Master/ Bachelor Thesis

Generate Near Infra-red iris Images using Latent Diffusion Models
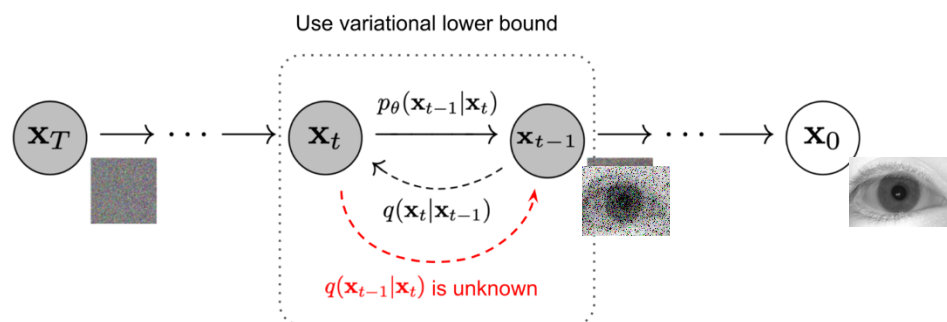
da/sec

da/sec is the biometrics and Internet security research group and is affiliated with University of Applied Sciences Darmstadt and the National Research Center for Applied Cybersecurity (ATHENE). The group is led by Prof. Dr. Christoph Busch. The focus of the group is on highly innovative and applied IT security research in the special fields of biometrics. Read more on www.dasec.h-da.de.

Motivation & Goals

By decomposing the image formation process into a sequential application of denoising autoencoders, Diffusion Models (DMs) achieve state-of-the-art synthesis results on image data and beyond. These techniques can be used to generated NIR iris images to reduce the lack on several domain such as iris on the move, Fitness for duty or Presentation Attack Detection.

Use variational lower bound

$$p_\theta(\mathbf{x}_{t-1}|\mathbf{x}_t)$$

$$q(\mathbf{x}_t|\mathbf{x}_{t-1})$$

$q(\mathbf{x}_{t-1}|\mathbf{x}_t)$ is unknown

* diffusion process of generating a sample by slowly adding (removing) noise. (Image source: Ho et al. 2020 with a few additional annotations)

Tasks

- Analyse the State of the art of Latent Diffusion Models applied to NIR iris images
- Train a LDM to created NIR Iris images.
- Evaluation and benchmark of manually labelled tagged images and automatic iris images.
- Evaluate iris recognition System.

Requirements

- High motivation, interest in security technologies and biometrics
- Strong interest in research
- Good programming skills (Python) are one advantage.

Start / Period

Immediately / by appointment

Contact

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