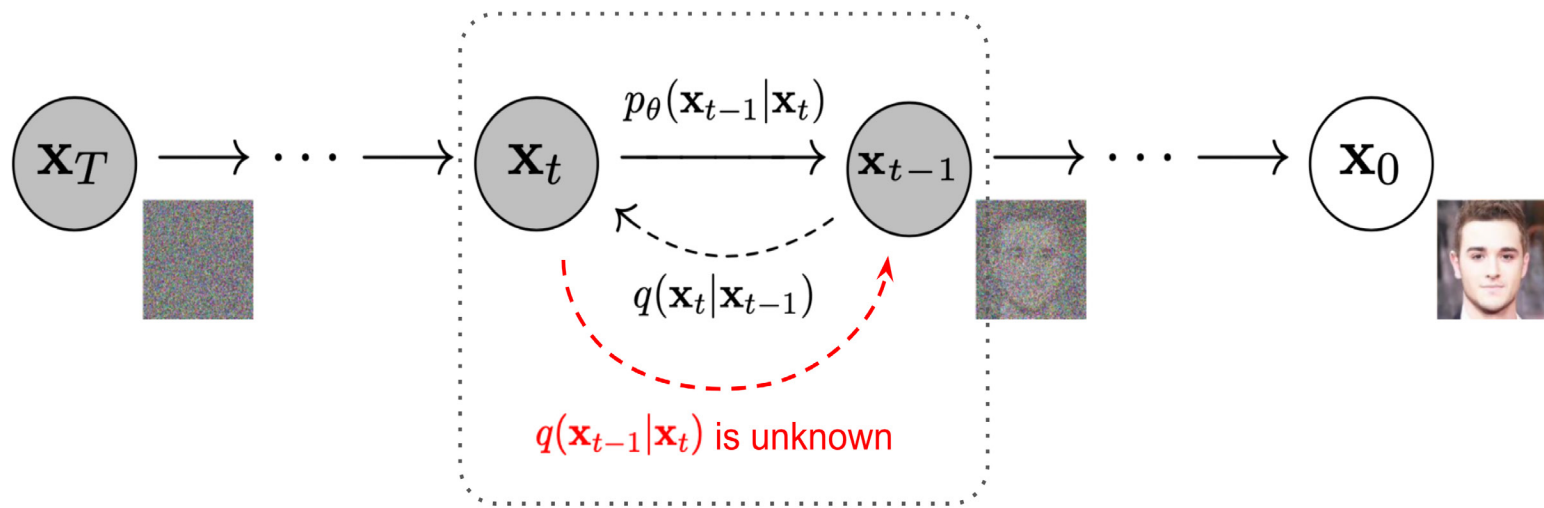


Use variational lower bound



# HIGH QUALITY IMAGE SYNTHESIS

## Context

Image synthesis is a powerful tool. Not only it can speed up work for content creators, but improve performance in various ML tasks: anomaly detection, semi-supervised learning, etc.

Reducing labeling effort is especially interesting, since it can significantly lower the cost of developing a new Computer Vision solution for any task. For this specific project we will target a cell segmentation/detection data. This data is hard to label, but large quantity of unlabeled examples is usually available. Generative model is a one way to leverage these samples to improve target segmentation/detection task.

## Activities

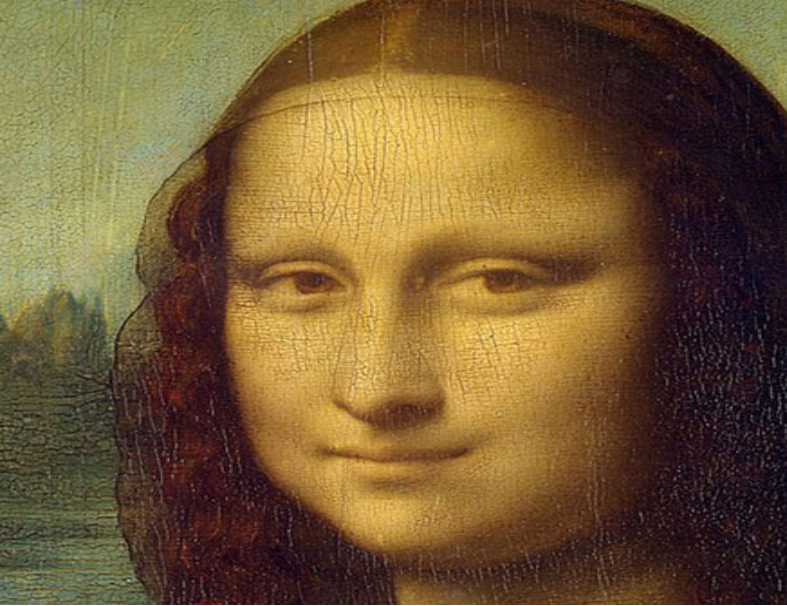
- Compare several state-of-the-art approaches on various datasets.
- Combine GAN with diffusion model to speed up inference.
- Implement diffusion model with conditional generation.
- Check if DatasetGAN and Discriminator Augmentation approaches are feasible with diffusion models.

## Internship overview

- Master
- Internship (potentially graduation)
- Mathware
- Location: Eindhoven

## Technologies

- Deep Learning
- Generative Adversarial Networks
- Diffusion Probabilistic Models
- Image synthesis



## Assignment

Research deep generative models: denoising diffusion, GAN and/or flow-based models, how they can be applied in real-world applications.

Compare and combine different state-of-the-art approaches in image synthesis. Develop a final model that achieves best from all worlds: high quality images, diversity, fast inference, easy to train.

Some specific examples:

- 1) Denoising diffusion probabilistic models achieve highest quality of synthetic images, but slow during inference. Extension to conditional generation (e.g. image-to-image, inpainting, deblurring) needs to be researched.
- 2) GAN-models are fast and allow to reach impressive quality with a very few examples (StyleGANv2 ADA). DatasetGAN approach manages to generate huge training dataset with little labeling effort. Transferring these techniques to diffusion models will lead to a very powerful generative model.

### Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great career opportunities
- Contributing to a safe, healthy and sustainable society

### Get in touch!

Would you like to know more about this student assignment?

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