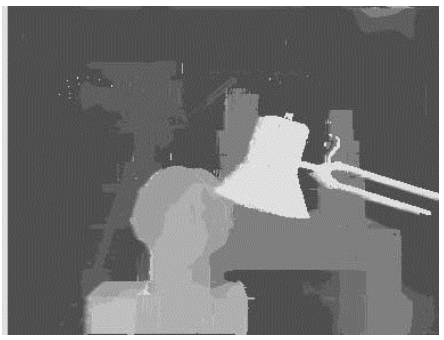
VO Stereo Vision – Exercise 1

1 General Task

The goal of the practical part of this course is the implementation of a local stereo matching algorithm based on the paper "*Locally Adaptive Support-Weight Approach for Visual Correspondence Search*". Although this paper is rather old and many newer algorithms produce far better results, it is still relevant as its idea builds the basis for many other works. There are three exercises while the first one only servers as a short introduction to OpenCV. The following two exercises deal with the more complex subject of implementing a stereo matching algorithm. In exercise 2 a simple window-based algorithm gets implemented which in turn is improved during exercise 3 using a weight function and an additional refinement step.



2 General Instructions

The exercises have to be implemented in C++ using OpenCV. The basic explanations for setting up a C++ project using this library can be found in exercise 1. Additionally useful links can be found at the end of this document.

Not only is each submission mandatory, but also each exercise is built upon the previous ones.

2.1 Recommended Setup

- Development environment: Visual Studio
- OpenCV: 2.4.13
- Operating system: Windows

Note that for different setups (especially regarding the operating system) no support can be provided.

2.2 SUBMISSION

The deadline for exercise 1 is 02.04.2017

The submission has to be a zip file containing:

- Your source code
- A stand-alone executable .exe file which shows your results. Make sure that (i) you compile the .exe file with the parameters that give the best results and (ii) all necessary files in order to run the .exe file are enclosed.

The file must be uploaded via the TUWEL course. Only upload one solution per group.

The structure of the submission should look like this:

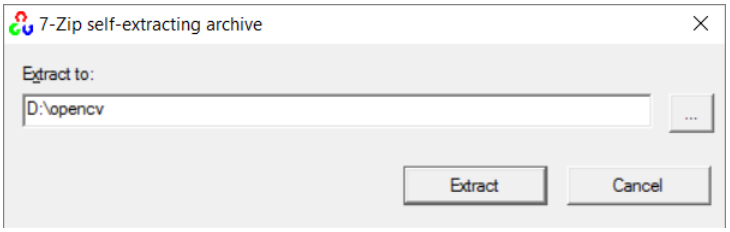
.zip

- /source
  - main.cpp
- /exe
  - .exe
  - all necessary files in order to run the .exe file

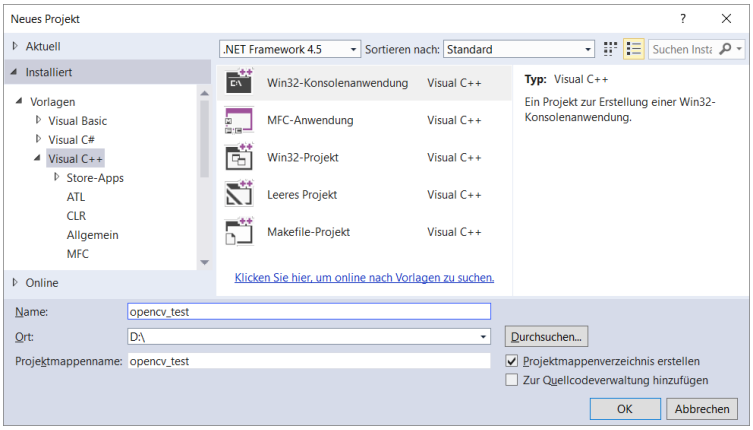
3 TASK 1 – SET UP A C++ PROJECT USING OPENCV

1. Download OpenCV version 2.4.13 from http://opencv.org/downloads.html

2. Run the .exe and extract the files

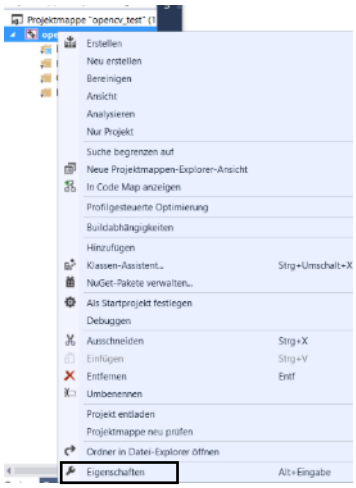


3. Create a new Visual Studio project

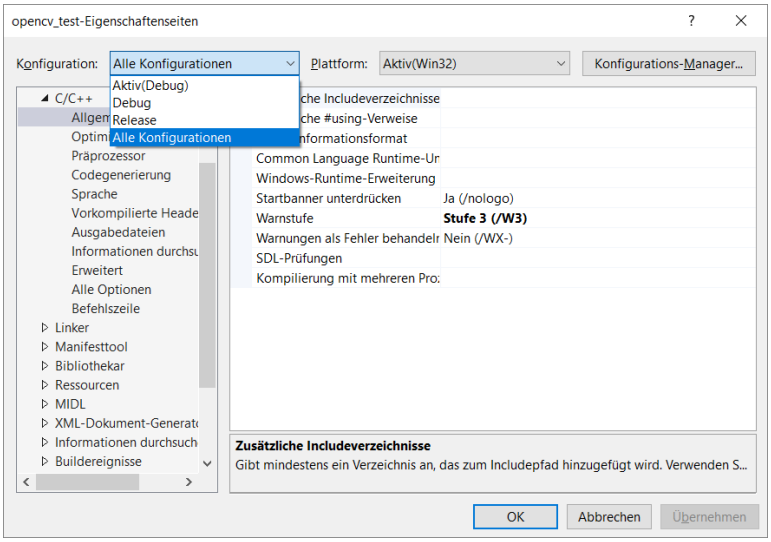


(1) Choose “Win32 Console Application”
(2) Select a save directory
(3) Press OK

4. Right click on your project and click on Properties

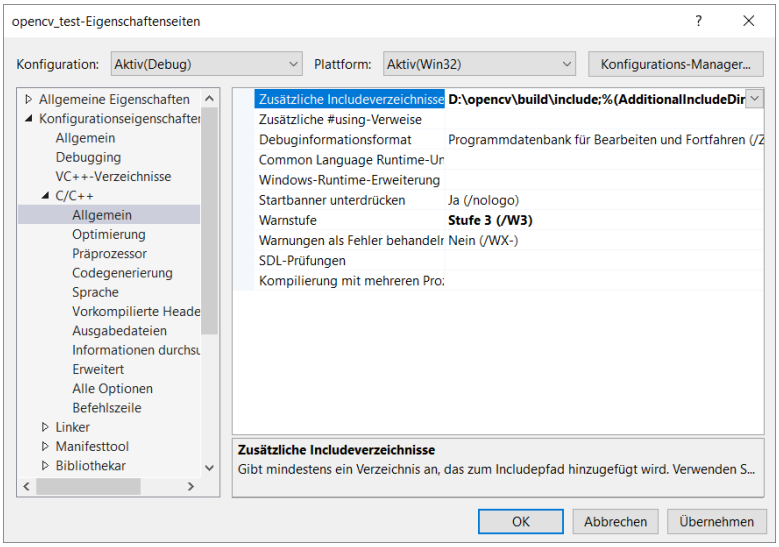


5. For Configuration select “All Configurations”



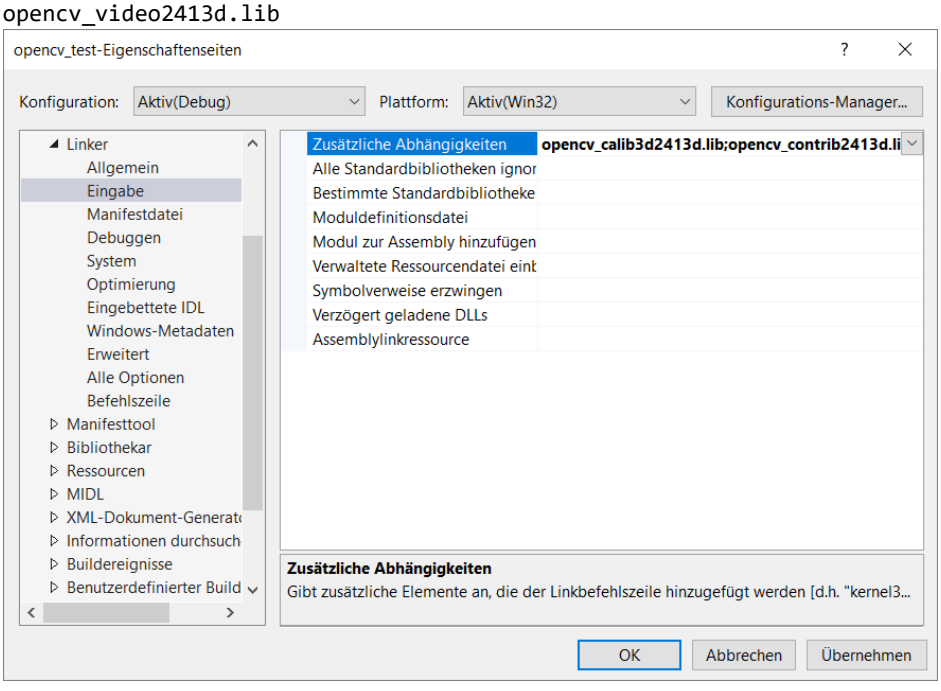
6. Go to Configuration Properties -> C/C++ -> General

7. Edit Additional Include Directories and add “D:\opencv\build\include”
   (Note: change accordingly if you have OpenCV in a different directory)

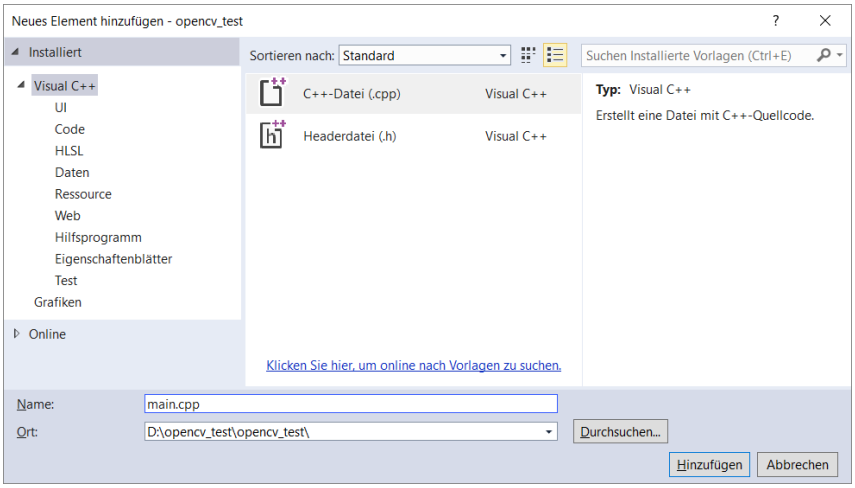


8. Go to Common Properties -> Linker -> General
9. Edit Additional Library Directories and add “D:\opencv\build\x86\vc12\lib”
   (Note: change accordingly if you have OpenCV in a different directory)
10. Go to Common Properties -> Linker -> Input
11. Edit Additional Dependencies and add the following files

```
opencv_calib3d2413d.lib
opencv_contrib2413d.lib
opencv_core2413d.lib
opencv_features2d2413d.lib
opencv_flann2413d.lib
opencv_gpu2413d.lib
opencv_highgui2413d.lib
opencv_imgproc2413d.lib
opencv_legacy2413d.lib
opencv_ml2413d.lib
opencv_objdetect2413d.lib
opencv_ts2413d.lib
opencv_video2413d.lib
```



12. Press OK to finish the Configuration
13. Copy the .dll files from “D:\opencv\build\x86\vc12\bin” to the project folder where the .exe file is located.
14. Create a “main.cpp” file



15. Modify “main.cpp” so it looks as follows and run the code. If everything is ok, a green image should appear.

```
#include <stdio.h>
#include <opencv2\opencv.hpp>

int main()
{
	cv::Mat img(500, 500, CV_8UC3, cv::Scalar(0, 255, 0));
	cv::imshow("test", img);
	cv::waitKey(0);

	return 0;
}
```

4 Task 2 – Experimenting with OpenCV

To get used to working with OpenCV implement the following:

1. Read the two images (tsukuba_left.png and tsukuba_right.png) provided in the TUWEL course.
2. Calculate the absolute difference between both images.
3. Display the result.

5 Useful Links

http://opencv-srf.blogspot.co.at/2013/05/installing-configuring-opencv-with-vs.html

http://docs.opencv.org/2.4/modules/refman.html

http://docs.opencv.org/2.4/doc/tutorials/tutorials.html

http://docs.opencv.org/2.4/doc/user_guide/user_guide.html