An Efficient Damage Relief System based on Image Processing and Deep Learning Techniques

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Abstract

The Unmanned Aerial Vehicle (UAV) has been around for a long time but has been widely used recently by humans. Their acceptance of various communications-based applications is expected to improve coverage, compared to traditional ground-based solutions. In this paper, the Deep-learning and Image Processing Process framework is expected to provide solutions to the various problems already identified when UAVs are used for communication purposes. UAVs are used in disaster relief because of their accessibility even in inaccessible places. In this paper, we propose research into Deep learning and Image Processing strategies for UAVs. In deep learning is a form of machine learning that teaches computers to do what comes naturally to people: learn by example and get a lot of attention recently and for a good reason. It achieves previously impossible results. Image processing is the process of performing a specific task on an image, finding an enhanced image or extracting useful information from it. So our paper has the idea of using in depth face recognition and photo processing a digital photo taken by the UAV to identify victims of rescue, overcoming back to the latest UAV technology some of which include blurry images, unable to identify the victim when there are too many objects and much more. The solution includes a variety of features that allow for the distribution of images. It includes features and presentation of image detection and demonstrates the effectiveness of drone use in damage applications.

1. Introduction

Technology and inclusion grows every year with the need to analyze and determine the most exciting data identification technology. As technology rises to a higher level, the level of speculation

and performance and analysis needs to be expanded to a broader level [1]. In this regard, extensive research, particularly (CNN), has found promising results in the recognition of the latest phenomenon. However, it remains an open question: Existing jobs tend to focus on reporting CNN properties that work well in object recognition rather than investigating the cause. In this project, we are conducting a comprehensive review of Yolo recognition software (You only look once) in our agreed environment to make our work more productive. Specifically, we use LFW (Labeled Faces in the Wild) images to train Yolo, unlike many existing CNNs who are trained in confidential information [2]. We propose three CNN buildings which are the first reported structures trained using LFW data. This paper compares the scope of in-depth learning frameworks and analyzes the impact of various implementation options. We identify several useful properties of objects. For example, the magnitude of the elements studied can be greatly reduced without adversely affecting the accuracy of the object. In addition, the traditional mathematical learning method using Object facial features is explored [3]. Tests point to two key factors in Yolo's effectiveness in the combination of in-depth learning and metrics. To make our work born again, source code and models will be made public [4].

2. Objectives

In this scenario, the classification of UAV-assisted disaster management applications is based on the purpose of a specific set of applications. The UAV-assisted disaster management applications considered for this function are as follows:

2 (a) Status Awareness

The purpose of this set of disaster risk management applications is to collect data during the disaster phase, especially with regard to the movement of people at risk of disaster. However, there are currently two main restrictions on doing this job well. First, it is currently not always possible to access live video feeds from a UAV camera due to limited bandwidth [5]. Second, even if video feeds are available, monitoring and analyzing video for a long time is a tedious task for people.

2 (b) Damage Inspection

In the event of a disaster, it is important to assess the extent of the damage using a variety of methods. Non-compliant aircraft (UAV) systems are becoming increasingly important because good

location resolution and temporal altitude were not available on traditional remote sensing platforms [7]. Advanced UAV data can provide a good opportunity for disaster risk monitoring, including construction damage assessments.

2 (c) Purpose of Search and Rescue

The purpose of this UAV-assisted program is to search for and rescue unfortunate people who are missing, trapped or injured during a disaster or who are not moving in any other way.

3. Technologies Used in a Given Track

In deep learning methods and techniques have been gaining increasing popularity among the research areas of neural networks and artificial intelligence. The increase in their processing capacity, the large amount of data used for training [8], and the recent advances in machine learning and signal processing are the main reasons for the arrest of researchers. UAV technology has seen a huge increase recently, because such techniques are able to extract very useful information from aerial photographs.

Convolutional neural networks are a state of the art in advanced use of in deep learning of a range of activities such as image or video processing, speech recognition, and more. The use of CNN for image-related purposes is the most popular application domain for this particular type of neural network algorithm [9]. Their amazing ability to find out what an image is or what the image contains, or even captions automatically generated images, increasing their brilliant popularity and their practicality in the field of computer viewing.

YOLO is an open source of art object discovery system for real-time processing. Using a completely different approach, YOLO has several advantages, compared to previous regional vision systems and segmentation networks, in the way it makes acquisition and prediction. Regional proposal separation networks make the discovery using a model in a highly predictable image in different regions and image scales [10]. High-value regions are considered acquisitions, but YOLO uses a single-stage acquisition strategy and its structure is similar to a complete neural convolutional network (FCNN). Specifically, YOLO treats object acquisition as a retrieval problem using the same CNN and binding boxes in the full image, in both separate objects and local operations [11] The picture is divided into regions and the predictions are made with weighted binding boxes for

predicted opportunities. The great advantage of YOLO's real-time object acquisition is the improved speed in deep learning process.
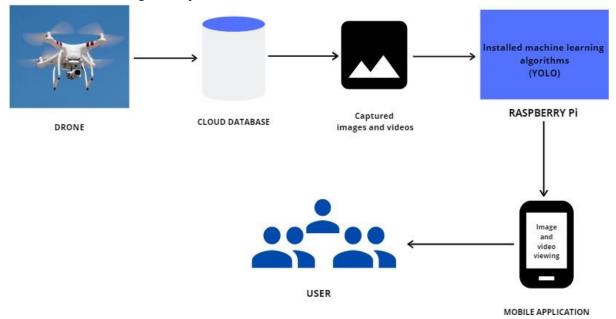
Fig. 1 - Proposed Framework for Prediction of Real Time Detection

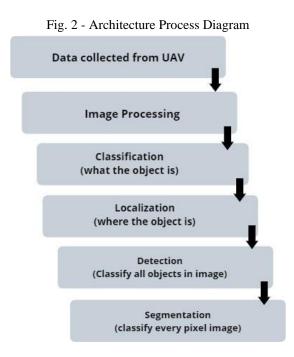
4. Experiments and Discussions

To assess the accuracy of the system and the proposed method, a series of simulation simulations were performed.

4 (a). Aerial Image Quality Inspection

Image quality testing plays an important role in external data performance analysis. If the image quality is low successive sequence counting will not be reliable [12]. Obviously, low-quality images cannot be used for subsequent calculations. In this paper, there are over 200 images currently in the air. According to image quality statistics, 32 photos are labeled as inappropriate images. After collecting a lot of image data, it can be found that the distribution of results between relevant and negative data is different. To overcome this problem of inappropriate images we will use image processing [13]. Image processing algorithms process the image and produce a relatively clear image as output. This will ensure that everything in the picture is visible.

4 (b). Identifying the Image

The main purpose of using advanced learning algorithms is to identify the victims in the images. Most of the time even after receiving photos or videos from UAVs indicating that the victims are traumatized because they will be trapped somewhere or only one part of their body will be seen in a video that is too easy to ignore enough [14]. Using these Deep-learning algorithms, which will be integrated into the raspberry pi (which will focus on the UAV), the victims are identified (surrounded) even if only one part of their body is found (eyes, hands, etc.). So this will be very helpful for rescuers as they can go directly to the scene and rescue the victims instead of searching and wasting their time and energy.
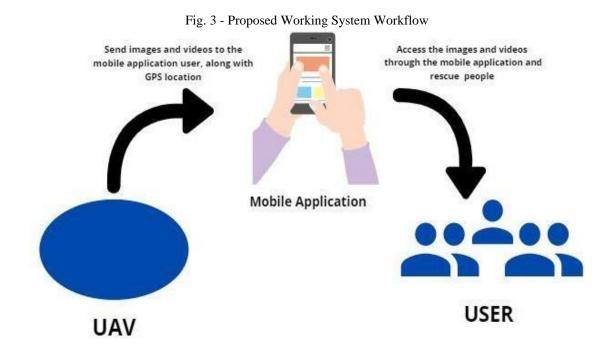
Fig. 2 - Architecture Process Diagram

5. Proposed Solution

The main focus is to send photos taken to the user using the mobile app. This is done using machine learning techniques where ML databases will be pre-installed to identify people and the damaged structure; images are taken and stored in a database [15]. Photos are sent to users via a mobile app with the help of a database and GPS location.

User: User can create an account in the mobile app and gain access to photos sent by UAV. Photos can be shared with other users. Location details will be posted along with photos.

This program is useful and usable. Users can access information about victims and if they are anywhere nearby they can go and help victims or pass on information they know. [16]. The main purpose of this program is to go into inaccessible areas and find the frequency of the damage done and also search where the victims are stuck. This will make it easier for rescuers as they have to spend their time searching as they are able to reach directly where the victims are.

Database: The database used here is a cloud database providing real-time access to control data, telemetry and video / payment from UAV over a secure and reliable visual interface [17]. This allows you to connect a UAV to a cloud website with real-time image analysis. The site supports multiple programming languages and programs as well as integrated, run, deploy and manage devops.

Fig. 3 - Proposed Working System Workflow

6. Conclusion

The integration of UAV technology with real-time computer vision and in deep learning strategies for search and rescue purposes is presented in this work [18]. Our main goal is to make the drone travel to places inaccessible to any natural disaster and our vision consists of a mobile app to connect to the drone. So depending on the state of the art detection technology, the proposed system is able to accurately locate and save people and send location-like information via GPS and take pictures with the mobile app.

Hardware image processing on board, using raspberry pi 3b plus. The ability to work in real time, thus avoiding the transmission of video sequences to the world channel for processing and returning results to the UAV [19], which can lead to undesirable and significant delays in time.

While the proposed rescue plan has been used to save the lives of the victims. It can have the power to find people and provide emergency services to people. With only a few modifications. Given the high level of accuracy found in both detection and classification [20], there is unlimited potential for this proposed method to be used in SAR devices in multiple or multiple locations.

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