Human Rescue System for Flood Areas Using OPENCV Computer Vision

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Abstract **- Floods become the most common and severe natural disasters in the world due to extreme climate change. In addition to causing serious damage to the economy (human assets) they cause great loss of human life which has resulted in the deaths of people. Early detection is important in providing timely response to prevent damage to property and health. It is therefore important to use all available technologies, including global visibility, prevention and mitigation. On the other hand, focusing on the actions that will be taken immediately after the onset of the flood is very important. Person identification and tracking is a popular and widely used research field in computer vision. There are many security and safety features such as search and rescue, surveillance, driver assistance systems, or automatic driving. Previous flood detection methods use special satellite imagery. In this project, we propose a real-time way of using deep neural network algorithm based on video content feeds analysis from surveillance cameras, the most common and readily available these days. We show that an open CV is a more efficient and faster method of localization, recognition and practice in the COCO Human dataset. When a person is found, the system will take the captured image and post it on social media such as Instagram. This enables not only a team of rescuers who will be busy at the time but also ordinary people close to the area to provide assistance to those people found and rescue them by saving their lives.**

Index Terms **- Flood areas, Person identification, computer vision, COCO Human dataset, Instagram.**

I.INTRODUCTION

OVERVIEW

In this new era, when technological advances are making rapid progress, we are finding solutions to the vast majority of problems facing mankind worldwide where natural disasters threaten to overwhelm us. Floods are one of the major disasters in various parts of the world.

As a result of global climate change in recent years, rainfall has intensified and relatively fast. Rising water levels lead to flooding of land areas, especially low-lying areas, due to heavy rainfall. It causes to the damage to property and life. There has been government involvement in providing shelter for those affected by the floods. In addition, scientists have been researching effective ways to cope with the damage done. Rescue services and basic services provided to victims must reach the most immersed area first. Here comes the importance of plans for finding flood-affected areas. These days, there are video surveillance programs everywhere.

The use of convolutional neural networks (CNNs) has grown exponentially with higher accuracy. One of the biggest tasks transferred is finding something. The detection problem can be considered as the task of labeling objects in the image by the appropriate category and predicting the bounding boxes corresponding to the confidence of the real value. Many researchers have suggested a different design of deep neural networks in this issue, such as Overfeat, DeepMultibox, Region CNN, YOLO, SSD, etc. We use fast-tracking methods; here we focus on a specific acquisition function: video streams it is therefore very important to be able to see and track everyone's visible location in a recorded video stream tailored to the individual's perspective. With the availability of a large amount of data, faster GPUs, and better and more efficient algorithms, it is possible to train computers to find and distinguish multiple objects within a photo / video with high accuracy.

OBJECTIVE

- To ensure the safety of people in flood affected areas.

- To implement a technique that can enable even common people to save the affected people who are in danger.
- To get immediate help in order to avoid loss of human lives.

II. LITERATURE SURVEY

1. Krizhevsky, Alex, Ilya Sutskever, and Geoffrey E. Hinton, "Image-net classification with deep convolutional neural networks."
   The use of convolutional neural networks (CNNs) has grown exponentially as this activity has gained very high accuracy. One of the biggest tasks transferred is finding something.
2. Girshick, Ross, et al., "Rich feature hierarchies for accurate object detection and semantic segmentation"
   CNN acquisition types work differently. For example, RCNN removes potential commitment boxes using regional promotion methods such as Selective Search (SS) and separates these proposed filter boxes into a classified based CNN.
3. Redmon, Joseph, et al., "You only look once: Unified, real-time object detection"
   Instead of having a consecutive pipeline for regional suggestions and object classification, YOLO's approach has created object detection as a single retraction problem, from direct image pixels to linking binding boxes to class opportunities. In this discovery, a single solution network simultaneously predicts multiple binding boxes and class opportunities in those boxes. YOLO trains in full photos and directly improve acquisition performance. This leads to very low delays.
4. Ren, Peiming, Wei Fang, and SoufieneDjahel, "A novel YOLO-Based real-time people counting approach."
   Feature-based techniques detect faces using facial features such as edges, movements, point distribution models and much more. And the face recognition algorithm includes a neural network, a mathematical method. However YOLO out does it all. In terms of real- time performance, with the help of a GPU, YOLO-PC retrieves a deep convolutional neural network to detect a person over 40 fps (frames per second).
5. Ouaknine, Arthur, "Review of Deep Learning Algorithms for Object Detection"
   Common Objects in Context (COCO) was developed by Microsoft and launched in 2015. The 2017 database contains more than 120,000 pictures for training and certification, more than 40,000 pictures for testing and 80 classes. COCO is the acquisition of a large object, a division of shares, and a caption database.

III.EXISTING SYSTEM AND PROPOSED SYSTEM

EXISTING METHOD

- The approach uses a deep learning segmentation architecture SegNet to use with real-time cameras that work on certain flood-prone areas.
- Training the architecture helps with flood detection and necessary information can be sent for precautions.
- Deep learning approach also helps with scene understanding being efficient in almost every aspect due to being able to learn features much more in detail.

DISADVANTAGES:

This system focuses only on the pre-detection of flood but not focused on the post-management of the flood affected areas in order to save the affected people in those areas.

PROPOSED SYSTEM

- The camera will continuously monitor the flood affected area and check for the presence of humans.
- It implements a very quick detection of human method, by employing Histograms of Oriented Gradients (HOG).
- This technique will put a bounding box around the objects detected as people.
- The object detection algorithm will be first used to detect the people in given input image/frame.
- We used COCO human dataset for pre-training.
- Later, when the human is correctly detected in the input frame/image, the image will be captured and sent to social media like instagram.

ADVANTAGES:

- Our system outperforms all of the existing methods.
- In terms of real-time performance, the algorithm used in the system will produce precise detection outputs.

IV.ARCHITECTURE DESIGN

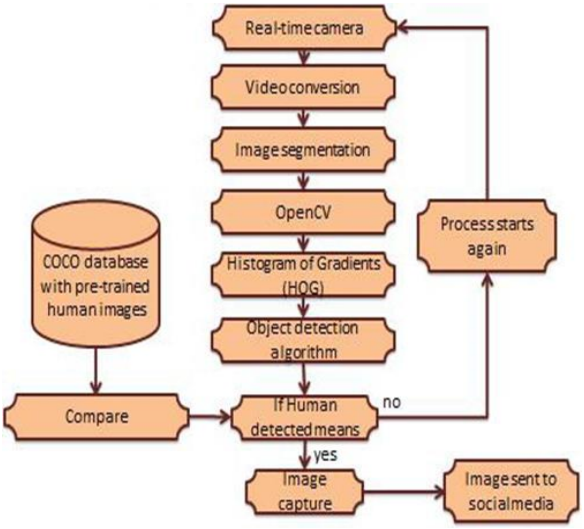

Fig.no:1: Flow Diagram of the proposed system

MODULES

There are five modules in this system

- Video monitoring module
- HOG module
- COCO Database module
- Human detection module
- Instagram upload module

MODULE DESCRIPTION

- Video monitoring module -In this module, the real- time camera will continuously monitor the flood affected area in search of humans. The live video streaming will be captured and frame extraction will be done to produce segmented images.
- HOG module –This module will implement histogram of gradients to detect the presence of persons in frames.
- COCO Database module –In this module, the images with human will be stored in the database to pre-train the system to detect the desired region of interest (human) in the input images.
- Human detection module –This module detects human in the area by applying the person detection algorithm and by comparing with pre-stored images in the database. It will create bounding boxes around the detected objects (humans) to represent as detected objects.
- Instagram upload module –Once the person is detected, the system will capture the respective image in which the person is detected and then the captured image will be uploaded in social media like instagram in order to get immediate help.

V.SYSTEM SPECIFICATION

Hardware Specification

Processor	: INTEL I5 (7th generation)
RAM	: 4 GB RAM
Hard disk	: 1TB
Monitor	:20 color monitor

Software Specification

Front end	: GUI
Back end	: python (language) Software tool used : Thonny
Platform	: Windows 8

VI. ALGORITHM USED HISTOGRAM OF GRADIENTS IN 8×8 CELLS

- Here, the image is categorized into a histogram of gradients is calculated for each 8×8 cells and 8×8 cells
- Let's know the purpose of such categorization. One among the significant causes to utilize a descriptor for feature to define a patch of an image is that it offers a representation that is compact. An 8×8 patch of image comprises 192 (8x8x3) values of pixel. The gradient of this patch comprises two values (direction and magnitude) per pixel that adds up to 128 (8x8x2) numbers.

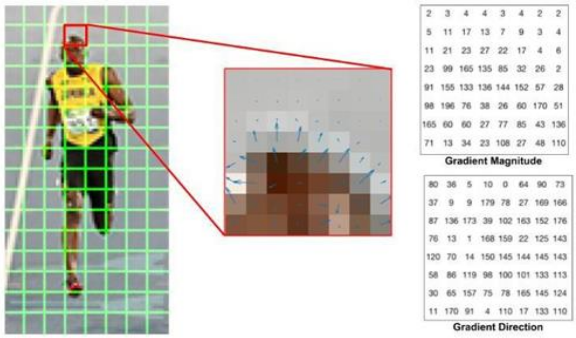

Fig.no:2: Pixel level gradient magnitude and direction

OBJECT DETECTION ALGORITHMS

It is a technique working under the principle of image processing and computer vision which performs detection and localization of objects of a particular group (such as buildings, humans, or cars) in images and videos (digital).

HUMAN DETECTION

This module detects human in the area by applying the object detection algorithm and by comparing with pre-stored images in the database. It will create bounding boxes around the detected objects (humans) to represent as detected objects.

Fig.no:3: Person detection in live video streaming

The real-time human detection is evolving as an important aspect with researchers and also for various industrial applications from intelligent cities to retail to surveillance. So, it will not be considered as some science fiction concept hereafter.

Effectively detecting a person in an image or video refers that we tend to combine image classification and object detection.

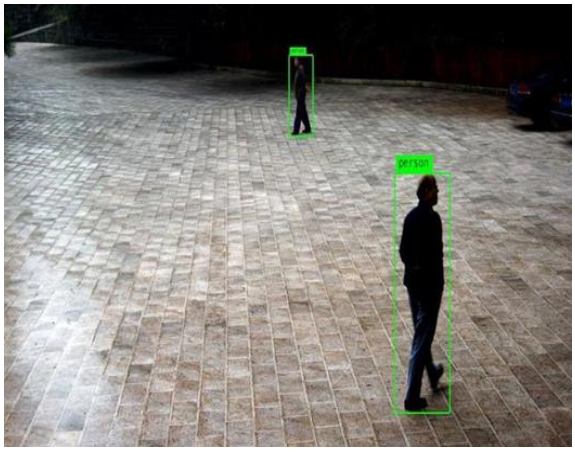

Fig.no:4: Object detection of human through real-time camera

COCO DATA SET

- Used for Detection of Objects
- Comprises of nearly 121,408 images
- Consists of around 883,331 object annotations
- There are 80 classes in this dataset
- 640 x 480 is the Dataset median image ratio
- Segmentation that is Semantic
- Segmentation that is Panoptic needs models to design boundaries among objects of interest in segmentation that is semantic
- Detection of Key points
- Could label keypoints for around 250,000 people
- Class List for COCO Dataset

Fig.no:5: COCO keypoints

IMAGE SEGMENTATION PROCESS

Image segmentation in different regions containing each pixel with the same characteristics will be performed. In order to be meaningful and to be used for image analysis and interpretation, regions must be strictly aligned with the exhibits or aspects of interest. Purposeful Segmentation is the first step from the processing of a low-level image that converts gray or color into one or more images to the definition of a high-quality image in terms of features, objects, and scenes. The success of image analysis depends on the reliability of the separation, but accurate image classification is often a major challenge. Segmentation strategies are context-or- non-contextual. The latter

ignore the spatial relationship between the elements in images and group pixels together on the basis of a specific global attribute, e.g. Gray level or color. More content strategies use this relationship, e.g. combine pixels with the same levels of gray and areas around the area.

VII.SYSTEM SOFTWARE THONNY IDE-INTRODUCTION

FEATURES

- Code auto completion
- Code inspection to offer highlight errors and bracket matching.
- It is convenient to begin with since its installer also installs Python 3.7.
- Debugger used by it is humble to utilize since no knowledge about breakpoints is needed.
- It allows us to call a function by giving information of local variables and viewing the pointer of code.

Pros and cons of Thonny are:

Pros

- Friendly user interface.
- It won't distract users.

Cons

- It provides primary operation as supposed to other improved IDEs like PyCharm.
- We may find a few problems for which an immediate remedy is not accessible.

PYTHON PROGRAM

Features of Python programming language

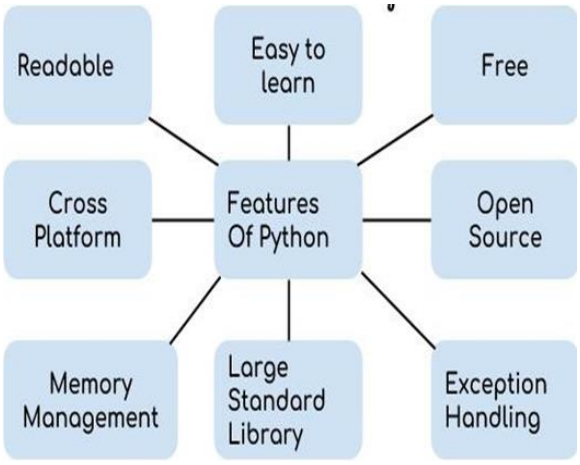

Fig.no:6: features of python

VIII.RESULTS

All the output prediction results were successfully obtained and indicate the efficiency of the system in an effective manner. The step-by-step procedure in the system is captured as snapshots and represented as follows,

Fig.no:7: Main Window of the project

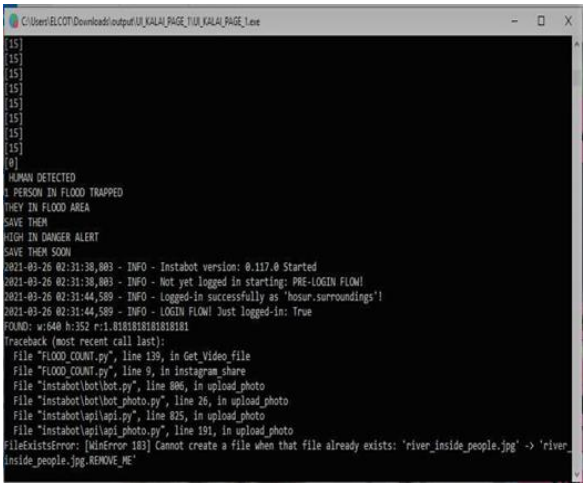

Fig.no:8: Console window showing the detection process

Fig.no:9: Detected person in flood area is captured and posted on Instagram

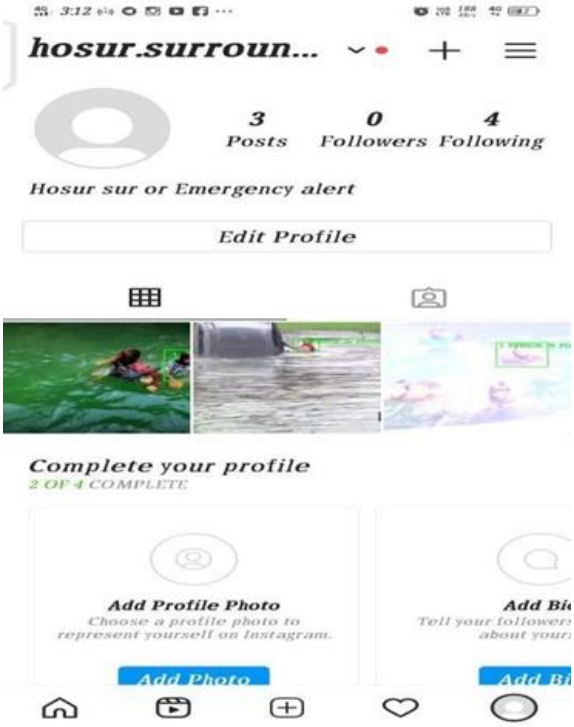

Fig.no:10: Instagram page created chiefly for the purpose posting the information regarding people trapped in flooded areas

IX. CONCLUSION

Neural networks and deep learning-based object detection has received huge consideration in the recent days, and it became so famous at this time. Each and every month researchers introduce their work, a new solution or a new algorithm for a particular issue. The major objective was implemented successfully, a functioning utilization that employs neural networks for detection of objects. The performance of detection is estimated on the segmented frames of test from the COCO dataset. An Artificial Intelligence based object detection approach was proposed to improve the precision of detection of humans. Our system showed a better performance in human detection and thus ensured the protection of flood victims by rescuing them at right time on detecting the presence of humans in flooded areas using real-time video analytics along with uploading the captured information in social media like Instagram to get immediate help.

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