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Analysis of fire extinguisher gauge level using OpenCV

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Abstract*— *Computer Vision domain holds the promise of finding solutions to the most arduous issues of today. Analyzing and deciphering an image clearly with the aim of gathering more insight, especially without any human intervention is the ideal goal. With this aim in mind, it would be highly desired to have an autonomous detector that measures the reading given by a fire gauge which is mounted off a fire exterminator.

Keywords*— Feature extraction, image processing, OpenCV.*

I. INTRODUCTION

This problem is primarily focused in the domain of disaster-averting; with an inclination towards fire-fighting.

Any fire can be controlled by making use of fire extinguishers that help douse out a flame by spray out CO2 (carbon-dioxide). These fire extinguishers are installed at multiple locations in any establishment depending on the number of people frequenting the place, size of the establishment, nature of work conducted at the establishment etc. These cylinders have a dimension of about 30cm – 50 cm and typically weigh around 2.5kg – 18kg or so. The fire extinguishers are typically mounted with a fire gauge meter that helps track the pressure exerted on carbon dioxide still pending within the cylinder.

Regular maintenance work involves the monitoring of these gauges manually by maintenance workers to ensure that the content level is up to the mark. This would involve regular up-keep and monitoring by the said personnel at regular fixed intervals. This is a necessity, not just to get an estimate of the content level but also to ensure that proper health of the cylinder is being maintained. Such measures may not be entirely feasible if and when the establishment in question is very vast in size or lacks sufficient number of people to man the premises. This could create unimaginable difficulties in that, if a particular cylinder is partially full or not fully equipped to douse out a flame then it could lead to substantial loss of property and worse - injury as well as loss of life.

An ingenious work around could be to utilise the CCTV (closed circuittele-vision) cameras installed at such places to maintain the up-keep of cylinders installed at such premises. In fact, the inclusion of CCTV systems in manning them can help in taking daily as well as weekly updates.

A brief manner in which this can be done would involve taking snapshots of the video stream gathered from these cameras at regular, predefined intervals. Further processing and filtering of the image. Segmenting out the image to determine the features and areas of interest i.e. the fire gauge meter section. Ultimately, this would help in reaching a conclusion.

II. WORKING

The abstract code would involve writing code in Python, utilizing OpenCV - Python's feature-rich library that caters exclusively to the computer vision domain.

The initial steps would involve procuring images of a certain preset dimension. Allowances can be made later on, to accommodate live video feed too.

The steps would involve:-

1. Fetching of the image of pre-defined configurations
2. Implementation of initial, filtering on the images to convert the image from a colored image to a gray-scale image
3. Smoothening of the image to remove noise, blurring effects from these images.
4. Performing color identification to identify particular color pixels in a certain region.
5. Cropping out or segmenting this region.
6. Drawing a conclusion.

System Flow:

Make use of OpenCV library by Python to read and perform filtering of the images. ThePython version used would be - 2.7 on Windows 8.1/10 environment. IDEused was Visual studio 2015 community edition - which provides support for installation of all other Python packages through the IDE itself, namely - Numpy, Matplotlib and OpenCV (but provided Python 2.7 has been installed before).

OpenCV: It provides certain in-built commands such as imread(), imshow() to take in as well as display images. cvtColor() to convert images from one color scale to another. Also, support for certain filters for edge detection, blurring etc. is provided.

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Numpy: It helps in reading the image as an array of numbers. That helps in identifying important features that can be further isolated and which would aid in classification. For instance - the Numpy value of an image provides information not just about the image dimension and size, but also about particular pixel values which in turn indicate the presence of a certain color. Each pixel in an image has an RGB component – which denotes the extent of the colors – Red, Green and Blue. In case of the fire extinguisher cylinder, the pressure gauge measures the pressure exerted in psi on the pressurized gas.The gauge meter is separated into two color-coded regions i.e green and red. Green indicates the "Safe" zone and Red that the pressure is well within the normal range.

Fig.1: Standard fire extinguisher pressure gauge image

Conversion of this image to the it's gray-scale equivalent yields the below result –

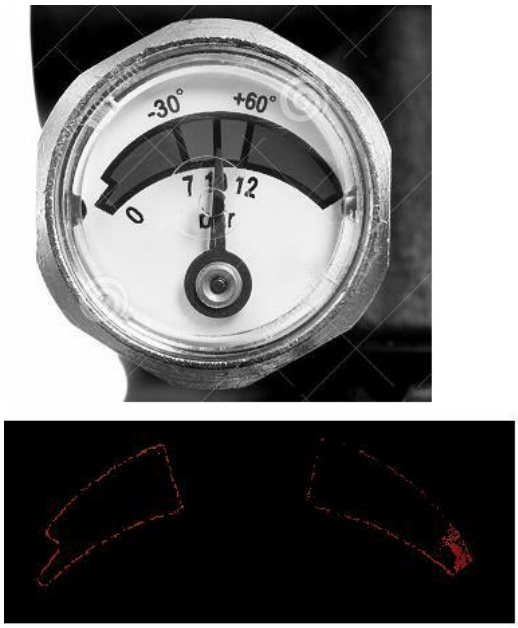

Fig.2: (a) Standard fire extinguisher pressure gauge image on gray-scale conversion. (b) On segmenting out the red-colored region.

Segmenting the image based on the pixel values that would identify the region based on it's underlying color.

III. RESULTS

Utilizing this approach helped identify fire extinguishers which would not function as expected in the advent of a fire emergency. The relative position of the dial on the particular color region indicates the health of the fire extinguisher. In this case, it came out to lie in the "danger" or red zone, so the fire extinguisher could be duly replaced or repaired before-hand.

REFERENCES

[1] www.opencv.org/
[2] http://ieeexplore.ieee.org/document/6240859/?reload=true
[3] http://www.pyimagesearch.com/