Lecture 2 - Exercise sheet

Master in Deep Learning - Generative Models

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Problem 1.

What happens when you adjust the hyperparameter β that multiplies the KL divergence in the β-VAE loss? Explain with your own words.

Problem 2.

How would you discover which vectors represent specific features in the latent space? For example, if you trained a VAE on MNIST, how would you discover which vector corresponded on average to a specific digit?

Problem 3.

How would you discover vectors in the latent space that produce a specific change? For example, consider a VAE trained with images of faces. How would you discover a vector that, when summed to the latent representation of a face, makes that face smile? Assume that you have access to the feature for each of the training images. In the example, you know if a face in the image is smiling or not.

Problem 4.

Can you modify the the shape of the input shown in fig. 1, step by step, through a deconvolution process as shown in class? First, apply the conceptual transformations for the stride and output padding, then the shape modification after the kernel, and finally the shape modification from the padding parameter. Use a kernel size $K = 5$, a stride $S = 3$, an output padding $OP = 1$ and a padding $P = 1$.

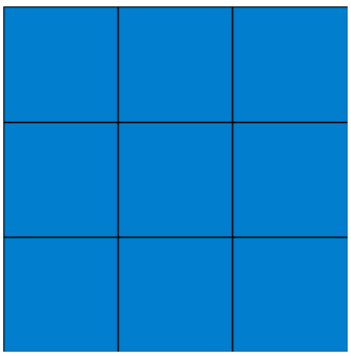

Figure 1: Original input image.