementation of the Variational Autoencoder (VAE) was started. The VAE architecture, consisting of an encoder and a decoder, was designed to learn a latent representation of the medical images and generate realistic image samples. The core components of the VAE, including the probabilistic encoder and decoder, were implemented

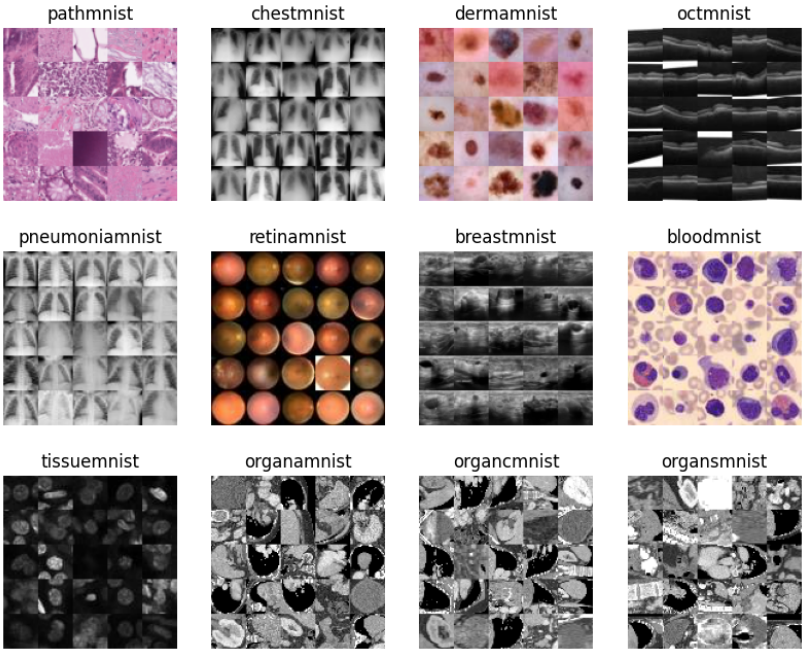

Abbildung 1: Visualization of the different datasets in MedMNIST using matplotlib.

2 Next Steps

1. VAE Training: The primary objective is to make the VAE training process functional. This involves fine-tuning the VAE architecture, optimizing hyperparameters, and implementing the necessary loss functions, such as the reconstruction loss and the Kullback-Leibler (KL) divergence loss. The training pipeline will be established, and the model will be trained using appropriate optimization techniques.

2. Training Result Visualization: Once the VAE training is successfully implemented, the next step is to visualize the training results. This includes generating sample medical images from the learned latent space and comparing them with the ground truth images.