Object Measurement using OpenCV & NumPy

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***Abstract*—Object Measurement from real time image play an important role in daily industrial uses. In this program we detect real-time object's dimensions. The object measurement and detection are some of the important topics of computer vision. This project presents the way to detect and measure an object's dimension in real time from webcam. We have utilised the OpenCV and NumPy libraries to measure the object's dimension in real-time.**

Keywords: Object Measurement, OpenCV, NumPy, Webcam

I. Introduction

"Object Measurement" is a program that we have used to calculate and display real-time object's measurements. There are not many real-time object measurement models. Usually, it is a basic point of computer vision issues. As expressed, this extend presents a technique for computing the estimations of measurement of dimensions in real-time from images. To clarify its working it fundamentally employs a webcam and a white A4 sheet paper as a background to identify the object. After identifying the object, it shows its measurements in specified measuring units at real-time. Within the execution of the proposed method, we outlined a framework that utilized OpenCV and NumPy library. We used PyCharm IDE for programming the whole program.

II. Previous Work

Some Edge Detection techniqus for Images Segmentation have been researched earlier as well. In the (Muthukrishnan.RDec2011)[1] various edge detection techniques were carried out with an image using MATLAB. It was observed that the results Marr-Hildreth, LoG and Canny edge detectors produce almost same edge map. Canny result is superior one when compared to all for a selected image since different edge detection work better under different conditions. Even though, so many edge detection techniques are available in the literature, since it is a challenging task to the research communities to detect the exact image without noise from the original image.

III. Methodology

3.1: PLATFORM OR TECHNOLOGY USED:

PyCharm

- PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python programming language.
- It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as data science with Anaconda.
- PyCharm is cross-platform, with Windows, macOS and Linux versions.

OpenCV

- OpenCV (Open Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision.
- OpenCV runs on the following desktop operating systems: Windows, Linux, macOS, FreeBSD, NetBSD, OpenBSD.
- OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. All of the new developments and algorithms appear in the C++ interface. There are bindings in Python, Java and MATLAB/OCTAVE.

NumPy

- NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.
- NumPy targets the CPython reference implementation of Python, which is a non-optimizing bytecode interpreter. Mathematical algorithms written for this version of Python often run much slower than compiled equivalents due to the absence of compiler optimization.

- NumPy addresses the slowness problem partly by providing multidimensional arrays and functions and operators that operate efficiently on arrays; using these requires rewriting some code, mostly inner loops, using NumPy.

Webcam

- Pre-installed webcam in one's laptop with enough pixels quality to capture a picture to recognize it.

3.2: Steps of designing the project:

1) Download all dependencies and required libraries in PyCharm IDE, libraries and packages such as OpenCV, NumPy. After that import OpenCV as cv2 and numpy as np.
2) Write code for controlling webcam to turn it off or on and then declare a path of the image to be taken for measurement.

```
main.py  utlis.py
1  import cv2
2  import numpy as np
3  import utlis
4  ####################
5  webcam = False
6  path = '2.jpg'
7  cap = cv2.VideoCapture(0)
8  cap.set(10,160) #brightnessofvideo
9  cap.set(3,1920) #width
10 cap.set(4,1080) #height
11 scale = 3
12 wP = 210 *scale
13 hP = 297 *scale
14
```

Fig. 1. Settings for image to be taken from webcam

3) Since all initial settings are done, now we will write the code to measure the object from image taken.
4) Created a file utlis.py to find the contours and apply processes.
5) Created a canny image of the input image, dilated it and obtained a smooth canny image.
6) Writing code to finding the constraint of A4 sheet paper taken for testing.
7) Applying filter as a rectangle as the A4 sheet paper taken for testing is also a rectangle. Finalizing the contours and appending the length and area. Therefore, specifying the detection of the A4 sheet paper.
8) Applying an arrowed line display the estimated measurement of the object.
9) Applying some mathematical concepts such as distance formula, Pythagoras theorem to calculate object measurement on A4 sheet paper with the help of canny image measure.

Fig. 2. Canny image display of the input image

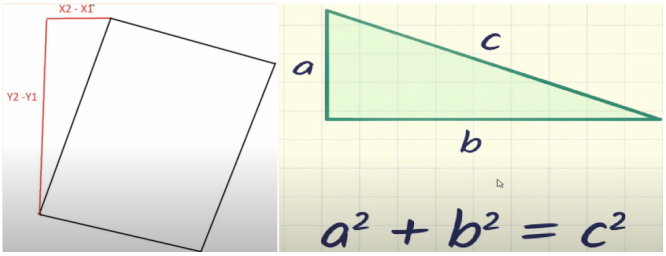

Fig. 3. If object is in other angles, getting their measurements using distance formula or Pythagoras theorem.

3.3: Flowchart:

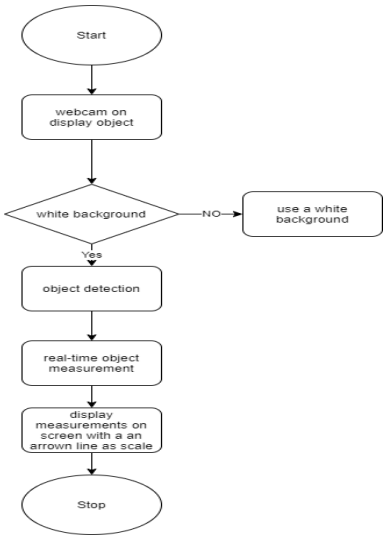

Fig. 4. Flowchart of the whole program

IV. Results

Fig. 5. Input Image and Output of the Program as displaying measurement of the object detected

V. Conclusions:

In industrial sector, many improvements can be made by utilizing such advance and efficient technologies. Like measuring the height and width of courier, etc. The project we implemented for object measurement using OpenCV, NumPy successfully measures the dimension of the object detected from the input image. And also it measures the dimensions of the object in real-time as well. We used the laptop's webcam to measure the dimensions of various objects in real-time. It was little bit slow but measured dimensions successfully. Webcam captures the image in real-time and take it as input and then process the code to give output as the measurements of object in the input image. The canny edge detector we implemented helps to detect the edges of the object and therefore the dimensions. This process is really efficient if applied and implemented in real world.

VI. Appendix

References

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