International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 11 | November - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

Incident Detection Website Using Computer Vision

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Abstract : The Incident detection website using computer vision that utilizes machine learning algorithms and computer vision techniques to detect various incidents, including car accidents, violence, fire accidents, and weapons detection. The system aims to enhance safety, security, and emergency response capabilities by providing real-time alerts via SMS to relevant authorities upon incident detection. However, the design model enables the end user to instantly report the most frequent casualties that occur in public, such as fires, automobile accidents, violence, and weapons (guns), by simply visiting the website and uploading the causality image, which will immediately report to the relevant authority.

While the system aims to improve emergency response, it is important to note its limitations. Factors such as environmental conditions, image quality, and lighting variations may affect the system's accuracy and reliability. The system serves as an aid to enhance emergency response capabilities and should not replace the role of human responders. The incident detection system offers a valuable tool for enhancing public safety, facilitating rapid incident response, and minimizing the consequences of accidents or violent incidents. Its deployment can contribute to a proactive and efficient approach to emergency management.

Disasters and emergencies, whether natural or man-made, often result in chaotic and life-threatening situations where rapid response is crucial. The ability to swiftly and accurately identify casualties amidst the chaos can significantly improve the effectiveness of disaster response efforts.

This project proposes the development of an innovative Computer Vision system aimed at automating incident detection and victim identification, leveraging advancements in image processing and deep learning techniques.

IndexTerms **- Disease detection, CNN (Convolutional Neural Network),**

Introduction

Incident can be termed as a person killed or injured in a war or accident. Incident detection using computer vision, analyses the surveillance camera videos. Over the last few years, these cameras and other surveillance equipment have been installed in different places for public safety e.g. educational institutions, hospitals, banks, markets, streets etc. to monitor the activities of people. Casualty is a phenomenon that can occur at any time, at any given moment. If reported late, some casualties might have a significant negative impact on the environment.

Our project's goal is to create a website powered by Machine Learning and Deep Learning that can identify and notify the authorities of incidents like fires, shootings, accidents, and fights. This website can be quite helpful in delivering prompt aid and improving public safety in the modern world, where similar situations are occurring increasingly frequently. The proposed system can be used to alert casualties caused at various public places as soon as possible to the authorities. Casualties can be caused by human behavior or natural calamities.

The created machine learning model is capable of spotting violence, fire, and weapons (including guns). The Yolo V7 method is used by the model to find the aforementioned casualties . For instance, if a fire breaks out in a public area and is not reported right away, the amount of destruction will rise. A weapon (gun) can cause defacement in public if it is held out in plain sight by an unidentified person. One's life can be saved by reporting the car collision right away. Also, it's critical to swiftly stop public violence Advanced machine learning techniques are used on our website to analyse user-uploaded image data. The technology is capable of precisely identifying particular patterns and objects connected to the episodes of interest, such as flames, guns, damaged vehicles, and physical altercations. The website instantly alerts local authorities when an incident is found, giving them access to real-time information about the issue and empowering them to take the necessary action. Our website, in our opinion, has a great deal of potential to increase public safety and save lives

The proposed system can be used to alert casualties caused at various public places as soon as possible to the authorities.

Casualties can be caused by human behavior or natural calamities, For

example-

- Fire
- Car Accident
- Weapons(Gun)

Literature survey:

Sr.No	Paper Name/Year	AuthorName	Description
1	Custom Object Detection using YOLO Algorithm 01-Jan-2021	Srujan Patel Naeem Patel Siddhesh Deshpande	The project is prepared for detecting instances of semantic objects of a certain class(Humans, buildings, cars)
2	Fire Detection Using computer Vision Year - 2018	Taha Zaman Saneeha Ahmed	Detection of fire using computer vision and identify hazardous fire by processing the video data generated.
3	Video-based real time intrusion detection system for smart city application Year - 2019	Rashmiranjan Nayak Mohini Behera Umesh Pati	Detect the unauthorized entry or mal-intentional intrusion to the unattended sensitive area and notify.
4	State-of-the-Art Violence Detection Technique Year - 2017	Muhammad Ramzan Adnan Abid	Violence Detection technique using computer vision analyze the surveillance camera video.

Algorithm & System Model:

Object Detection using YOLO algorithm.
Recently, the area of machine learning mainly in detection and classification of objects and image segmentation has been revolutionized by deep learning. You look only once (YOLO) outperformed other detection algorithm at predict in images what objects they are.

System Architecture is a rough model that describes the structure of a system and provides a proper view of the system. System architecture can be defined as “Structural Design of Systems”. It formally represents the behavior of a system and helps to understand the relationship between different components.

System architecture acts as a blueprint, generally it's made or designed for assignment management. It is a combination of different components that are linked or connected to each other which contributes in making a complete system architecture. Each component is having its own function and responsibility, sometimes it might happen that two or more components are dependent on each other. And if one of them fails then the other one will also show some unexpected results/outputs.

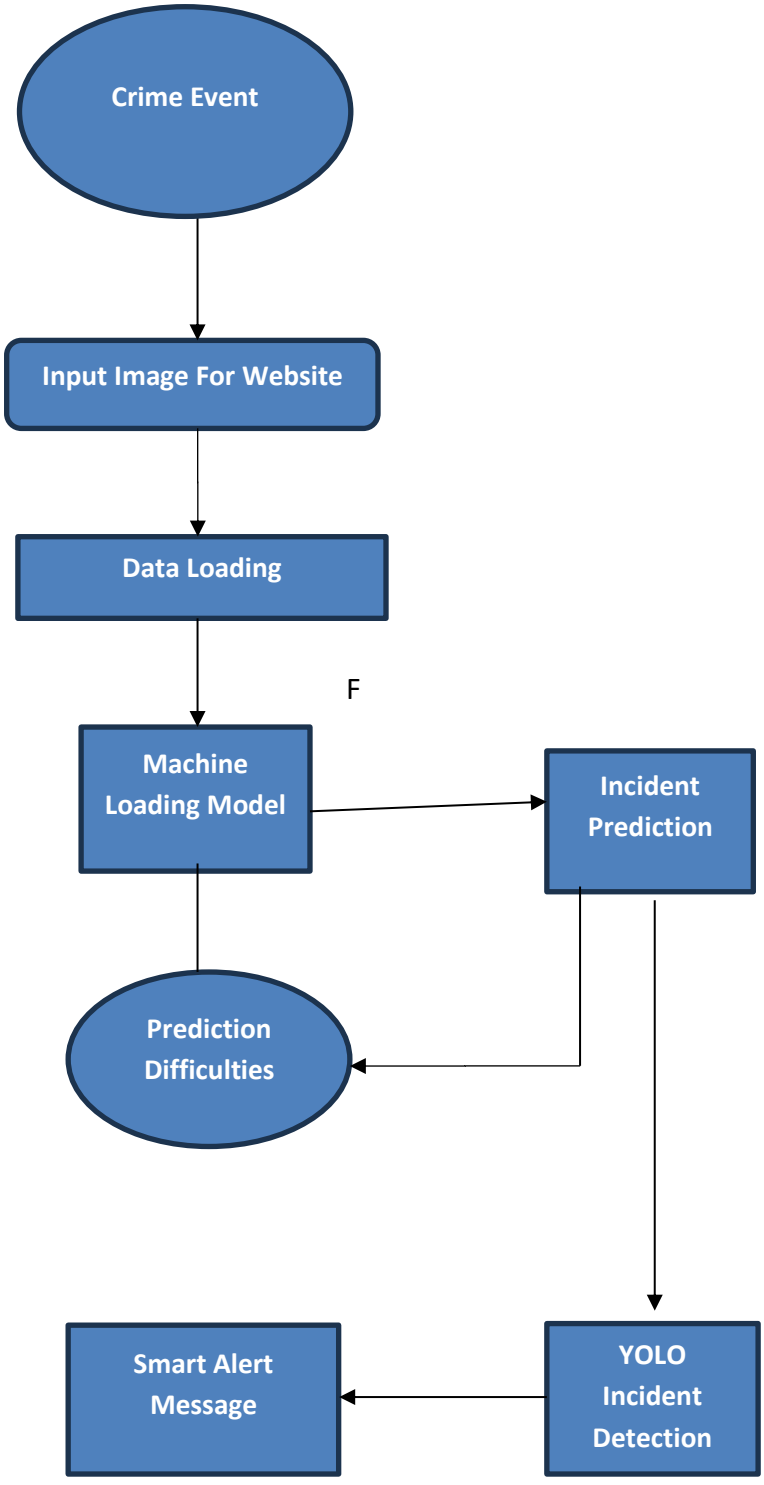

Fig:1 System Architecture for Incident Detection

Working Methodology

The YOLO algorithm works by dividing the image into *N* grids, each having an equal dimensional region of SxS. Each of these *N* grids is responsible for the detection and localization of the object it contains. therefore, these grids predict B bounding box coordinates relative to their cell coordinates, along with the object label and probability of the object being present in the cell . This process greatly lowers the computation as both detection and recognition are handled by cells from the image, but it brings forth a lot of duplicate predictions due to various cells predicting the same object with multiple bounding box predictions. YOLO makes use of Non Maximal Suppression to deal with this problems.

In Non-Maximal Suppression, YOLO suppresses all bounding boxes this have lower probability scores. YOLO achieves this by first looking at the probability scores associated with each decision and taking the largest one. Following this, it suppresses the bounding boxes having the largest Intersection over Union with the current high probability bounding box . This step is repeated till the final bounding boxes are obtained.

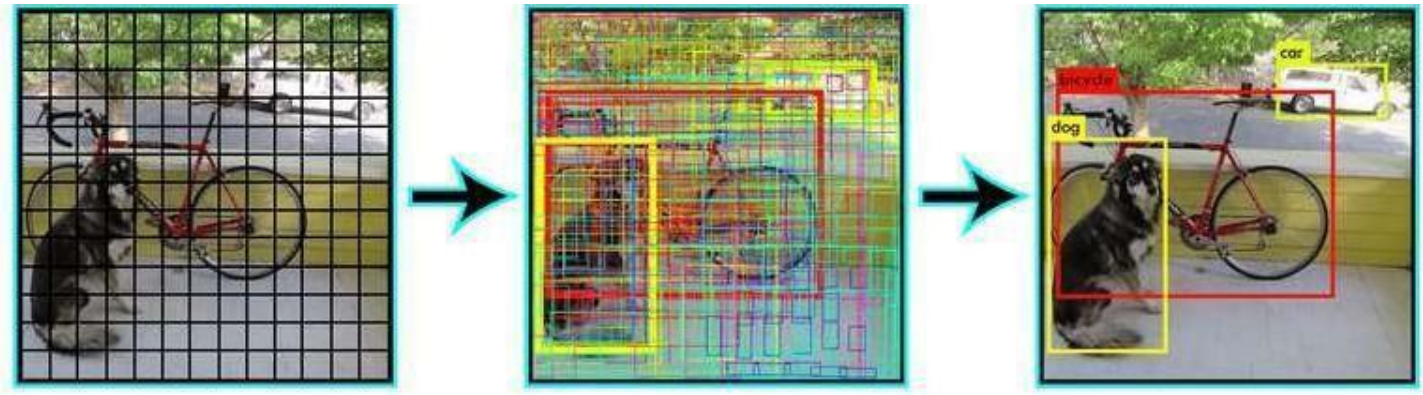

Fig:2 Working of Algo

Conclusion:

To sum up, our project is a Website powered by Machine Learning, Deep Learning and Artificial Intelligence that can identify and notify authorities about Fire, Gun, Accident, and Violence occurrences from photographs posted by users. Advanced machine learning methods are used in the project to evaluate photographs and find certain objects and patterns connected to the episodes of interest.

We have shown how machine learning can improve public safety and emergency response through the project's progress. Our solution can increase the overall efficiency of emergency services, cut down on response times, and ultimately save lives by enabling rapid identification emergencies. and reaction to emergencies.

We think that our initiative might be a useful resource for first responders, law enforcement, and the general public. Authorities can respond swiftly and effectively to incidents by using the system's ability to offer real-time information about them.

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