

Project on IMAGE PROCESSING

This Project aims to rotate an image at any angle.

##Technology Used

1-Visual Studio 2019(Latest Version)/Visual Studio Code(Latest Version)

2-OpenCV(Latest Version)

##Installation

#Visual Studio 2019

1-Check the system requirements for Visual Studio 2019.

2-Next, Download the Visual Studio 2019 from <https://visualstudio.microsoft.com/downloads/>.

3-Install and run the Visual Studio installer.

4-Next click on Continue.

5-Select Visual Studio Community 2019.

6-After the installer is installed, you can use it to customize your installation by selecting the feature sets—or workloads—that you want.

7-For C++, choose Desktop Development with C++.

8-Now, click on the Install button to begin the installation of Visual Studio 2019.

9-The installer will now download each component from the internet and starts the installation. This will take a while depending on your internet speed.

10-Once the installation is complete, you will be presented with the Installation succeeded message along with the option to register.

#OpenCV

1-Download OpenCV 4.2.0 latest stable release (opencv-4.2.0-vc14_vc15.exe) for Windows platform. Go to the official OpenCV website:

<https://opencv.org/> -> Resources -> Releases and click on the Windows platform. You will be redirected to SourceForge and download will automatically start.

2-Run the installer and extract the zip file to the opencv-4.2.0 folder.

3-Add opencv's bin directory to path in Environment variables. If you've extracted the downloaded .exe file into c:\, the path to the bin directory should be c:\opencv\build\x64\vc15\bin.

4-In this step, we're creating a new project in Visual Studio 2019. Note that the settings we set below are only applied to the new project.

If you create a new project, you'll need to repeat the steps below.

5-First, select Create a new project.

6-In the next page, select Console App. Note that you may have multiple variants of console apps (.NET Core, .NET Framework, etc). Select the one without parentheses.

It should also have C++, Windows, Console tags.

7-Configure your project and continue. You can name the project however you'd like.

8-Before we go any further, I want to outline the steps we're taking and why we are performing each step.

a-Set platform target to x64 — Pre-built binaries are built for x64 Windows platforms.

b-Add to Include Directories — Tell the compiler how the OpenCV library looks. This is done by providing a path to the header files (build/include).

c-Add to Library Directories — Tell the linker where it can find the lib files for different modules.

d-Add Additional Dependencies — List .lib files for different modules. Note that we're only going to list a single all-in-one file named opencv_world.

9-First, set platform target to x64. Also, make sure "Debug" is selected.

10-Now, go to Project → YourProjectName Properties in the menu.

11-Once new window opens up, select VC++ Directories page on the left and click on Include Directories row. Once you see the down arrow on the rightmost part

of the row, click on the arrow, and select <Edit...>.

12-In Include Directories window, add C:\opencv\build\include.

13-Click OK. In the same tab, look for Library Directories. Again, click on the down arrow and select <Edit...>.

14-In Library Directories window, add C:\opencv\build\x64\vc15\lib and again click OK.

15-Now, select Linker tab and inside linker tab edit the Additional Dependencies column.

16-Inside Additional Dependencies window, Edit the VC++ project linker with the opencv_world420d.lib OpenCV dynamic library.

You will find the DLL (Dynamic Link Library) here: C:\OpenCV-4.2.0\opencv\build\x64\vc15\lib
copy the name of the file opencv_world420d.lib

and paste it in the dependency box and click on OK.

17-Now select Apply and then select OK.

18-We now should be ready to write some OpenCV code and see it in action.

##Working of Project

1-Import necessary libraries required in the Project:-

```
#include<opencv2/opencv.hpp>
```

```
#include <iostream>
```

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications such as Image Processing.

2-Import namespace required in the Project:-

```
using namespace cv;
```

```
using namespace std;
```

3-Create a function named as rotate to rotate an image at any angle that has return type as Mat.The function will return a rotated image matrix.

Syntax: <return type> <function_name>()

Mat rotate(Mat src, double angle)

This rotate function will rotate an image and will return rotated image as a mat object for output image file.

Parameters : src (source image), angle

Return Type : angle

Inside this function, following things are done:-

- 1- Mat dst; -> Mat object for output image file
- 2- Point2f pt(src.cols / 2., src.rows / 2.); -> Point from where to rotate
- 3- Mat r = getRotationMatrix2D(pt, angle, 1.0); ->Mat object for storing after rotation
- 4- warpAffine(src, dst, r, Size(src.cols, src.rows)); -> Apply an affine transformation to image

4- Driver Function

```
int angle;
Mat src = imread("image path"); -> read image file in mat object
Mat dst; -> Mat object for output image file
cout << "Enter angle to rotate:";
cin >> angle; -> to input an angle for rotation
dst = rotate(src, angle); -> function call
string srcname = "Source Image"; -> Name of the source image window
namedWindow(srcname); -> create window1: Source Image
string windowname = "Rotated Image"; -> Name of the rotated image window
namedWindow(windowname); -> create window2: Rotated Image
imshow(srcname, src); -> display window1: Source Image
imshow(windowname, dst); -> display window2: Rotated Image
waitKey(0); -> to exit press any key
destroyAllWindows(); -> to destroy all windows created after key press
```

5-Build and run the project.

- 1-Select Build Solution from the Build menu.
- 2-To run the code, on the menu bar, choose Debug->Start without Debugging.

6-In the terminal window, input an angle to rotate an image and click on enter.

7-Now, two windows will pop up displaying the source image and rotated image.

8-As a result, this project is now capable of rotating any image at any desired angle.