Conditional geological facies generation using Denoising Diffusion Models

Ferdinand Bhavsar*†[1]

[1]Mines Paris - PSL – MINES ParisTech - École nationale supérieure des mines de Paris – France

Résumé

The spatial distribution of lithofacies is essential to simulate in many fields of geosciences. In particular, mapping the configuration of channelized reservoirs is useful for resource exploration, hydrogeology, and geothermal energy production. For several years, deep generative learning models, and more specifically generative adversarial networks (GANs), have proven to be effective alternatives to traditional geostatistical simulation models. Diffusion models are gaining popularity as a new class of generative models that offer an alternative to previous models such as GANs and VAEs. They have been shown to produce high-quality results that are comparable to those of GANs. Their main advantage is their training paradigm, which is more stable than previous adversarial training methods. The main focus of this work is to simulate conditional realistic facies indicator maps and compare the results to previous GAN models.

*Intervenant

†Auteur correspondant: ferdinand.bhavsar@minesparis.psl.eu