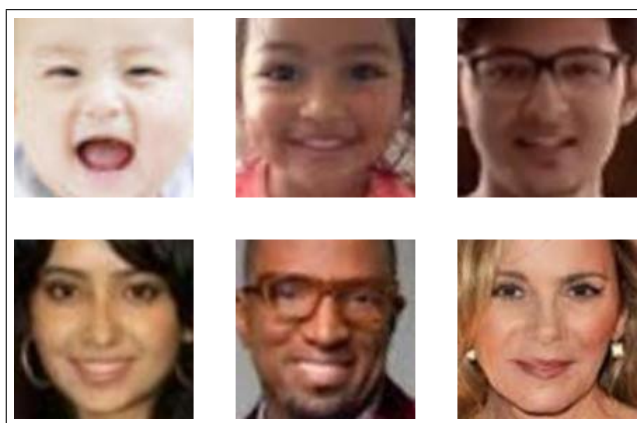


Machine Learning 2

Coursework 1: Age Estimation and Gender Classification

University of Bath



ID	Contribution	Agree? [Y/N]
oir20	50%	Y
vs929	50%	Y

No.	Model Links
1.	The custom CNN model
2.	The pre-trained CNN model

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Abbreviations

CNN Convolutional **N**eural **N**etwork

Coursework Report

1.1 Introduction

The purpose of this assignment is to use a subset of the UTKFace data set to build and train Convolutional Neural Networks (CNNs) for age estimation and gender classification. Gender classification and age estimation from images is a key computer vision task that has applications in social media analytics, security, and human-computer interaction. Humans are quite accurate at guessing a person's age and gender. However, due to differences in facial characteristics, lighting, and image quality, training a deep learning model to perform similarly is a difficult task. CNNs have shown significant improvements in performance for age and gender classification tasks compared to traditional models, which often struggle with these variations in facial images [Benkaddour, 2021].

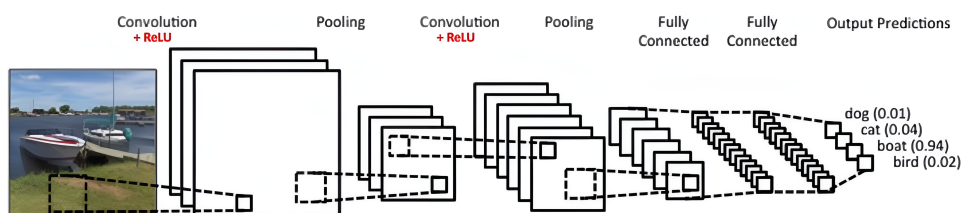


Figure 1.1: Structure of a CNN

CNNs are a type of deep learning model that is effective in processing data with grid-like topology, such as images. They are used in computer vision tasks as they can automatically learn spatial hierarchies of features from images. As shown in Figure 1.1, they consist of multiple layers, including convolutional layers, aggregation layers, and fully connected layers, which all work together to extract and learn features from input data [Wang et al., 2020].

This assignment involves training two CNN models:

1. **A Custom CNN Model:** Designed from scratch with certain restrictions and trained entirely on the subset of the UTKFace data set.
2. **A Fine-Tuned Pretrained Model:** A pre-existing CNN model will be used and fine-tuned on the data set to improve its performance.

The data set used for this assignment is a subset of the UTKFace data set, which is a large database of faces with a wide age range (from 0 - 116 years old). There are more than 20,000 face photos in the dataset, each with annotations of age, gender, and ethnicity. making it the perfect data set to use for this assignment. Training for both the models will be conducted using GPU resources available in Google Colab for efficient computation. We will then explain the architecture of each model, the training process, and a performance comparison, highlighting the benefits and challenges of each approach and their outcomes.

1.2 The custom CNN model

1.3 The pre-trained CNN model

1.4 Summary and discussion

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