Age Prediction from Facial Images

This project predicts the age of a person from their image using deep learning. It uses facial detection and a convolutional neural network (CNN) for regression to predict age from static images or webcam feed.

# Tech Stack

- Language: Python 3.x  
- Libraries: OpenCV, dlib, NumPy, Matplotlib, PyTorch, Torchvision  
- Deep Learning: Custom CNN or pre-trained models  
- Tools: Jupyter Notebook, Docker (optional), TensorBoard (optional)  
- Deployment: CLI/Notebook-based execution

# Project Structure

age-prediction/  
├── data/ # Image data and CSVs  
├── src/ # All source code  
│ ├── model.py # CNN model for age prediction  
│ ├── train.py # Model training script  
│ ├── infer.py # Inference on new images  
│ └── detect.py # Webcam demo + detection  
├── architecture.png # System architecture diagram  
├── requirements.txt # Required dependencies  
├── Dockerfile # For containerization (optional)  
└── README.md # Project documentation

# System Architecture

1. Image Input: Either static image or webcam.  
2. Face Detection: Performed using OpenCV or dlib.  
3. Preprocessing: Resize, crop, normalize.  
4. Age Prediction: Forward pass through CNN model.  
5. Result Output: Age printed, logged, or overlayed on image/webcam feed.

# Model Workflow

Training:  
python src/train.py --data\_csv data/train.csv --epochs 50 --batch 32

Inference:  
python src/infer.py --image\_path path/to/image.jpg

Webcam Demo:  
python src/detect.py --webcam

# Setup Instructions

1. Clone the repository:  
 git clone https://github.com/lucasmark07/age-prediction.git  
 cd age-prediction  
  
2. Create virtual environment & install dependencies:  
 python -m venv venv  
 source venv/bin/activate  
 pip install -r requirements.txt  
  
3. (Optional) Run via Docker:  
 docker build -t age-predictor .  
 docker run age-predictor

# Dataset

The project supports both custom datasets and common age-estimation datasets (e.g. UTKFace, Adience). You can place the image dataset in data/images and use a corresponding CSV (train.csv) with image\_path and age columns.

# Future Improvements

- Add gender classification  
- Support ONNX model export  
- Optimize for mobile deployment  
- Add model checkpointing and learning rate scheduling

# License

This project is licensed under the MIT License.

# Acknowledgements

- UTKFace Dataset: https://susanqq.github.io/UTKFace/  
- PyTorch: https://pytorch.org/  
- dlib: http://dlib.net/