UNIVERSITÀ
DEGLI STUDI
DI PADOVA

DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

Lab 1 - Biometrics

Face Recognition

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Outline

Introduction

Face Recognition is used for:

- People identification.
- Access control.
- Security and surveillance.
- Database search.
- Identity verification.
- ...

Steps of Face Recognition

- **Face localization:**
  Localize the area of the face.
- **Face align. & norm.:**
  Normalize the face geometrically.
- **Face processing:**
  Compensate illumination, pose, viewpoints.
- **Feature extraction:**
  Extract salient information
- **Face comparison:**
  Features compared against 1 face **(verification)** or N faces **(identification)**.

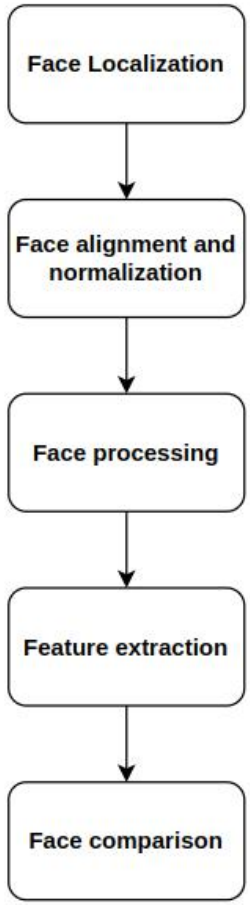

Figure: Steps of FR.

Lab Experience I

TO DO tasks for Dataset CelebA-HQ:

- Prepare the data for the analysis, i.e. normalize the `.npy` file and prepare the train and test set.
- Define a simple CNN.
- Train and Test your model.
- Try the model on masked faces.

Lab Experience II

TO DO tasks for Dataset Stranger Faces:

- Prepare the data for the analysis, i.e. normalize the `.npy` file and prepare the train and test set.
- Use a pre-trained model in keras (VGG16, AlexNet, ResNet50) for the analysis.

Conclusion I

For CelebA-HQ Dataset:

- Your model must not overfit.
- Your model should reach a precision around $\sim 90\%$.

Conclusion II

For Stranger Faces Dataset:

- You should keep the pre-trained model as it is, i.e. do not train the weights of the backbone model.

This technique is called **"Transfer learning"** and focuses on applying knowledge gained while solving one task to a related one. In this lab, we have used the knowledge gained by a backbone model (e.g. VGG16) trained on a different dataset to classify the Stranger Faces dataset.

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