



*Norwegian Biometrics Laboratory (NBL) is a distinguished research lab contributing actively to the biometrics research across Europe. NBL spans its expertise over physiological and behavioral biometrics including 2D & 3D face, iris, fingerprint, hand vein, gait, keystroke, gesture and mouse dynamics recognition.*

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## Master Thesis

### Face age progression with Generative Models

#### OBJECTIVES & GOALS:

Face age progression is applied in vast domains, such as finding missing children, digital entertainment, post-cosmetic surgery, and cross-age face recognition [4]. Most existing bottleneck-based Generative Adversarial Networks suffer from ghosting artifacts or blur for generating age progression results with an increased age gap. Although this can be solved using data collected over long age spans, it takes time and effort. Meanwhile, in recent years, several improvements have been proposed for StyleGAN [1][2] and Diffusion [3]. In this work, you need to review advanced techniques in StyleGAN and Diffusion models [2], develop a face age progression solution with identity presentation and aging effect simulation algorithm based on the selected method, and evaluate the impact of using simulated publicly available dataset like FFHQ and CelebHQ for face aging and regression. \*This topic requires regular physical meetings at NTNU, Gjøvik.

#### TASKS:

- Develop a face age progression and regression models based on StyleGAN and Diffusion models.
- Evaluate the Identity preservation, Aging accuracy, and Face image quality on synthetic age progression and regression data generation.

#### PREREQUISITES:

- Background knowledge of deep learning and image generation
- Experience with implementation of deep learning models: Python/Pytorch/Tensorflow

#### FURTHER READING:

- [1] Yujun Shen et. al., Interpreting the Latent Space of GANs for Semantic Face Editing, <https://genforce.github.io/interfacegan/>
- [2] E. Richardson et al., "Encoding in Style: a StyleGAN Encoder for Image-to-Image Translation," 2021 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Nashville, TN, USA, 2021, pp. 2287-2296.
- [3] Banerjee et al., Identity-Preserving Aging of Face Images via Latent Diffusion Models, 2023, IEEE/IJCB.
- [4] Chandaliya et. al., ChildGAN: Face aging and rejuvenation to find missing children, Pattern Recognition, 2022.

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**NOTE:** Highly qualified foreign students can get financial support to cover cost of an internship.