**Optimization Report**

**Implementation**

In this program, the mosaic technique has been applied on different images with different size. The mosaic block would be created, then it will slip over the image with calculating the average value of RGB in the block. The size of the mosaic block, c, has some specific rules when program running. The first, the c should be less than both size of width and height. The second, the c should be any positive power of number 2, otherwise the c would be processed to the nearest valid number, e.g. c = 3 will be processed to c = 2. The average RGB value of the whole image will be calculated depending on average RGB value of each mosaic block. The program could run under two optional methods. The one is under CPU with single process, another one is under CPU with multiple process.

In the code part, the program could be divided into four parts, reading, pre-processing, calculation, outputting. The program starts at the main function which could receive the argument from the execution command. Then the image data will be read from the input file and be pre-processed. The file will be opened in binary mode and then be processed and stored into 2-D integer array. This process is implemented in the function *read\_data*(). The data in 2-D array will be divided into different blocks according to the size of the mosaic block, meanwhile, if c is not the factor of the number of width or height, the block at the edge will be clipped. All situations have been considered in the program. Then the average RGB value would be calculated and replace each original pixel RGB value in the mosaic block. This process is implemented in the optional function cpu\_cal() or openmp\_cal().