AI BASED ACCIDENT DETECTION AND ALERT SYSTEM

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ABSTRACT

Road accidents are a common cause of tragic deaths, and frequently the victim dies as a result of failing to report them to the appropriate authorities. The accident was not reported, so emergency care was not provided, resulting in death. A smart city with a traffic monitoring and reporting system based on AI can assist in providing medical assistance in real time, saving many lives. In most of the city, traditional traffic control systems already have IP cameras and sensors installed to monitor and control traffic. Traffic tickets can be generated automatically by these systems. In this paper, propose a more advanced traffic monitoring system that uses live camera fees to identify and detect moving objects like cars, bikes, and other vehicles.

1. INTRODUCTION

1.1 VEHICLE DETECTION

The individual drivers of overweight vehicles are alerted by the vehicle detection system as they approach overhead structures like bridges, tunnels, and other structures. Speed, vehicle counts, vehicle classification, stopped vehicle detection, wrong-way vehicle detection, and accident detection are just a few of the many types of detection that these kinds of systems can perform, as are more common traffic data like occupancy, gap between vehicles, queue detection, and so on. Any subsystems that make up the system are: traffic flow control, gate control at toll stations, video surveillance of traffic, remote facility monitoring, and a central control room. One of the most important research topics is vehicle detection and recognition, which is also essential to the safe operation of vehicles. The process of rectifying a radio wave and recovering any information that has been superimposed on it; real-time detection and recognition of current automobiles can effectively prevent fatal traffic accidents like rear-end collisions.

1.2 DEEP LEARNING

Deep learning is a subset of machine learning and artificial intelligence (AI) that mimics human learning. Statistics and predictive modeling are two branches of data science that include deep learning. It is very helpful for data scientists who are responsible for collecting, analyzing, and Interpreting lot of data; Deep learning Algorithms are stacked in a hierarchy of increasing complexity and abstraction, in contrast to traditional machine learning algorithms that are linear. The process that a child goes through when learning to identify a dog is very similar to that of deep learning computer programs. In order to generate a statistical model as an output, each algorithm in the hierarchy applies a nonlinear transformation to its input. The process continues until the output is accurate enough to be considered acceptable. The name "deep" came from the number of processing layers that must pass through data.

1.3 CONVOLUTIONAL NEURAL NETWORK

Convolutional neural networks are a specialized type of artificial neural networks that use a mathematical operation called convolution in place of general matrix multiplication in at least one of their layers. They are specifically designed to process pixel data and are used in image recognition and processing. In deep learning, a Convolutional neural network (CNN, or Convnet) is a class of artificial neural network (ANN), most commonly applied to analyze visual imagery. CNNs are also known as Shift Invariant or Space Invariant Artificial Neural Networks (SIANN), based on the shared-weight architecture of the convolution kernels or filters that slide along input features and provide translation-equivariant responses known as feature maps. Counterintuitively, most Convolutional neural networks are not invariant to translation, due to the down sampling operation they apply to the input. They have applications in image and video recognition, recommender systems, image classification, image segmentation, medical image analysis, natural language processing, brain–computer interfaces, and financial time series.

LITERATURE REVIEW

2.1 MEASURING THE OBJECTNESS OF IMAGE WINDOWS

Bogdan Alexe and others In this paper, present a generic objectless measure that quantifies the likelihood of any class of objects being present in an image window. It is explicitly trained to distinguish between amorphous background elements like grass and a road and objects with clearly defined boundaries in space like cows and telephones. In a Bayesian framework, the measure combines a number of image cues measuring characteristics of objects, such as how different they appear from their surroundings and whether their boundaries are closed. An innovative cue to measure the closed boundary characteristic is one of these. In this project to demonstrate that the combined objectless measure outperforms any other cue in experiments on the challenging PASCAL VOC 07 dataset and that this new cue outperforms a cuttingedge saliency measure. A HOG detector, interest point operators, and three recent attempts at automatic object segmentation are also compared. In conclusion, to describe about the present two examples of objectless in use. In the first, we present a method for using a small number of windows as location priors for contemporary class-specific object detectors by sampling them based on their objectless probability. This significantly reduces the number of windows evaluated by the costly class-specific model, as demonstrated experimentally. Which use objectless as a complementary score in addition to the class-specific model in the second application, which results in fewer false positives. Objectless has been shown to be a useful mechanism for focusing attention in a number of other image window-based applications, such as unsupervised pixel wise segmentation, weakly supervised learning of object categories, and video object tracking.

2.2 TECHNIQUES FOR VEHICLE TRACKING AND DETECTION: A SIMPLE REVIEW

Raad Ahmed Hadi and company This paper proposes that applications of vehicle detection and tracking play an important role in both civilian and military applications, such as control, management, and urban traffic planning for highway traffic surveillance. The road-based vehicle detection process can be used for a variety of purposes, including vehicle tracking, vehicle counts, the average speed of each vehicle, traffic analysis, and vehicle categorization. In this review, to provide a brief overview of the image processing and analysis tools utilized in the development of the aforementioned traffic surveillance system-related applications. To be more precise, and in contrast to other reviews, are divided the processing methods into three groups to provide a better explanation of the traffic systems. Traffic surveillance is one of the most important uses for video-based supervision systems. As a result, for a considerable amount of time, research has been conducted in the Vision-Based Intelligent Transportation System (ITS), transportation planning, and traffic engineering applications in order to extract useful and precise traffic information for traffic image analysis and traffic flow control. This information includes vehicle count, vehicle trajectory, vehicle tracking, vehicle flow, vehicle classification, traffic density, vehicle velocity, traffic lane changes, license plate recognition, and other similar data.

2.3 SELECTIVE OBJECT RECOGNITION THROUGH SEGMENTATION

Koen, E. A. van de Sande, and others the current state of the art for object recognition is based on exhaustive search, as this paper proposes. A selective search strategy, on the other hand, is required in order to make use of more expensive features and classifiers and thus advance beyond the current state of the art. As a result, to reconsider segmentation in order to adapt it to a selective search: Because an object whose location is never generated cannot be recognized and appearance and immediate nearby context are most effective for object recognition, To propose that many approximate locations be generated rather than few and precise object delineations. With just 1,536 locations per image, our class-independent method covers 96.7 percent of all objects in the Pascal VOC 2007 test set. On the Pascal VOC 2010 detection challenge, our selective search enables the use of the more expensive bagof-words method, which we use to significantly outperform the standard by up to 8.5% for 8 out of 20 classes.

2.4 CPMC: CONSTRAINED PARAMETRIC MIN-CUTS FOR AUTOMATIC OBJECT SEGMENTATION

Joao Carreira and others, has proposed in this paper that, by utilizing mid-level selection cues and bottom-up computational processes, we can generate and rank plausible hypotheses for the spatial extent of objects in images. By solving a series of constrained parametric min-cut problems (CPMC) on a regular image grid, the object hypotheses, which are represented as figure-ground segmentations, are automatically extracted without prior knowledge of the properties of individual object classes. Then diversify the estimated overlap score using maximum marginal relevance measures to learn to rank the corresponding segments by training a continuous model to predict how likely they are to exhibit real world regularities (expressed as putative overlap with ground truth). In the VOC 2009 and 2010 datasets, to demonstrate that this algorithm significantly outperforms the current state of the art for low-level segmentation. A segmentation-based visual object category recognition pipeline can successfully employ the algorithm, as we demonstrate in our companion papers. In the VOC2009 and VOC2010 image segmentation and labeling challenges, this architecture came in first place. For highlevel vision tasks like object recognition, it is important to be able to reliably identify the spatial extent of objects in images. A region that completely surrounds an object provides a characteristic spatial scale for feature extraction, protects the object from background signals that could be confusing, and makes it possible for information to spread from individual parts of the object to the whole. For instance, if a human body is completely covered, it is possible to spread the person's identity from the face, which is easier to identify, to the rest of the body.

2.5 COMBINATORIAL GROUPING AT MULTIPLE SCALES

Pablo Arbeláez and others In this paper, we present Multiscale Combinatorial Grouping (MCG), a unified strategy for bottom-up hierarchical image segmentation and object candidate generation for recognition. First, to create a quick normalized cuts algorithm for this purpose. After that, it suggest a hierarchical segmented with high performance that makes good use of multiscale data. Finally, To propose a grouping strategy that efficiently explores the combinatorial space of our multiscale regions to combine them into highly accurate object candidates. To demonstrate that MCG produces cutting-edge contours, hierarchical regions, and object candidates through extensive experiments on the BSDS500 and PASCAL 2012 segmentation datasets.

2.6 HARDWARE DESCRIPTION

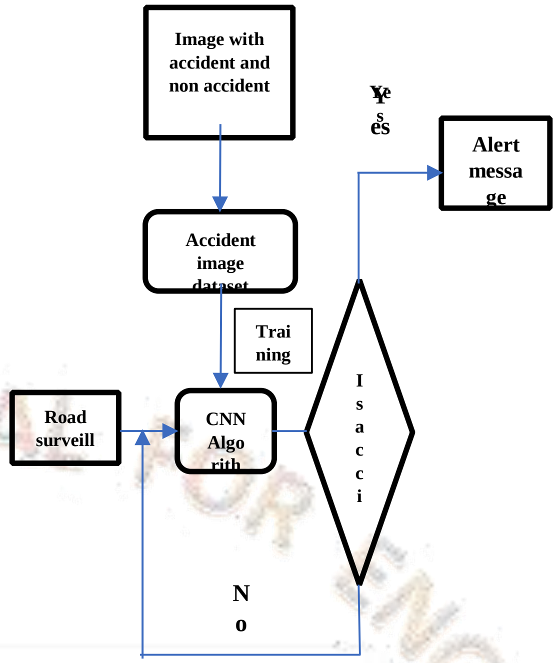
A GSM Module is principally a GSM Modem(like SIM 900) connected to a PCB with different types of affair taken from the board – say-so TTL Affair(for Arduino, 8051 and other microcontrollers) and RS232 Affair to affiliate directly with a PC(particular computer). The board will also have legs or vittles to attach mic and speaker, to take out 5V or other values of power and ground connections. These type of vittles vary with different modules. Lots of kinds of GSM modem and GSM Modules are available in the request to choose from. For our design of connecting a GSM modem or module to Arduino and hence shoot and admit SMS using Arduino its always good to choose an Arduino compatible GSM Module – that's a GSM module with TTL Affair vittles.

3. EXISTING SYSTEM

In the existing system to use algorithm RCNN and YOLO. The traditional traffic monitoring system is only intended to monitor or control traffic; however, it does not offer a solution for reducing the rate of fatal accidents resulting from a lack of immediate medical assistance. Take for instance a situation in which an accident took place but no one was present to report it; the victim is in critical condition, so every second counts, and any delay could result in disability or death. Additionally, there are numerous sensor-based systems on the market that require vehicle owners to install those sensors. These systems operate on the basis of any damage detected by the installed sensors; a system that will alert nearby medical assistance or an emergency contact number will be triggered by these signals from the sensors. But what if an accident occurred with a vehicle without such a sensor-based system? It's need a cutting-edge surveillance system based on artificial intelligence that can not only detect an accident but also instantly notify nearby hospitals, ambulances, or traffic police.

4. PROPOSED SYSTEM

In India, accidents have been a major cause of death. More than 80% of deaths caused by accidents are not caused by the accident itself, but rather by the lack of prompt assistance for the victims. Accident victims may be unattended for a considerable amount of time on highways with extremely light and rapid traffic. A system that would use the live video feed from a highway-mounted CCTV camera to identify an accident is the goal. The process involves running each video frame through a deep learning convolution neural network model that has been trained to classify video frames as accidental or not. Classifying images using Convolutional neural networks has proven to be fast and accurate. When compared to other image classifying algorithms, CNN-based image classifiers require less preprocessing and have an accuracy of over 95% for relatively smaller datasets.



4.1 USER LOGIN MODULE

Module for user login using this module, a user can log in by entering the correct user name and password.

4.2 LOAD AND GENERATE CNN MODEL MODULE

The CNN model module can be used to load the training data set and generate the CNN model.

4.3 START ACCIDENT DETECTION MODULE

Start the accident detection module by entering video The user can start the accident detection module by entering video.

4.4 LOSS AND ACCURACY GRAPH MODULE

Loss and accuracy graph module this module's overall loss and accuracy in finding accidents

4.5 EXIT MODULE

Exit module the proposed system's home page can be used by the user to exit.

5. EXPERIMENTAL RESULTS

The use of Deep Learning's visual and temporal features in the construction of road accident analysis and automatic detection models is crucial for the timely implementation of road accident detection systems. The proposed model is applied to each frame of the video that is being captured by the Pi-camera when the system begins to run, and if an error is detected, the GSM module is immediately used to send a message. Additionally, it transmits the frame at which it detected an accident along with the accident percentage.

Fig 1. TRAINING AND VALIDATION ACCURACY

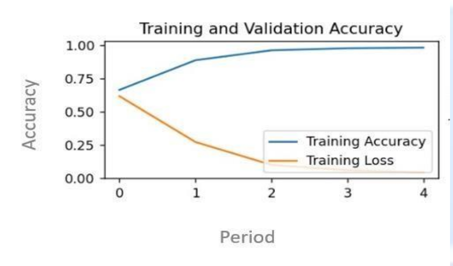


Fig 2. TRAINING AND VALIDATION LOSS

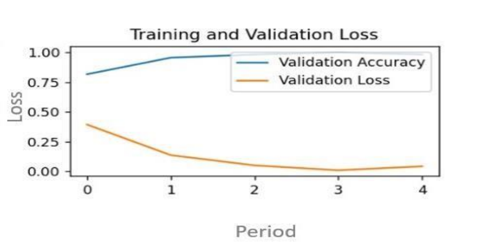
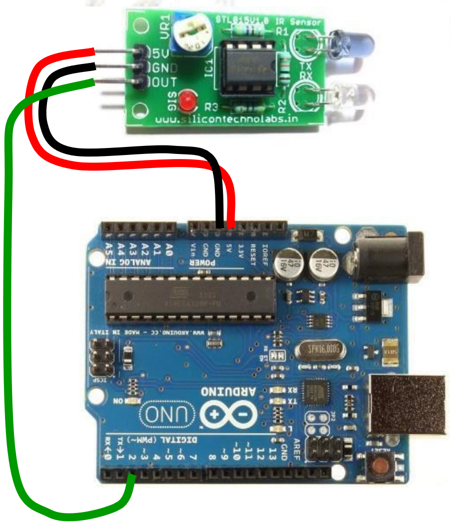


Fig.3 IR PROXIMITY SENSOR CONNECTED WITH ARDUINO BOARD



6. CONCLUSION

Today, road traffic accidents account for a significant portion of daily fatalities. The driver's error and the emergency services' tardiness in responding are the primary causes. A reliable road accident detection and information transfer system is required to save injured individuals. The proposed approach is based on video analytics methods. In particular, architectures of deep learning neural networks that have been trained to recognize signs of a car accident are used. approach is based on video analytics methods. In particular, architectures of deep learning neural networks that have been trained to recognize signs of a car accident are used.

7. REFERENCE

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