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.

Master Thesis

Print-scan Effect Simulation of 2-D Face Images for Morphing Attack Detection

OBJECTIVES & GOALS:

Print-scanned data is commonly used in many real-world face recognition applications such as morphing attack detection (MAD). Hence, it is essential for relevant research activities to use print-scanned data for training and evaluation of developed algorithms to make the experiments representative. However, generating print-scanned data takes a lot of manual work, making it difficult for large-scale datasets. Motivated by this, researchers have been using conditional GANs to simulate the print-scan effect [1]. Meanwhile, in recent years several improved image generation techniques have been proposed [2] [3]. In this task, you need to review advanced techniques in image-to-image translation, develop a print-scan effect simulation algorithm based on the selected technique, and evaluate the impact of using simulated print-scanned data for morphing attack detection. *This topic requires regular physical meetings at NTNU, Gjøvik.

TASKS:

- Develop a print-scan effect simulation algorithm based on diffusion models.
- Evaluate the face image quality of the data with simulated print-scan effect.
- Evaluate the impact on using simulated print-scan data for training MAD.

PREREQUISITES:

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

FURTHER READING:

[1] C. Rathgeb, A. Dantcheva, and C. Busch. Impact and detection of facial beautification in face recognition: An overview. IEEE Access, PP:1–1, 10 2019

[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] Y. Zhang et al., "Inversion-based Style Transfer with Diffusion Models," 2023 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Vancouver, BC, Canada, 2023, pp. 10146-10156.

CONTACT:

- Haoyu Zhang (haoyu.zhang@ntnu.no)
- Prof. Raghavendra Ramachandra (raghavendra.ramachandra@ntnu.no)
- Prof. Christoph Busch (christoph.busch@ntnu.no)

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