IJMRSET

e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 12, December 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

6381 907 438 6381 907 438 ijmrset@gmail.com www.ijmrset.com

© 2024 IJMRSET | Volume 7, Issue 12, December 2024| DOI: 10.15680/IJMRSET.2024.0712016

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Road Accident Detection

Mr.K.Vigneshwar[1], Mr. V.Thirumal Reddy[2], Mr. K.GiriPrasad[3], Mr.K.Karthik[4]

Assistant Professor, Department of Computer Science & Engineering, Guru Nanak Institute of Technology, India[1]

Student, Department of Computer Science & Engineering, Guru Nanak Institute of Technology, India[2,3,4]

ABSTRACT: In today's era, need of efficient accident detection has drawn much attention as number ofaccidents are increasing day by day. One of the widely employed method is to use accelerometer to detect a crash. In this method, acceleration(g) value measured from the accelerometer is calibrated to detect an accident. This method, however is limited by the accuracy of the accelerometer. To make an efficient accident detection system, convolutional neural network(CNN) methodology can be incorporated in the system. CNN is the state-of-the-art method for image classification. In the recent work, image classification has been used to detect accident. However, CNN takes large time, data and computing power to be trained. To mitigate these issues, transfer learning technique has been innovatively incorporated for the accident detection application, which involves retraining the already trained network. Inception-v3 is an image classifier developed by google, which is incorporated for this purpose. In this work, accident detection system is designed using advanced and efficient Transfer Learning algorithm, which gives 84.5% of accuracy. Also, an effective comparison between this advanced method and the traditional accelerometer-based technique have been made.

I. INTRODUCTION

With increase in number of individuals owning vehicle, road accidents are also increasing correspondingly. Vehicles have become inevitable part of everyone's life nowadays. With increasing congestion, limited sense of traffic rules among citizens, and lack of enforcement of traffic rules, causalities and death rates due to road accidents are enormous and among the highest of all deaths. Most of the road casualties happen on highways where most of the vehicles are heavy and moving with higher speeds. According to World Health Organization (WHO), it is reported that there were 1.25 million road traffic deaths in 2013 globally. It is also predicted that this number is likely to increase in future. Low and middle income countries have higher road fatalities than higher income countries due to lack of law enforcement and poor availability of emergency medication facilities.

Various social activists, researchers and concerned agencies have made several attempts and proposed solutions in the direction to lessen road accidents and provide viable solutions or systems to mitigate road accidents. For the fast relief operation initialization, some automated system deployment in the vehicle itself shall be very beneficial. In the present work, crash detection system in vehicle that senses accident and also raises emergency help is devised. Many times victim of road accidents die due to delay in getting medical treatment. So, in case of accident, the proposed system can save many lives. There have been a few methods proposed and implemented for accident detection system till date. Different methods are briefly discussed here. In all these cases different methods are used to detect accident, however GPS and GSM are common techniques used to locate the victim and inform emergency services respectively, Vehicular AdHoc Networks (VANETs) based approach has been used for accident detection system.

In this system, accident is detected by accelerometer and all the drivers within a certain range receives an alert to inform them about the crash in nearby area and to stop further casualties. Message is transmitted using 802.11g standards. In, GPS based method is used to detect accident. GPS measures speed of vehicle every second and compares it with the previous readings. The algorithm is so designed that, it detects accident whenever the speed of the vehicle is below a certain level. Android app based accident detection system using tilt of accelerometer is described in. But it detects accident only when the vehicle is tilted with reference to the road, which is not the case every time.

An accident detection unit with accelerometer using ARM7, which is equipped with gas and alcohol sensors is described in. Accident detection using some machine learning techniques such as Neural network, SVM, decision trees are described in. Machine learning is progressively making its way in almost every area nowadays. Innovatively, the

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

method of accident detection using image classification with the use of machine learning is proposed in this paper. Transfer learning can be applied on the already trained network of Google's Inception V3, which is Google's image classifier on the top of tensor flow, which uses convolutional neural networks to classify images among given classes.

II. LITERATURE SURVEY

P. M. Vitousek(2019)Human alteration of Earth is substantial and growing. Between one-third and one-half of the land surface has been transformed by human action; the carbon dioxide concentration in the atmosphere has increased by nearly 30 percent since the beginning of the Industrial Revolution; more atmospheric nitrogen is fixed by humanity than by all natural terrestrial sources combined; more than half of all accessible surface fresh water is put to use by humanity; and about one-quarter of the bird species on Earth have been driven to extinction. By these and other standards, it is clear that we live on a human-dominated planet.

Chen, X et. al(2001)Decision support tools used for vegetation management require accurate information on the spatial array of different plant communities and an herbivore's grazing location. We tested the accuracy and precision of locations derived using the satellite navigation global positioning system (GPS). Before May 2000, the accuracy and precision of GPS-derived locations were degraded by a process known as selective availability (SA); after May 2000, SA was disabled. In this study we investigated how to handle and improve the quality of data generated both when SA was enabled and when SA was disabled using relative GPS (rGPS). rGPS entails the post-processed correction of the roving GPS module with simultaneously acquired positional errors recorded at a known stationary reference location. With SA enabled, GPS data were obtained at a fixed known location to obtain baseline information, and from a roving module that essentially mimicked surveying techniques or the movement of a free-ranging animal. The mean accuracy of GPS with SA enabled was 21 m for the fixed module and 25 m for the roving module. Use of rGPS and further manipulation of the data improved the mean accuracy of the data to 7 m for the fixed module and 10 m for the roving module. With SA disabled, data were similarly recorded from the fixed known location and resulted in a mean location accuracy of 5 m. The use of rGPS resulted in a significant improvement of this value to 3Ã¯Â¿Â½6 m and precision measured by the 95\% quantile was \< 10 m.

R. Kays et.al(2010)Studying animal movement and distribution is of critical importance to addressing environmental challenges including invasive species, infectious diseases, climate and land-use change. Motion sensitive camera traps offer a visual sensor to record the presence of a broad range of species providing location -specific information on movement and behavior. Modern digital camera traps that record video present new analytical opportunities, but also new data management challenges. This paper describes our experience with a terrestrial animal monitoring system at Barro Colorado Island, Panama. Our camera network captured the spatio-temporal dynamics of terrestrial bird and mammal activity at the site - data relevant to immediate science questions, and long-term conservation issues. We believe that the experience gained and lessons learned during our yearlong deployment and testing of the camera traps as well as the developed solutions are applicable to broader sensor network applications and are valuable for the advancement of the sensor network research. We suggest that the continued development of these hardware, software, and analytical tools, in concert, offer an exciting sensor-network solution to monitoring of animal populations which could realistically scale over larger areas and time spans.

Behera et. al(2015)How long does it take for the human visual system to process a complex natural image? Subjectively, recognition of familiar objects and scenes appears to be virtually instantaneous, but measuring this processing time experimentally has proved difficult. Behavioral measures such as reaction times can be used[1], but these include not only visual processing but also the time required for response execution. However, event-related potentials (ERPs) can sometimes reveal signs of neural processing well before the motor output[2]. Here we use a go/no-go categorization task in which subjects have to decide whether a previously unseen photograph, flashed on for just 20 ms, and contains an animal. ERP analysis revealed a frontal negativity specific to no-go trials that develops roughly 150 ms after stimulus onset. We conclude that the visual processing needed to perform this highly demanding task can be achieved in under 150 ms.

© 2024 IJMRSET | Volume 7, Issue 12, December 2024| DOI: 10.15680/IJMRSET.2024.0712016

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

III. METHODOLOGY

Modules Name:
1. Uniform Aspect Ratio
2. Image-Scaling
3. Normalizing Image Inputs

1. Uniform Aspect Ratio

It is the first step that is followed in the pre-processing of the image data. By applying this technique of unfirming all the images in the dataset, the model can be built seamlessly without any problems. Here each image in the dataset is brought to an equal size and shape for better execution of the model. All the images are brought into the same dimensions.

2. Image-Scaling

After unfirming all the image sizes in the dataset, by using the function image data generator from Keras package, the image scaling technique is used. Images are either upscaled or downscaled accordingly with the size fixed in the model.

3. Normalizing Image Inputs

This technique ensures the distribution of the data similarly according to the input parameters that are set previously. It helps in faster training of the data. The normalization is performed by deducting the average from each one of the pixels and dividing the obtained result with standard deviation**.**

Proposed System

Convolutional neural network is the state-of-the-art tech-nique in image classification and recognition. It has a stack of convolutional layers, ReLu layers and pooling layers. This is discussed in detail in [10]. Convolutional layer is feature extraction layer which detects from general features like edges to more specific features like objects and colors from the images. Pooling layer reduces the dimensionality. It takes much time and computing power to train such a network and very large image dataset is also required.

For example, Google's inception-v3 image classifier is trained on the ImageNet dataset of 100000 images to classify among 1000 classes. It has 22 hidden layers and it took weeks to train it. Transfer learning technique comes in handy to avoid such limitations. Transfer learning refers to using learning from previous training session to a new training session.

Proposed System Advantages

- It is very efficient to train data.
- It makes no assumptions about distributions of classes in feature space.
- It is very fast at classifying unknown records.

System Architecture

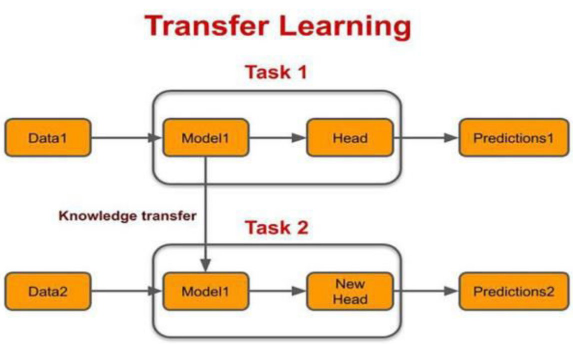

Fig 1: System Architecture

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Experimental Results

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. CONCLUSION

In this paper, accident detection system is presented. The proposed system design is based on the emerging machine learning fundamentals. For car crash detection, image classification with convolutional neural network technique is used. Further on, transfer learning is deployed, where only the last layer of the network is trained. Selection of images for transfer learning is also important. Image set used for transfer learning should provide variability for better performance. The accelerometer technique was easy to implement and use. Transfer learning technique gives good accuracy, which in this kind of critical situation might not be acceptable. So, as of now, transfer learning technique needs improvement before deploying it practically and it is advisable to use accelerometer or other sensors related technique currently.

V. FUTURE ENHANCEMENTS

In the near future, we focus on developing a fully enhanced learning techniques system by applying live cctv camera to detect at the time of accident. Transfer learning technique gives good accuracy, which in this kind of critical situation might not be acceptable. So, as of now, transfer learning technique needs improvement before deploying it practically and it is advisable to use accelerometer or other sensors related technique currently.

REFERENCES

[1] WHO road traffic deaths http://www.who.int/gho/road safety/mortality/en/
[2] J.L. DSouza,Road Safety: A Critical Issue Requiring Government Attention. International Journal of Education and Science Research review, Volume-2, Issue-2, April, 2015.
[3] J. Pang, I. Singh, Accelerometer Based Real-Time Remote Detection and Monitoring of Hand Motion. Proceedings of the World Congress on Engineering and Computer Science 2011 Vol II WCECS 2011, October 19-21, 2011, San Francisco, USA.
[4] Author: Scott J. Weiner, Feasibility of a 802.11 VANET Based Car Accident Alert System.
[5] halil, U., Javid, T., & Nasir, A. (2017). Automatic road accident detection techniques: A brief survey. 2017 International Symposium on Wireless Systems and Networks (ISWSN).

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

[6] Faiz, A. B., Imteaj, A., & Chowdhury, M. (2015). Smart vehicle accident detection and alarming system using a smartphone. 2015 International Conference on Computer and Information Engineering (ICCIE).
[7] Ozbayoglu, M., Kucukayan, G., &Dogdu, E. (2016). A real-time autonomous highway accident detection model based on big data processing and computational intelligence. 2016 IEEE International Conference on Big Data (Big Data).
[8] Shailesh Bhavthankar, Prof. H.G.Sayyed, Wireless System for Vehicle Accident Detection and Reporting using Accelerometer and GPS. International Journal of Scientific & Engineering Research, Volume 6, Issue 8, August-2015.
[9] Miao Chong, Ajith Abraham and Marcin Paprzycki, Traffic Accident Analysis Using Machine Learning Paradigms. Informatica 29 (2005) 8998.
[10] Keiron OShea, Ryan Nash, An Introduction to Convolutional Neural Networks. arXiv:1511.08458v2 [cs.NE] 2 Dec 2015.
[11] Pan, S. J., & Yang, Q. (2010). A Survey on Transfer Learning. IEEE Transactions on Knowledge and Data Engineering, 22(10), 13451359.
[12] Dogru, N., & Subasi, A. (2018). Traffic accident detection using random forest classifier. 2018 15th Learning and Technology Conference (L&T).
[13] Jayadeva, Khemchandani, R., & Chandra, S. (2007). Twin Support Vector Machines for Pattern Classification. IEEE Transactions on Pattern Analysis and Machine Intelligence, 29(5), 905910.
[14] Ding, S., Yu, J., Qi, B., & Huang, H. (2012). An overview on twin support vector machines. Artificial Intelligence Review, 42(2), 245252.
[15] Tanveer2015application, title=Application of smoothing techniques for linear programming twin support vector machines, author=Tanveer, M, journal=Knowledge and Information Systems, volume=45, number=1, pages=191–214, year=2015, publisher=Springer.
[16] Richhariya, B., & Tanveer, M. (2018). A robust fuzzy least squares twin support vector machine for class imbalance learning. Applied Soft Computing, 71, 418432.
[17] Li, D., & Tian, Y. (2014). Twin Support Vector Machine in Linear Programs. Procedia Computer Science, 29, 17701778.
[18] P.Kaliuga Lakshmi, C.Thangamani, AN EFFICIENT VEHICLE ACCIDENT DETECTION USING SENSOR TECHNOLOGY. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5 Issue 3, March 2016.
[19] Peddi Anudeep, K. Hari Babu, Wireless Reporting System for Accident Detection at Higher Speeds in Peddi Anudeep Int. Journal of Engineering Research and Applications.
[20] Marek Dbrowski, Tomasz Michalik, How effective is Transfer Learning method for image classification. Position papers of the Federated Conference on Computer Science and Information Systems, pp. 39.

INTERNATIONAL JOURNAL OF
MULTIDISCIPLINARY RESEARCH
IN SCIENCE, ENGINEERING AND TECHNOLOGY