Défi 3 : Generative Artificial Intelligence

Défis en Intelligence Artificielle 2023-2024 - UMONS

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1 Project statement

This project focuses on the application and comparison of three different generative models, utilizing a dataset comprising various human facial images. You will consider the following models:

1. **A multivariate Gaussian** with diagonal covariance matrix. The model is trained with maximum likelihood estimation as presented in the first lab. This model represents a naive baseline where each pixel is treated independently.
2. **A variational auto-encoder (VAE)** similar to the one presented in the second lab.
3. **A diffusion model** similar to the one presented in the third lab.

Your task involves conducting experiments using provided implementations of these models and addressing a set of predefined questions for each.

2 Deliverables

We ask you to upload to Moodle a **single zip file** containing your project **report** (PDF) and a single Python **notebook file** (.ipynb). Submit one file per group (composed of two students). The deadline is **February 2, 11:59 pm**.

Your *report* (ideally written in LaTeX) can be a maximum of **5 pages** with **font size 12** in **PDF format** and must contain **three sections**, one for each model. All images should be contained within **at most two dedicated page** of the report, with no images appearing elsewhere. You should include a justification of your choices and discuss your results, including all figures. The report may be written in either French or English. You should acknowledge any AI tools that have been used to write the report (e.g., ChatGPT).

Your *code*, based on the notebook available here, should be properly structured and well-commented, and your experiments should be **reproducible**.

Do not wait till the last minute. Late submissions will not be allowed.