HW: Convert color image to gray image

In this homework, we provide the source code to convert a color image to gray image in ".jpg" format.

To setup the program, please follow these steps:

1. Download jpegsr6.zip and unzip it to your working folder.
2. Build the libjpeg.a with the following steps:
    a. cd JpegLib ---- change current directory to JpegLib
    b. ./configure
    c. Make
3. Now you can come back to your working folder, and "make". It will compile the code and link with the libjpeg.a. The executable file "ColorToGray.exe" will be generated.
4. Run "ColorToGray.exe" file. It will read the color image "testcolor.jpg", and convert it to a gray image and write to file "testmono.jpg".

Your work is to parallelize the ColorToGray.cpp file by using OpenMP. You only need to parallelize the converting part.

Change the color image to a large image at your choice. Run your code with 1, 2, 4, 8, … threads, up to the core number your computer has. And plot the scalability of the program.

When you count the time, please do not count the time for reading and writing jpg files. File I/O is mostly related to hardware and difficult to get it parallelized, and thus we do not count the time for File I/O. Because this is a very fast process for computer, the time is too short to get enough accuracy. You may want to convert a large picture and add an extra loop outside to run the converting part (not include the File I/O) multiple times to get a longer time.

Note that you can also use the stb_image libraries to read/write jpg files. Please refer to

https://solarianprogrammer.com/2019/06/10/c-programming-reading-writing-images-stb_image-libraries/

Note that for each of your programming homework, you need to give detailed documentation, including a ReadMe file. Your code need to be well commented for readability.

A final report should be submitted with the following sections:

1. Objection of the project
2. Details about how you complete your project
3. Results
4. Did you do anything to improve its performance?
5. (optional) Any bug you encountered, and how did you fix it?