Gender Detection

Project ID: PRAICP-1001-GenderDetc

Gender detection is a specialized field within image processing that focuses on understanding and predicting a person's gender in a given frame.
In this project, we build a Machine Learning Model based on the provided dataset.

This project was completed as a part of DataMites Internship.

Gender Detection Analysis Report

1. INTRODUCTION

Gender detection is a specialized field within image processing that focuses on understanding and predicting the gender of a person in a given frame. In this project, we build a Machine Learning Model based on the provided dataset.

2. BUSINESS CASE

The goal of this project is to develop a Machine Learning (ML) model that can accurately classify the gender of a person from an input image. This can be useful in applications such as security systems, personalized marketing, and demographic analysis.

3. OBJECTIVES

- Predict the gender of a person in a given image.
- Perform image preprocessing to enhance prediction accuracy.
- Deploy the model using Flask on VS Code for easy accessibility.

4. PROJECT GOAL

1. Image Preprocessing
2. ML Model Development
3. Deployment using Flask

5. DATA OVERVIEW

Dataset:

- Image dataset consisting of labeled images for male and female categories.

Data Attributes:

- Image: The input image of a person.
- Label: The ground truth gender classification (Male/Female).

6. METHODOLOGY

Data Processing:

- Data Cleaning: Ensuring images are properly labeled.
- Resizing: Standardizing images to 224x224 pixels for compatibility with MobileNet.
- Normalization: Scaling pixel values to improve model learning.

Model Used:

- MobileNet: A pre-trained convolutional neural network (CNN) optimized for lightweight and fast predictions.
- The model is fine-tuned on the dataset to classify images into two categories: Male and Female.

Flask Deployment:

- A Flask web app is developed to accept image uploads and return gender predictions.
- The model is loaded in Flask and predicts gender based on uploaded images.
- A chatbot is integrated to answer queries related to gender detection and machine learning.

7. PERFORMANCE METRICS

- Accuracy: Measures how many predictions were correct.
- Precision & Recall: Evaluates the reliability of gender classification.
- Confusion Matrix: Analyzes correct and incorrect classifications.

8. CHALLENGES

- Variability in Image Quality: Different lighting, angles, and occlusions can impact accuracy.
- Model Bias: Dataset imbalances may affect predictions.
- Real-time Processing: Ensuring fast and efficient image classification.

9. CONCLUSION

- The MobileNet model successfully predicts gender with reasonable accuracy.
- Flask-based deployment makes the model easily accessible.
- Image preprocessing plays a crucial role in improving model performance.
- Future improvements can include training on a larger dataset and implementing data augmentation techniques.