CSD TEAM-21

AGE AND GENDER PREDICTION

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AGE AND GENDER PREDICTION

Introduction

Age and gender prediction is a computer vision and machine learning task that aims to determine a person's age and gender based on facial images. It has numerous real-world applications, including personalized marketing, security systems, healthcare, and human-computer interaction.

Advancements in deep learning and artificial intelligence have significantly improved the accuracy of age and gender prediction. Convolutional Neural Networks (CNNs) and pretrained models, such as VGGFace and FaceNet, enable automated feature extraction and classification from facial images. Additionally, datasets like UTKFace and Adience provide labeled images to train and evaluate these models effectively.

This project explores various techniques and technologies for predi

cting age and gender, leveraging deep learning frameworks like TensorFlow and PyTorch. The goal is to develop an accurate and efficient model capable of real-time or batch processing for different applications.

Abstract

The Age and gender prediction project aims to develop a deep learning-based model capable of accurately predicting a person's age and gender from facial images.

It utilizes deep learning models like CNNs trained on datasets such as UTKFace and Adience. Images are preprocessed using OpenCV for face detection and feature extraction.

The model predicts gender as male or female and age as a regression or classification problem. Performance is evaluated using accuracy and MAE. This technology is useful in security, marketing, and personalized user experiences.

Technology

1.Python:

The primary programming language used for implementing the model and processing data.

2.OpenCV:

Used for image preprocessing, face detection.

3.TensorFlow/Keras:

Utilized for building and training the deep learning model for age and gender classification.

4.CNN (Convolutional Neural Network):

The core architecture for extracting features and making predictions from images.

5.Pre-trained Models (VGG16, ResNet, MobileNet):

 Used for transfer learning to improve accuracy and efficiency.

Computer Vision Techniques

Facial Landmark Detection – Identifies key points on the face to analyze aging patterns.

Histogram of Oriented Gradients (HOG) – Extracts facial features for gender classification.

DeepFace, FaceNet – Pre-trained deep learning models used for facial analysis.

Uses and Applications

Age and gender prediction has a wide range of applications across various industries, enhancing automation, personalization, and security. Below are some key areas where this technology is applied:

1.Retail and Marketing

Personalized advertisements based on age and gender.

Customer demographics analysis for targeted marketing.

2. Security and Surveillance

Enhancing facial recognition systems for law enforcement.

Identifying individuals in restricted areas based on age restrictions

3. Healthcare

Predicting age-related diseases using facial analysis.

Personalized healthcare recommendations.

4. Social Media and Entertainment

Age verification for restricted content.

Auto-tagging and filters based on user demographics.

5. Smart Access Control

Adaptive security measures based on user profile.

Age-restricted access in places like casinos, bars, and gaming zones.

6. Human-Computer Interaction

Customizing user interfaces based on age groups.

Voice assistants adapting tone and content based on estimated age.

Conclusion

Gender and age prediction is a crucial task in various applications, including marketing, security, and human-computer interaction. Using machine learning, deep learning, and statistical methods, researchers can analyze facial features, voice, text, or other biometric data to predict an individual's gender and age.

Age:25, Gender:0   Age:2, Gender:0   Age:28, Gender:0   Age:32, Gender:1   Age:46, Gender:1
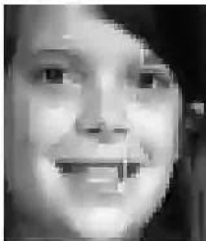Age:31, Gender:0   Age:40, Gender:1   Age:34, Gender:0   Age:26, Gender:1   Age:26, Gender:1
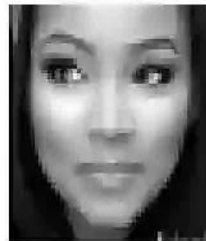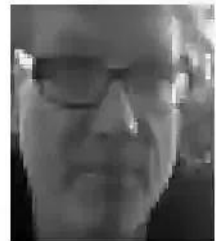Age:13, Gender:1   Age:42, Gender:0   Age:28, Gender:1   Age:24, Gender:1   Age:54, Gender:0

Summary:

Input:

Facial Image: Captured via a camera or uploaded from a dataset.

Process:

1.Data Collection: Use datasets like UTKFace, Adience, or custom image data.

2.Image Processing: Face detection, resizing, normalization (using OpenCV).

3.Feature Extraction: Use CNNs (e.g., VGG16, ResNet) for image features.

4.Model Training: Train deep learning models using labeled data.

  • Age: Regression or classification.

  • Gender: Binary classification (Male/Female).

5.Evaluation: Measure accuracy, MAE (Mean Absolute Error) for performance analysis

Output:

Predicted Age: Either as a specific value (regression) or an age range (classification).
Predicted Gender: Classified as Male or Female.