机器视觉 - 第五次作业

程序

```
#include "opencv2/opencv.hpp"
#include <time.h>
#include <iostream>

using namespace cv;
using namespace std;

void uniformFilterBox(Mat& in, Mat& out, int ksize);
void uniformFilterSeparate(Mat& in, Mat& out, int ksize);

int main(){
    Mat inImg, grayImg, filteredBoxImg, filteredSeparateImg, filterCVImg;
    clock_t clockval, clockdiv;

    inImg = imread("../input.png");
    cvtColor(inImg, grayImg, COLOR_RGB2GRAY);

    cout << "3x3 box filter processing...";
    clockval = clock();
    uniformFilterBox(grayImg, filteredBoxImg, 3);
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
    imwrite("../output_box_3x3.png", filteredBoxImg);

    cout << "5x5 box filter processing...";
    clockval = clock();
    uniformFilterBox(grayImg, filteredBoxImg, 5);
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
    imwrite("../output_box_5x5.png", filteredBoxImg);

    cout << "3x3 separate filter processing...";
    clockval = clock();
    uniformFilterSeparate(grayImg, filteredSeparateImg, 3);
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
```

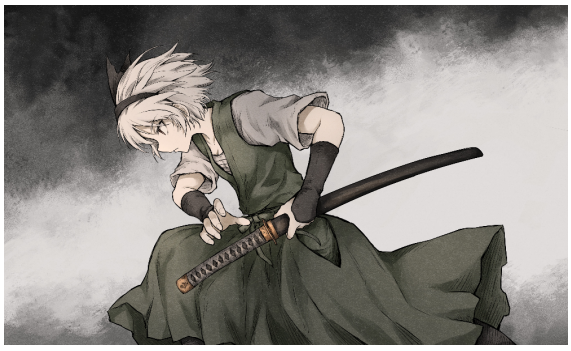
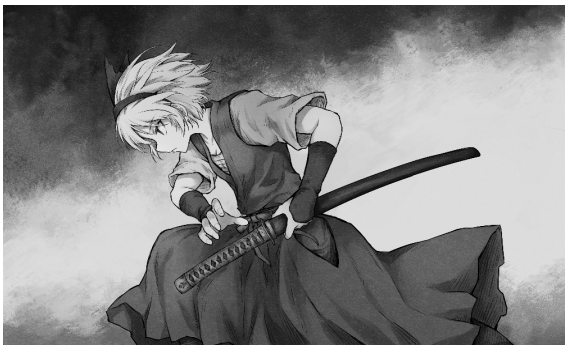
```
    imwrite("../output_separate_3x3.png", filteredSeparateImg);

    cout << "5x5 separate filter processing...";
    clockval = clock();
    uniformFilterSeparate(grayImg, filteredSeparateImg, 5);
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
    imwrite("../output_separate_5x5.png", filteredSeparateImg);

    cout << "3x3 opencv filter processing...";
    clockval = clock();
    boxFilter(grayImg, filterCVImg, -1, Size(3,3));
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
    imwrite("../output_opencv_3x3.png", filterCVImg);

    cout << "5x5 opencv filter processing...";
    clockval = clock();
    boxFilter(grayImg, filterCVImg, -1, Size(5,5));
    clockdiv = clock() - clockval;
    cout << " Done. " << clockdiv/1e3 << " ms.\n";
    imwrite("../output_opencv_5x5.png", filterCVImg);

    return 0;
}

void uniformFilterBox(Mat& in, Mat& out, int ksize){
    /** 请自行补充 **/
}

void uniformFilterSeparate(Mat& in, Mat& out, int ksize){
    /** 请自行补充 **/
}
```

输出截图

（当时后台有其他程序，耗时不太稳）

```
1 sieroy@port...  2 sieroy@port...  3 sieroy@port...
5x5 separate filter processing... Done. 7.289 ms.
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ make
Scanning dependencies of target imfilter
[ 50%] Building CXX object CMakeFiles/imfilter.dir/src/imfilter.cpp.o
[100%] Linking CXX executable imfilter
[100%] Built target imfilter
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ ./imfilter
3x3 box filter processing... Done. 20.734 ms.
5x5 box filter processing... Done. 41.683 ms.
3x3 separate filter processing... Done. 9.709 ms.
5x5 separate filter processing... Done. 7.364 ms.
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ make
Scanning dependencies of target imfilter
[ 50%] Building CXX object CMakeFiles/imfilter.dir/src/imfilter.cpp.o
[100%] Linking CXX executable imfilter
[100%] Built target imfilter
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ make
Scanning dependencies of target imfilter
[ 50%] Building CXX object CMakeFiles/imfilter.dir/src/imfilter.cpp.o
[100%] Linking CXX executable imfilter
[100%] Built target imfilter
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ ./imfilter
3x3 box filter processing... Done. 27.896 ms.
5x5 box filter processing... Done. 39.823 ms.
3x3 separate filter processing... Done. 6.897 ms.
5x5 separate filter processing... Done. 7.336 ms.
3x3 opencv filter processing... Done. 0.656 ms.
5x5 opencv filter processing... Done. 0.405 ms.
sieroy@portableDeepin:/media/sieroy/Data/files/homework/MV/05/build$ _
```

输出图像

原图(1000x600)	原图灰度图(1000x600)
	

3x3盒型滤波(998x598)	5x5盒型滤波(996x596)
	

3x3分离滤波(998x598)	5x5分离滤波(996x596)
	

3x3 OpenCV库函数(1000x600)	5x5 OpenCV库函数(1000x600)
	

分析

- 速度上，使用定义法实现的均值滤波，大大逊色于分离滤波。
- 输出结果上，两种方法没什么区别。

- 而OpenCV的库函数就很厉害了，不仅在速度上大大优于定义法和分离法，而且输出的结果也不会由于滤波而出现边缘缩减的问题。