L aboratório
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COMOD
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Relatório de Atividades

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1 INTRODUTION

Variational auto-encoder (VAE) model is a stochastic inference and learning algorihm based on variational Bayes (VB) inference proposed by Kingma and Welling (2014). This is a generative technique whose central idea is the development of representations in a low-dimensional latent space that can be mapped back into a realistic-looking image.
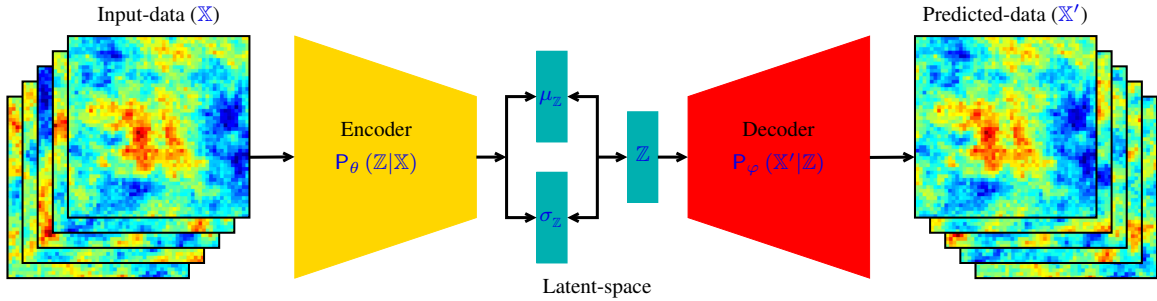
Higgins et al. (2016) introduced the β-VAE, a modification of the original VAE, that introduces an adjustable hyperparameter β to balance latent channel capacity and independence constraints with reconstruction accuracy. They demonstrate that with tuned values of β ($\beta > 1$) the β-VAE outperforms VAE ($\beta = 1$).

2 ZHANG ET AL. (2022)

Variational auto-encoder (VAE) model is a generative network based on variational Bayes (VB) inference proposed by Kingma and Welling (2014).

Zhang et al. (2022) proposed a method to reconstruct porous media based on VAE and Fisher information with good quality and efficiency.

Consider the input data $\mathbb{X} = \left\{ \boldsymbol{x}^{(i)} \right\}_{i=1}^{\mathsf{N}}$ consisting of N *i*ndependent and *i*dentically *d*istributed (*i.i.d.*) samples of the continuous (or discrete) variable $\boldsymbol{x}$.

$$\mathbb{Z} = \mu_{\mathbb{Z}} + \sigma_{\mathbb{Z}} \cdot \varepsilon, \quad \text{where} \quad \varepsilon \sim \mathbb{N}(0,1) \tag{1}$$

REFERENCES

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Ting Zhang, Tu Hongyan, Xia Pengfei, and Du Yi. Reconstruction of porous media using an information variational auto-encoder. *Transport in Porous Media*, 143(2):271–295, 2022. doi: 10.1007/s11242-022-01769-5. URL https://doi.org/10.1007/s11242-022-01769-5.