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FACOLTÀ DI  
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DIPARTIMENTO  
DI INGEGNERIA INFORMATICA, AUTOMATICA E GESTIONALE

**Neural Networks course**  
**Final project**

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## Report of C3AE Project

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# Chapter 1

## Introduction

In the past decade ((years?)) soft biometrics has emerged out to be a new area of interest for the researchers due to its growing real-world applications. This includes a classic learning problem in computer vision: the estimation of demographic traits, such as the age. Researchers are trying to develop models which can accurately estimate the age or the age group of a person using different biometric traits. Currently, neural networks give the best classification results for age estimation using human faces. Many CNNs (convolutional neural networks) such as AlexNet, VggNet, GoogLeNet and ResNet ((citations needed?)) are able to accomplish this task with promising performance.

However, to obtain more precise accuracy these networks have grown deeper and larger. This trend has resulted in increasingly higher computational costs in either training or deploying. In particular, deploying the previously mentioned models on mobile phones, cars and robots is next to impossible due to the model size and computational cost.

Recently other models have been proposed with the aim to reduce the number of parameters, thus yielding lightweight models without weakening their efficiency. In this work, we investigate the limits of compact models for small-scale images and focus on one the most compact models for age classification, implementing it in practice to evaluate its performance.

### 1.1 Related works

The following report presents the development of the final project for the Neural Networks course at Università degli studi di Roma "La Sapienza", A.Y. 2020/21.

Our work is based on the study made by ((citation)). In the paper ((citation)) they propose a **Compact** basic model, **C**ascaded training and multi-scale **C**ontext, aiming to tackle small-scale image **A**ge **E**stimation. The model is called **C3AE**.

The proposed model is able to achieve a state-of-the-art performance compared with alternative compact models and even outperforms many bulky models. With an extremely compact model of 0.25 MB for the full model, which is possibly the smallest model that has been obtained so far on the facial recognition, C3AE is suitable to be deployed even on low-end mobiles and embedded platforms. A discussion on which techniques have been used to attain the desired results are discussed in a later chapter. [1]

### 1.2 Report organization section

((Report organization section?))

## Chapter 2

# Datasets

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### 2.1 Preprocessing

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### 2.2 Augmentation

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## Chapter 3

# Theory Stuff

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### 3.1 Spiegazione modello C3AE

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### 3.2 Spiegazione problema

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### 3.3 Implementation

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## Chapter 4

# Experiments

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## Chapter 5

# Project structure

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## Chapter 6

# Conclusions

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# Bibliography

- [1] Pippo, Pluto e Paperino. Guida di Paperopoli. ICLR, 1050:11, 2021