Gender and Age Detection Python Project

In this Python Project, I will use Deep Learning to accurately identify the gender and age of a person from a single image of a face. The predicted gender may be one of ‘Male’ and ‘Female’, and the predicted age may be one of the following ranges- (0 – 2), (4 – 6), (8 – 12), (15 – 20), (25 – 32), (38 – 43), (48 – 53), (60 – 100) (8 nodes in the final softmax layer). It is very difficult to accurately guess an exact age from a single image because of factors like makeup, lighting, obstructions, and facial expressions. The library I am using in this project is OpenCV.

Computer Vision is the field of study that enables computers to see and identify digital images and videos as a human would. The challenges it faces largely follow from the limited understanding of biological vision. Computer Vision involves acquiring, processing, analyzing, and understanding digital images to extract high-dimensional data from the real world in order to generate symbolic or numerical information which can then be used to make decisions. The process often includes practices like object recognition, video tracking, motion estimation, and image restoration. OpenCV is short for Open Source Computer Vision. Intuitively by the name, it is an open-source Computer Vision and Machine Learning library. This library is capable of processing real-time image and video while also boasting analytical capabilities. It supports the Deep Learning frameworks TensorFlow, Caffe, and PyTorch. OpenCv can read and write Images, detect faces and its features, detect shapes like Circle, rectangle etc. in an image and so much more.

Machines see and process everything using numbers, including images and text. Every number represents the pixel intensity at that particular location. Pixel values for a grayscale image where every pixel contains only one value i.e. the intensity of the black color at that location. Color images will have multiple values for a single pixel. These values represent the intensity of respective channels – Red, Green and Blue channels for RGB images, for instance. Reading and writing images is essential to any computer vision project. The OpenCV library makes this function a whole lot easier.

OpenCV (Open Source Computer Vision Library: http://opencv.org) is an open-source BSD-licensed library that includes several hundreds of computer vision algorithms. The document describes the so-called OpenCV 2.x API, which is essentially a C++ API, as opposite to the C-based OpenCV 1.x API. The latter is described in opencv1x.pdf.

OpenCV has a modular structure, which means that the package includes several shared or static libraries. The following modules are available:

* **core -** a compact module defining basic data structures, including the dense multi-dimensional array Mat and basic functions used by all other modules.
* **imgproc -** an image processing module that includes linear and non-linear image filtering, geometrical image transformations (resize, affine and perspective warping, generic table-based remapping), color space conversion, histograms, and so on.
* **video -** a video analysis module that includes motion estimation, background subtraction, and object tracking algorithms.
* **calib3d -** basic multiple-view geometry algorithms, single and stereo camera calibration, object pose estimation, stereo correspondence algorithms, and elements of 3D reconstruction.
* **features2d -** salient feature detectors, descriptors, and descriptor matchers.
* **objdetect -** detection of objects and instances of the predefined classes (for example, faces, eyes, mugs, people, cars, and so on).
* **highgui -** an easy-to-use interface to video capturing, image and video codecs, as well as simple UI capabilities.
* **gpu -** GPU-accelerated algorithms from different OpenCV modules.

Link: <https://docs.opencv.org/master/>

Link: <https://docs.opencv.org/2.4/opencv2refman.pdf>