



Age Gender and Ethnicity Prediction Using CNN

DA322M Mini Project

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Introduction

In the rapidly evolving field of computer vision, accurately predicting demographic attributes such as age, gender, and ethnicity from images has become paramount. Leveraging the power of **Convolutional Neural Networks (CNNs)**, researchers have made significant strides in developing models capable of discerning these attributes from visual data. By harnessing CNNs' ability to extract meaningful features from images, these models can analyze facial features and contextual cues to infer demographic information accurately. As a result, the intersection of computer vision and deep learning techniques presents exciting opportunities for advancing our understanding and utilization of demographic attributes in diverse real-world applications.



Motivation



Deepening Understanding of CNN Architectures

Working on a project in this domain provides a hands-on experience with CNN architectures, allowing us to gain a deeper understanding of how these networks operate and how they can be optimized for specific tasks.



Enhancing Personalization and User Experience

More engaging experiences, increased satisfaction, and improved outcomes for individuals and businesses, while also fostering the development of inclusive products and services that cater to diverse user groups effectively.

Application

- **Marketing and Advertising:** Companies use demographic information to tailor their advertising campaigns. Predicting age, gender, and ethnicity helps in creating targeted ads that resonate with specific demographics.
- **Security and Surveillance:** Age, gender, and ethnicity prediction algorithms can be used in security systems for identifying individuals in surveillance footage. This can help in law enforcement investigations and enhancing security measures in public places.
 - **Social Sciences and Research:** Demographic predictions are valuable in social science research for understanding patterns and trends in human behavior, attitudes, and preferences across different demographic groups.



Brief Literature

- **Age Estimation using UTKFace Dataset Based on Various Deep Learning Models: [Link](#)**
- **Comparative study between machine and deep learning methods for age, gender and ethnicity identification: [Link](#)**
- **Age and Gender Classification using Convolutional Neural Networks : [Link](#)**



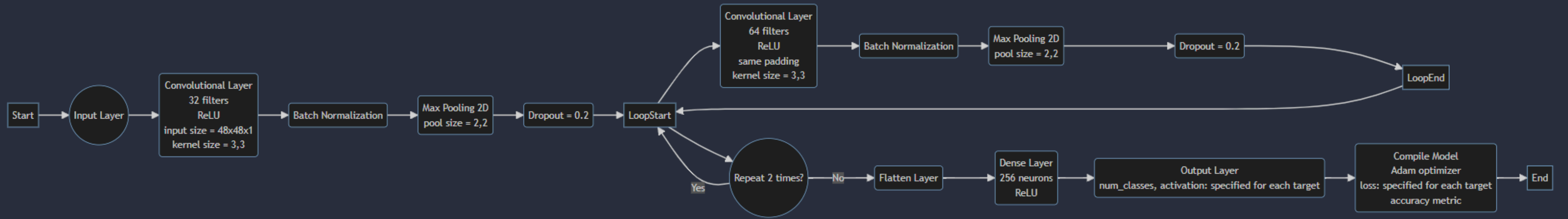
Objectives



- **Developing a Robust Model Architecture:** Design and implement a CNN architecture capable of accurately predicting age, gender, and ethnicity from images.
- **Evaluation and Optimization:** Evaluate the trained model's performance using appropriate metrics such as accuracy, loss for each demographic category (age, gender, ethnicity). Optimize the model architecture to improve performance.
- **Integrate Image Uploading Feature:** Add a feature which enables the user to upload a picture and see the model's predictions.



Methodology



Data

- **AGE, GENDER AND ETHNICITY (FACE DATA) CSV([Link](#)):** This dataset is a preprocessed version of the UTKFace dataset([Link](#)), which has over 20000 images with zoomed in faces spanning across 5 ethnicities, 2 genders and ages from 0 to 116



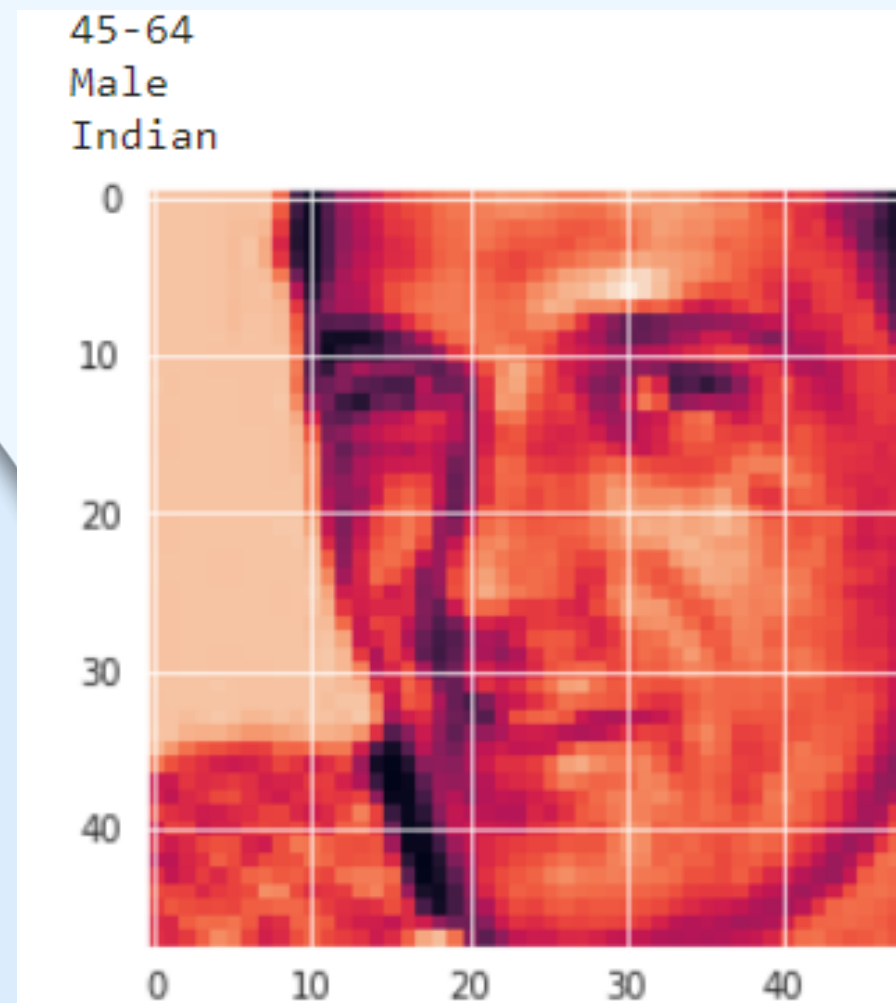
- **DATA PREPROCESSING:** The images are converted to 1 colour scale and resized to 48x48 arrays.
- **TRAIN AND TEST DATASETS:** 30% of the training set is given for testing.

Results

Ethnicity Prediction

Test loss: 0.678522

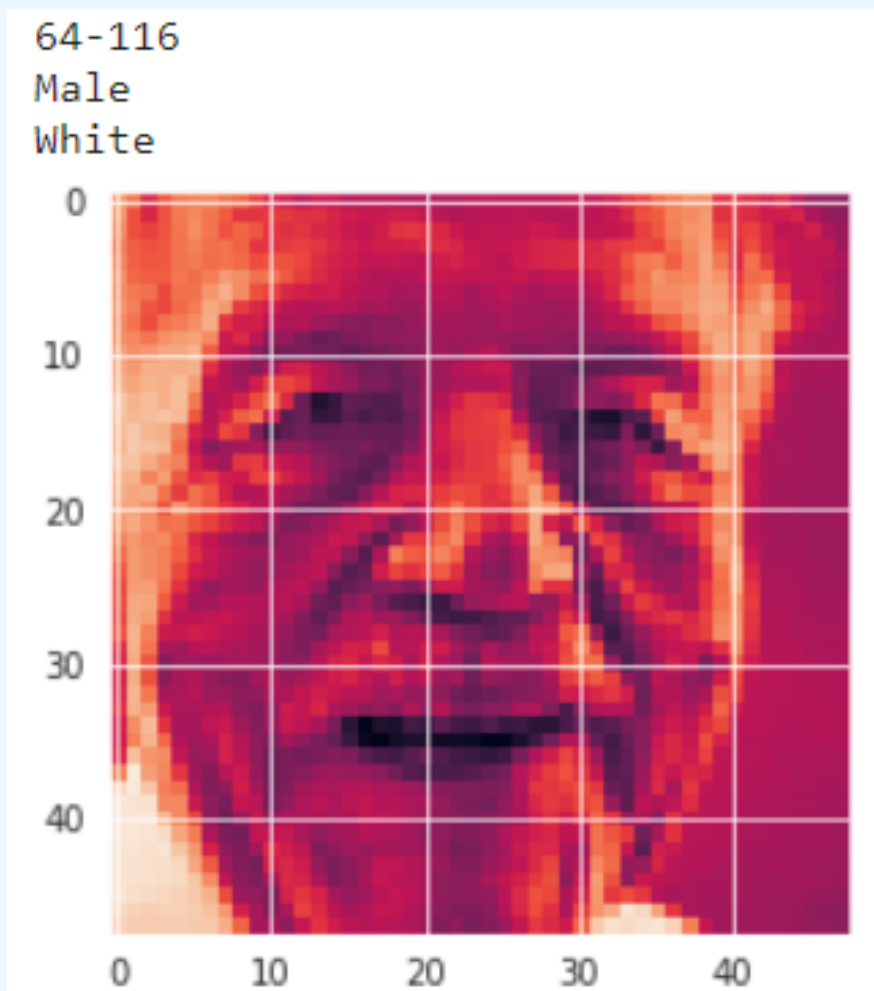
Test Accuracy: 0.764482



Age Prediction

Test loss: 0.628796

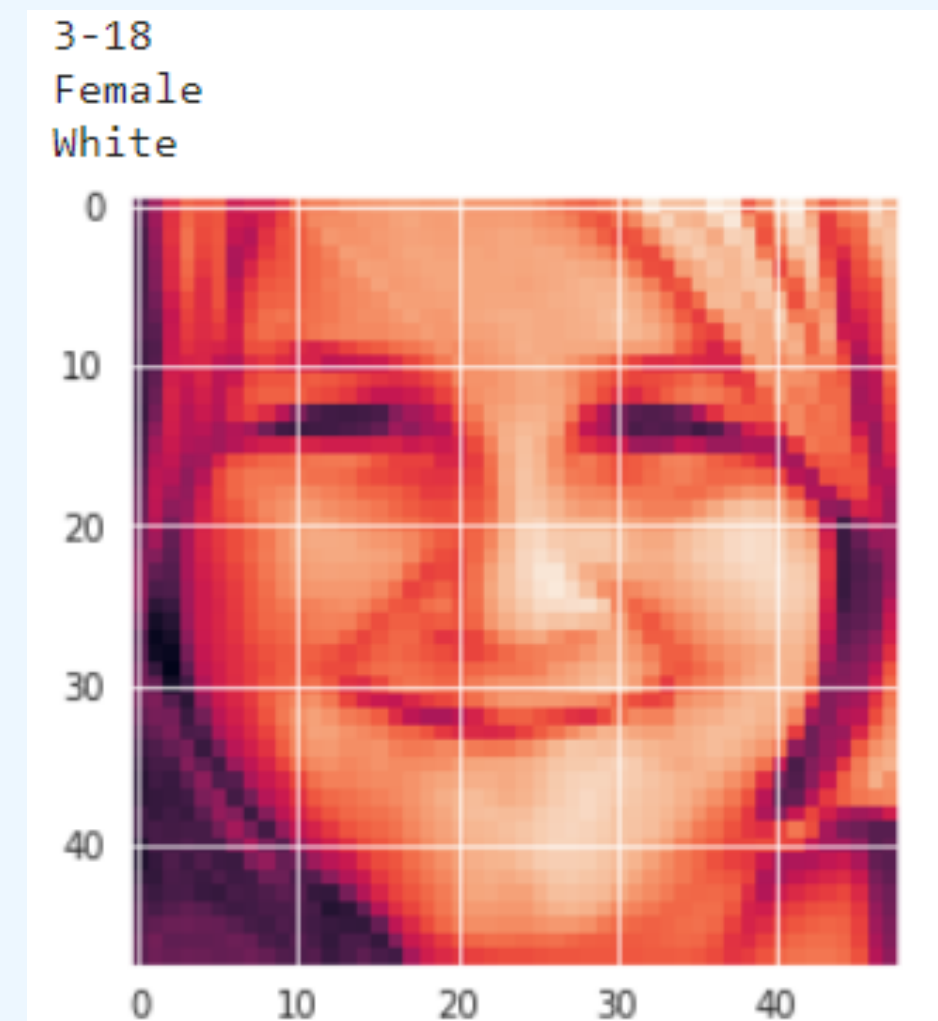
Test Accuracy: 0.758436



Gender Prediction

Test loss: 0.270137

Test Accuracy: 0.889482



Summary

1

Utilizing convolutional neural networks (CNNs)

The project successfully developed a robust model capable of accurately predicting age, gender, and ethnicity from facial images. By leveraging deep learning techniques, the CNN architecture learned intricate patterns and features, enabling precise classification across diverse demographic groups.

2

Performance Impact and Results

Through extensive training on large-scale datasets, the project achieved remarkable performance in age, gender, and ethnicity prediction tasks, demonstrating the potential of CNNs in automated demographic analysis. The model's accuracy and efficiency open avenues for various applications, including demographic research, targeted advertising, and personalized user experiences in digital platforms.



Thank
You

