Object Dimension Calculator From Images

– Python mini group project

Guided By –

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Group Members

Image pre-processing, Implement Canny Edge Method, Contours Detection, code debugging.

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Input data collection, Extract necessary data from the output image.

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Involved in code testing.

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OUTLINES

- Introduction to Object Dimension Calculator.
- Software Requirements.
- Work Flow of the project.
- Project Insight.
- Edge Detection (Canny Edge Method).
- Morphological Operations (Erosion & Dilation)
- Contours.
- Input & Output Image
- Observation Table
- Some Real life applications.

Object Dimension Calculator

- Object Dimension Calculator is a python program that calculates Actual dimension of objects from an image.
- This program gives you approximate average accuracy of 98% , When followed by some prerequisites while capturing an image.

Software Requirements

- Python (3.x)
- Python Modules & libraries

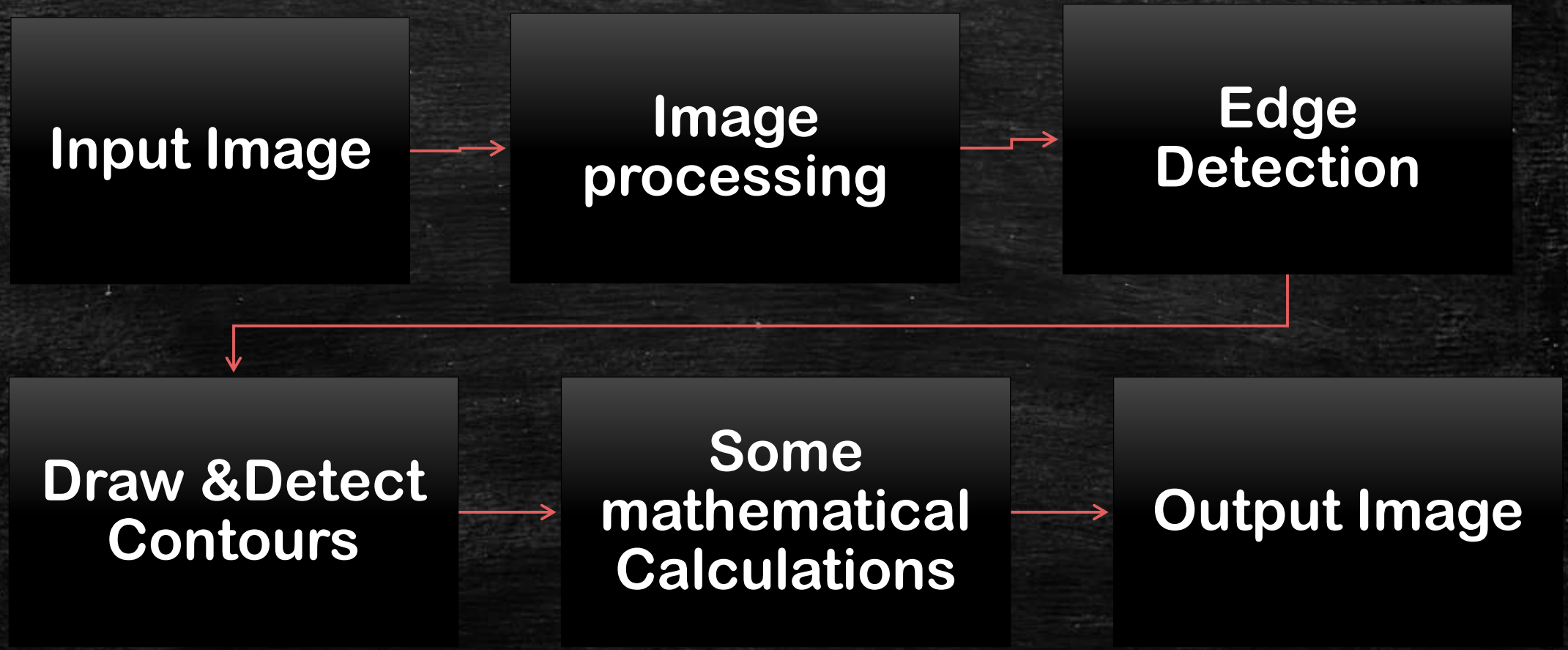
a) openCV (1.18.5)

b) Scipy

c) Numpy(>=1.17.3)

d) Imutils

WORK FLOW


Input Image
Image processing
Edge Detection
Draw &Detect Contours
Some mathematical Calculations
Output Image

Project Insight

- The Program execution starts when you provide the location of the image from the disk.
- Then, the pre-processing of the image takes place and you may also observed some of the frames.
- These frames simply give you a clear picture of the intermediate results. Following are the name of the frames:

1. Input Image Frame.
2. Gray-scale Frame.
3. Blurred Frame.
4. Canny Edge Frame.
5. Dilation Frame.
6. Erosion Frame.
7. Output Image Frame.

REFERENCE OBJECT APPROACH

(Object Detection Method)

- This approach is simply based on reference object .
- We need to consider a reference object in our input image.
- Our reference object should have two important properties which should be known beforehand:

1) We should know the dimension of this reference object(in terms of cm).
2) We should be able to find this reference object in an image based on the placement of the object (ensure that our reference object always placed in the left-most part of the image).

EDGE DETECTION (Canny Edge Method)

- Edge Detection is an image processing technique for finding the boundaries of objects within an image. It works by detecting discontinuities in brightness.
- Edge Detection is used for image segmentation and data extraction in areas such as in image processing, computer vision, and robotics.

(Edge Detection using Canny method)

Morphological Operations (Dilation & Erosion)

Dilation & Erosion are two fundamental Morphological operations :

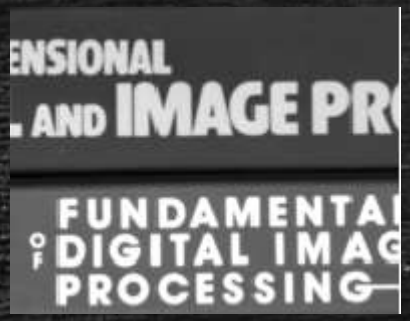
DILATION

- Dilation adds pixels to the boundaries of objects in an image.
- It fills the holes and broken areas in an object.
- It increases the brightness of the object.

EROSION

- While erosion removes pixels on object boundaries.
- It removes the small anomalies.
- It reduces the brightness of the bright objects.

RESULTS AFTER APPLYING DILATION & EROSION



Gray-Scale Image

Binary Image

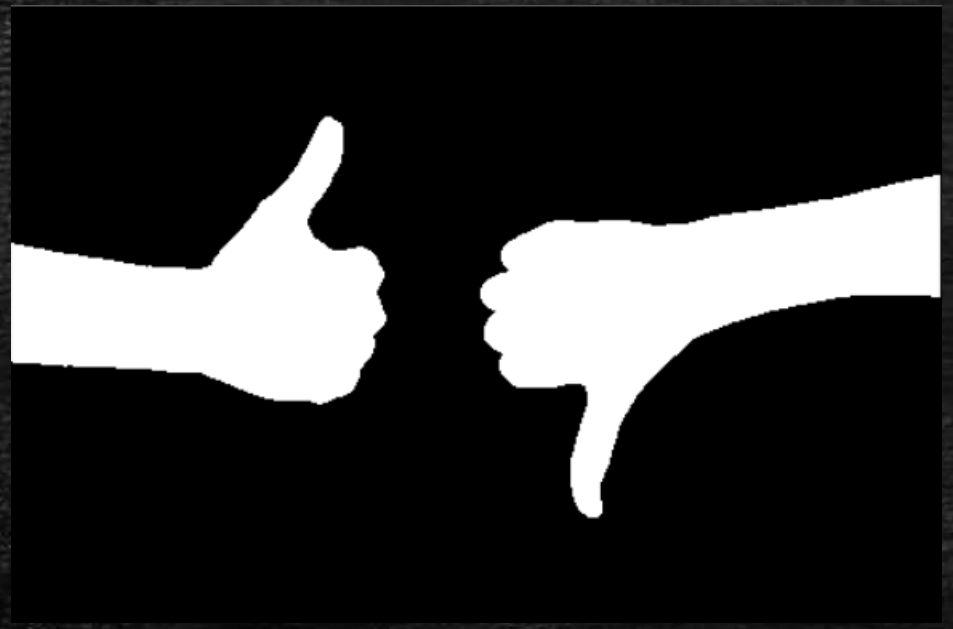
Dilated Image

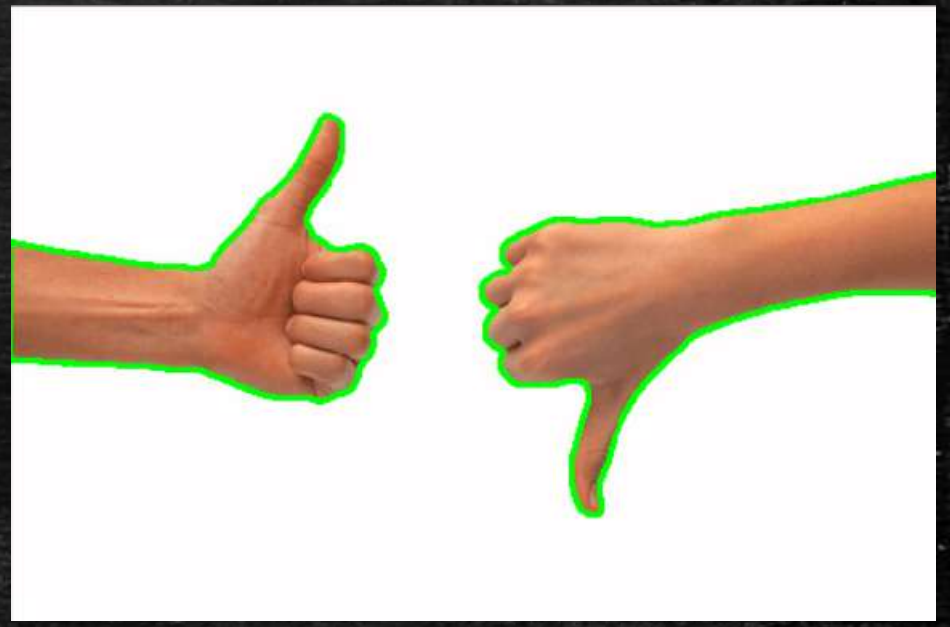
Erosion Image

Contours

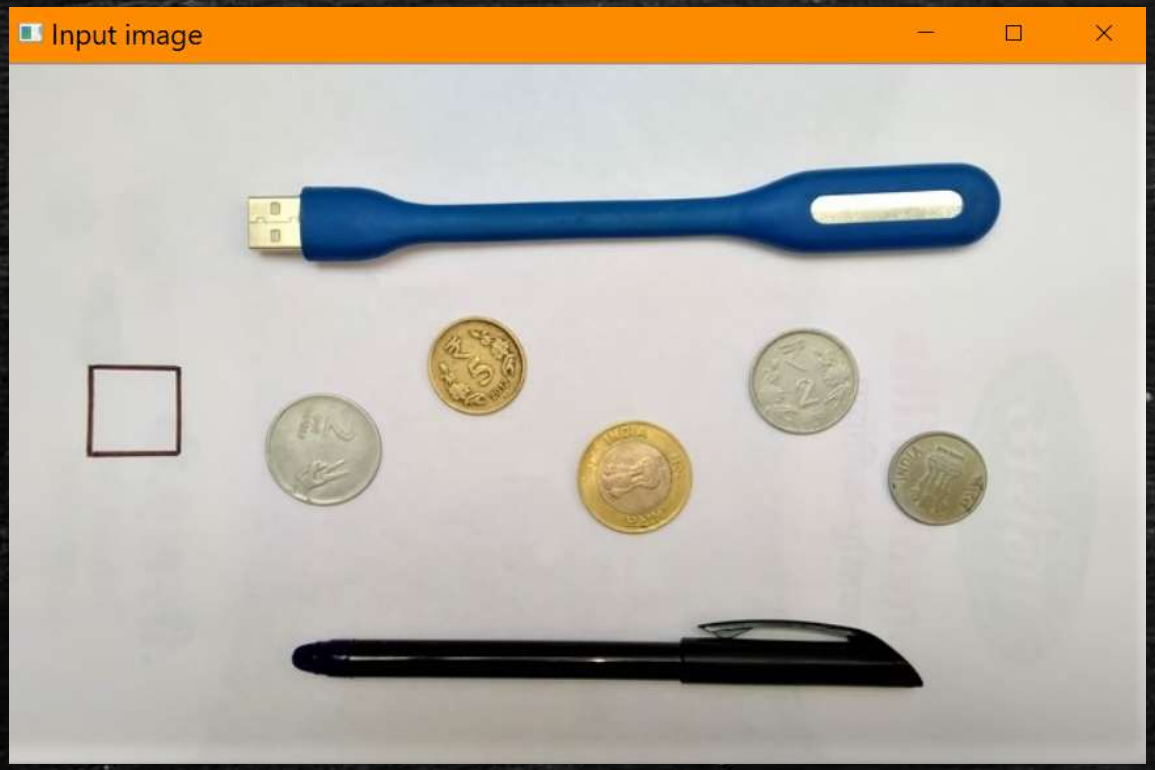
- A contour is a closed curve joining all the continuous points having some color or intensity, they represent the shapes of objects found in an image. Contour detection is a useful technique for shape analysis and object detection and recognition.
- The frame we get after the process of erosion & dilation is then passed through the cv2.findContour(), contours.sort_contours(), cv2.drawContours().
- Now from the above step we get contours in our frame.
- Contours helps to determine the shape & position of objects in the frame.

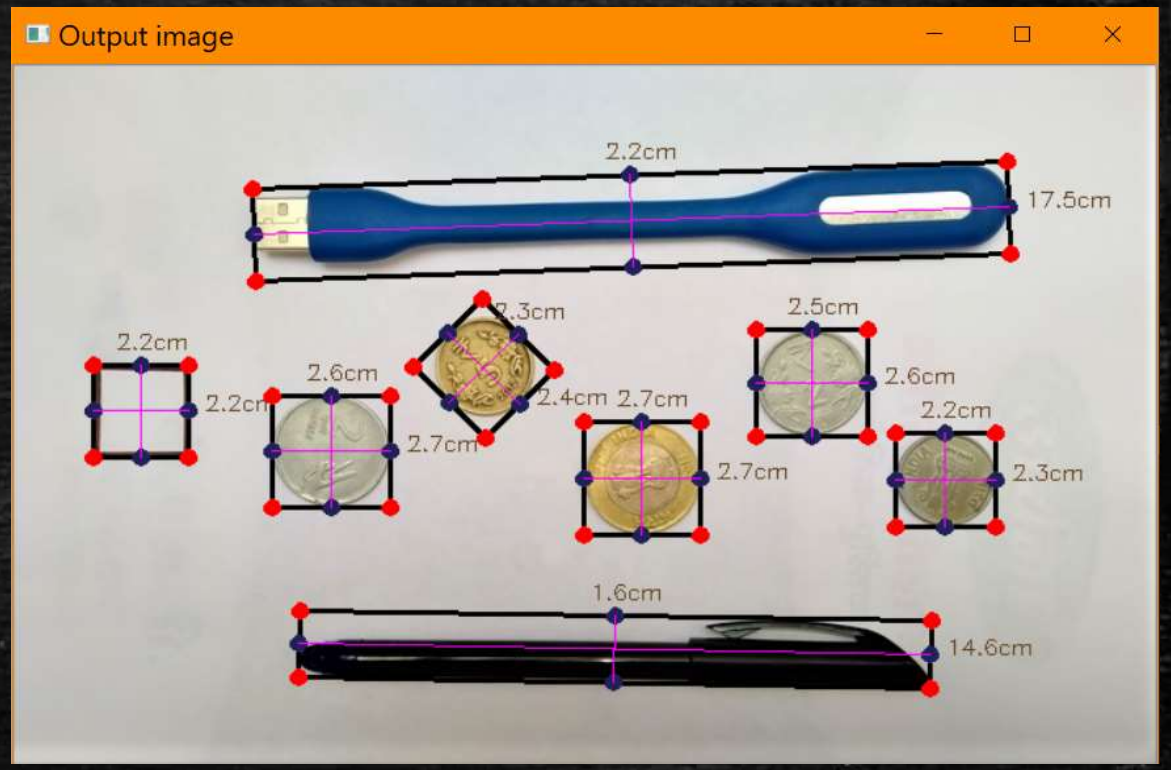
Contours





INPUT & OUTPUT IMAGE





OBSERVATION TABLE

AM-H: Actual Measure-Height.
PM-H: Proposed Measure-Height.
AM-W: Actual Measure-Width.
PM-W: Proposed Measure-Width.

TABLE 1: ACCURACY OF THE EXPERIMENT

NAME OF OBJECTS	AM-H CM	AM-W CM	PM-H CM	PM-W CM	ACCURACY (%)
Square Box(Reference Object)	2.2	2.2	2.2	2.2	100%
2 Rupees coin old	2.8	2.8	2.6	2.7	99.99%
Pen	1.6 -1.7	14.6-14.7	1.6	14.6	99.67%
5 Rupees coin	2.4	2.4	2.3	2.4	99.99%
10 Rupees coin	2.8	2.8	2.7	2.7	99.998%
1 Rupees coin	2.3	2.3	2.2	2.3	99.99%
Light	2.2	17.4	2.2	17.5	99.99%
2 Rupees coin new	2.6	2.6	2.5	2.6	99.99%

SOME REAL LIFE APPLICATIONS

- Measuring object dimension digitally can save the tediousness of performing many day-to-day activities like geometrical calculations involving real life objects.
- In many areas of industry we face lots of issues regarding the quality of the product, so the proposed system can be applied to an industrial quality control system to improve the product quality.
- This technique can be used in crime scene to investigate the dimensions of objects through an image.
- This technique can also be used in the field of robotics.

THANK YOU