Map Reducing Accident Identification using Vehicle Tracking

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Abstract-Road traffic video analytics aims at using a number of techniques to achieve better traffic, road safety, and control congestion to provide immediate care for accident victims. In this paper, we propose a traffic analytics system which can automatically detect road accidents from video streams. By calculating speed of the vehicle, to know that the vehicle must be met with an accident or not. Hadoop map reduce algorithm is used to reduce the frames of the object while tracking the vehicle. We have deployed and tested the system on a cluster computer.

Index Terms—Control Congestion, Hadoop map reduce, Tracking ,Traffic video analytics, Video Frames.

I. INTRODUCTION

The economy of a city extraordinarily depends on its street system and it is vital to screen this base. Car influxes, clog, and mishaps in city streets is a typical issue in most real urban communities over the world. Street car crashes on the roadways are expanding. The World Health Organization reports that by 2030 street auto collisions will turn into the fifth driving reason for human passing. The National Crime Records Bureau reports that consistently in India more than 135,000 car accidents related passing happens [1].

Current era movement checking frameworks have the ability to catch and transmit continuous live activity information, number of vehicles that go through a convergence as an element of time interims, and normal velocity of vehicles. The information develops in size quickly and examination involves high computational prerequisites. Moreover, this information consolidated with Geographic Information Systems (GIS) and Global Positioning System (GPS) empower new potential outcomes that were unrealistic until now.

The vast majority of the examination in street movement investigation is done with regards to created nations where activity takes after strict path discipline. Sensor gadgets are utilized to recognize vehicles and measure street activity variables. Sensor gadgets incorporate attractive circle sensors, speed weapons, and video reconnaissance cameras. Attractive circle finders are utilized as a part of vast scale for movement checking [2]. Establishment and upkeep of these sensor-based frameworks are both work concentrated and costly. In addition, drivers don't take after path discipline in more than 90% of the urban areas in the creating scene. Besides, utilizing sensors to recognize vehicles and gather movement information is restrictively costly for these urban communities.

Another way to deal with movement checking and investigation depends on video picture handling. In [3], a way to deal with vehicle location utilizing a standard based thinking is proposed. In another work [4], a Hidden Markov model (HMM)- based method is proposed to recognize mishaps and different occasions at street crossing points. PC vision based procedures for distinguishing vehicles utilizing corner components is talked about as a part of [5]. Here once more, path standing movement and also normal vehicle speeds in the reach 80 km/h to 110 km/h are accepted. Unmistakably, these methodologies don't work in circumstances where there is no path order and vehicle speed ranges differ greatly.

A movement checking framework that we created which is suited for street activity conditions in the creating scene. Our framework depends on Hadoop MapReduce structure and can catch, process, store, break down, and recover video information at scale. Our framework recognizes and tracks singular vehicles in the video outlines and registers absolute number of vehicles that have disregarded through a crossing point a period interim. It additionally processes the pace of individual vehicles and normal rate of vehicles. The framework distinguishes vehicle impacts which can be conveyed to an adjacent doctor's facilities and interstate salvage groups progressively. Extra usefulness of the framework incorporates recommending elective courses to workers when clog is spotted on roadways.

Activity is the significant issue of a creating which will lead a genuine deferral in work advance so to clear the movement different executions has been recommended yet the contextual investigation were not chose in the early times but rather now movement overviews were directing and helps in discharging activity allowed to open. Because of the intense change of vehicle utilization and change of method for transportation drives this movement high rate conditions. Here we studied for vehicle supplement and activity zones.

The goal about this value of exertion is will make a picture based result to discovery, numbering what's more request toward vehicle kind for road development. A picture based strategy stands out beginning from various roadway sensors, for example, radar or inductive circles, which give data primary review development stream Furthermore thickness, Also don't give information something like those kind from asserting vehicle dynamically. By utilizing headways On machine dream computations Also machine Taking in strategies, A novel calculation to do recognition, tallying, and arrange about vehicles may be done Eventually Tom's examining using spilling highlight enter from the system for organized development perception cameras that now exist On The larger part metropolitan domains.

The remainder of the paper is described as follows. Section II describes the process involved in detecting the vehicle using background subtraction and motion extraction algorithms. Speed & Accident detection using Four Neighbourhood Blob algorithm must be outlined in section III. Experimental Results and their analysis is present in section IV. Finally, Section V concludes the paper.

II. VIDEO SPLITTING

For the most part in Hadoop the document is part into squares of determined size (default is 64 MB). Every piece is prepared by one guide process and guide forms keep running in parallel. Bigger square size offers a few favorable circumstances. Video records are part into pieces in an approach to stay away from data misfortune. At the end of the day, we don't need some video edges of a mishap to go to one mapper prepare and remaining edges of the same mischance go to another mapper. At that point split video into squares in light of time units, which is determined by the clients of the framework.

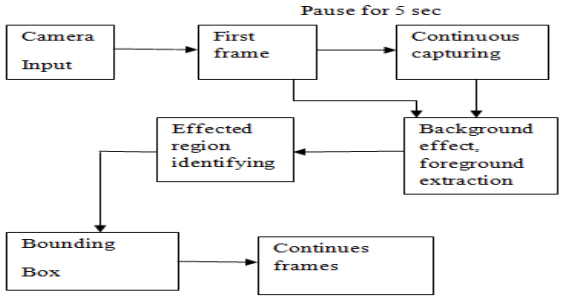

Fig 1. Video Splitting into Frames

Initially considered camera as information. Info must be isolated into edges. From this edge, considered first casing, this first edge must be respite for 5sec then caught nonstop. By utilizing foundation subtraction calculation,

foundation impact must be considered. After that the affected district must be recognized by blob division.

2.1. Background subtraction

A video object division calculation in light of foundation reproduction. This calculation firstly utilizes change location to accomplish the cover speaking to moving areas, then the foundation picture is accessible by mapping the veil to the correspondence edge of arrangements, and a complete foundation picture is remade from numerous edges, the underlying video article is at last determined in every edge by subtracting the foundation from this image [11].

Contrasting with conventional foundation subtraction calculation, the exactness of this calculation is enhanced, for video arrangements with no adjustments out of sight; the division results are really great. In any case, one and only foundation picture is implicit this calculation, for supervisory groupings, the picture with no moving articles is typically taken as the foundation picture, which implies that if the moving items since quite a while ago stayed out of sight, the articles will in any case be perceived as moving ones even after they have swing to be static. Foundation subtraction strategy that vigorously handles different changes out of sight have been proposed by [12],[13],[14] and [15].

Moving Objects Detection and following are generally utilized low-level undertakings as a part of numerous PC vision applications, similar to observation, checking, robot innovation, signal acknowledgment, object acknowledgment and so on. Numerous methodologies have been proposed for moving article discovery and following from recordings, primarily committed to activity checking and visual reconnaissance. In spite of the fact that the precise prerequisites shift between reconnaissance frameworks, there are issues that are regular to all. Generally, an administrator is intrigued just in specific articles in the scene. Case in point, in observation of an open territory, one might be intrigued just in checking the general population inside it instead of the whole scene.

$$B(x, y, t) = \frac{1}{n}\sum_{i=0}^{n-1} I(x, y, t-i) > Th \quad \text{..... (1)}$$

Where,

x, y = present and previous frames

t = time interval

I = image

Th = threshold value used to detect the moving object very accurately.

- If a particular pixel value is crossing the limit of threshold level then automatically each part will be subjected to binary ‘1’ value and if certain value is less than to our threshold value the pixel will be fixivated to ‘0’(zero).
- This can be observed by only tracing the difference between present and previous frames.
- Difference between present and previous frames is to attain background.

2.2. Motion Extraction

The movement investigation preparing can in the easiest case be to distinguish movement, i.e., discover the focuses in the picture where something is moving. More mind boggling sorts of preparing can be to track a particular item in the picture after some time, to gathering indicates that have a place the same inflexible article that is moving in the scene, or to decide the extent and heading of the movement of each point in the picture. The data that is created is regularly identified with a particular picture in the grouping, comparing to a particular time-point, however then depends additionally on the neighbouring pictures. This implies movement investigation can deliver time-subordinate data about movement.

$$\frac{dI}{dt} = \frac{\partial I}{\partial x}\cdot\frac{dx}{dt} + \frac{\partial I}{\partial y}\cdot\frac{dy}{dt} + \frac{\partial I}{\partial t} = 0 \quad \text{.... (2)}$$

Where,

$\frac{dI}{dt}$ = change in position of image

$\frac{\partial I}{\partial x} \cdot \frac{dx}{dt}$ = movement of change in x – direction

$\frac{\partial I}{\partial y} \cdot \frac{dy}{dt}$ = movement of change in y- direction

$\frac{\partial I}{\partial t}$ = pixel change

- In tracking motion of vehicle is very important. Split the motion into four carders.
- For variation of each and every motion known as optical flow.
- Optical flow is '0' (zero) then there is a movement in the object.
- Optical flow is not equal to '0' (zero)

i.e. o.f≠0 then there is no change in movement of object. But it completely depends on lighting.

Moving article discovery contrasts the information video outline and the recreated foundation outline, and recognizes the frontal area pixels from the info outline. The most generally utilized technique for closer view location is to check whether the information pixel is not quite the same as the remade foundation gauge:

$$| f_t(x, y) – b(x, y)| > Th ..... (3)$$

Where,

$f_t(x, y)$ – Original frame at time t.

B (x, y) – reconstructed background.

Difference between original frame at time t and reconstructed background of the object must be greater than the threshold value.

III. PROPOSED METHOD

3.1. Speed Detection & Accident Detection

In our video we need to recognize every vehicle and to locate their comparing separation secured in sequential casings. In our methodology we track every vehicle and follow their centroid in up and coming edges to get the separation went by that vehicle. In this methodology we utilize the variety of structure to store centroid of every vehicle. In this as vehicle is landed into the area of enthusiasm for the video their relating jumping box is made by that we created the centroid of the bouncing box. As new vehicle arrived we store its centroid worth to the tracks. Furthermore, we store their centroid values into the track structure that we made. Also, redesigning the centroid of all vehicles all the while as the new edge arrived. We continue upgrading the centroid values until it is in the area of interest. For the redesigning of the centroid of the vehicles in continuous edges. We utilize the technique in that followed autos upgrade their centroid in their next forthcoming back to back edge by ascertaining the base separation centroid of the present casing. As we know the development of the vehicle is major in the one course as it were. So in this way we overhaul followed centroid to the base separation current centroid. We utilized the circles for contrasting every track separation with every present centroid. Here 3 cases emerge as takes after:-

1) If (Tracked Cars==Current Frame Centroid): In this we become acquainted with that no. of vehicles stay same in back to back casing.

2) If (Tracked Cars< Current Frame Centroid): In this we become more acquainted with that no. current casing centroid is more than the followed autos that implies new vehicles are landed into the casing video.

3) If (Tracked Cars> Current Frame Centroid): In this followed autos are more than the present edge centroid, it implies that a few vehicles crossed their district of interest and goes by their video window outline.

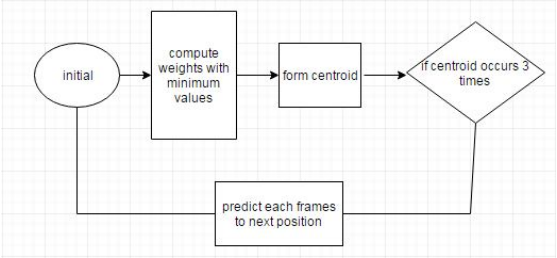

Fig 2. Calculating of Speed Using Centroid

By measuring the separation went by a vehicle in a specific time.

Here, we figured velocity by measuring the separation secured by the autos starting with one edge then onto the next by utilizing the equation of

Speed = (separation secured in unit of pixels)/time.

As probably caught video has outline rate of 15 edges for each second.

Hence, rate of progress of one edge to another sequential edge is 1/15 seconds.

Speed = (separation secured in unit of pixels)/(1/15)

The unit of velocity is no. of pixels exchanged every second.

The pace is figured in the quantity of pixel voyaged every second unit, and after that we transform it into the km/hr unit by taking the genuine separation measure of the zone secured by the camera view.

In movement observing framework, vehicle discovery, speed estimation and mischance of the vehicle must be distinguished. The accident of the vehicle must be calculated by using centroid formula. The formula is as follows:

$$I_c(x,y) = k\frac{I_o(x,y) - N(x,y)}{F(x,y) - N^{|}(x,y)} \quad \text{..... (4)}$$

Where,

N(x,y) – Black spot of image

$N^{|}(x,y)$ - Change in positions (Next & Previous positions)

F – Present Frame

I - Image

Block Diagram

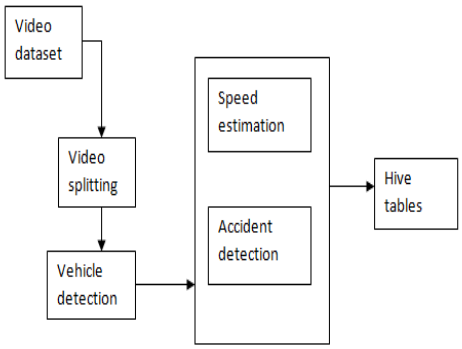

Fig 3. Block Diagram

Video is taken from the dataset and is splitted into frames. From those frames vehicle must be detected by using required algorithms. Speed can be calculated by using centroid formula. Then accident of the vehicle must be detected.

IV. EXPERIMENTAL RESULTS

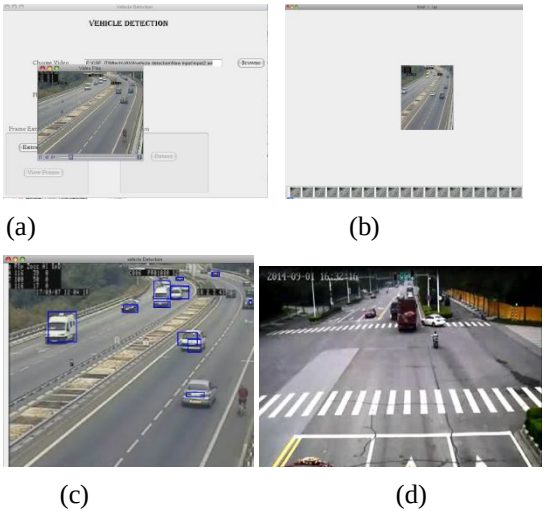

Fig 4. (a)Input Video (b)Frames Extraction (c)Object Tracking (d)Accident Identification

The Vehicle must be detected through the taken input video. Then the frames are extracted from the video. Tracking the objects must be done. By using Hadoop map reduce similar frames must be reduced and then the accident vehicle must be identified.

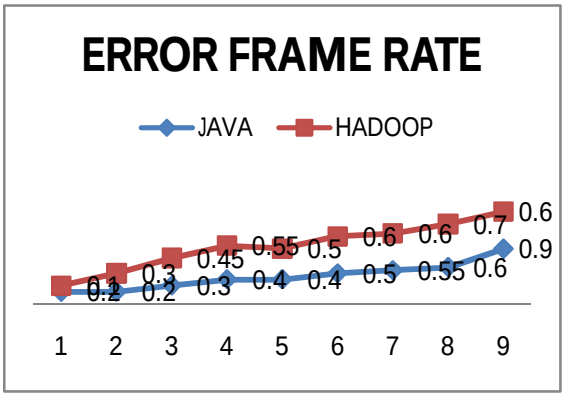

Fig 5. Calculating Error Frame Rate

S .No	Java	Hadoop
1	0.2	0.1
2	0.2	0.3
3	0.3	0.45
4	0.4	0.55
5	0.5	0.5
6	0.5	0.6
7	0.55	0.6
8	0.6	0.7
9	0.9	0.6

Table1: Error Frame Rate

V. CONCLUSION

By using Map reducer with Hadoop technology helps in minimising the frame error rate in identifying the object we are reducing the number of objects in a frame and speed calculated to find the accident of the vehicle by using four neighbourhood blob algorithm. Accidents were also detected for the video sequences. To get accurate results Hadoop map reducing is used. Here identification of accident depends on the size of the object. So, to enhance accident identification top view video processing will be processed as our future work.

REFERENCES

[1] S.- Y. Cheung, S. Coleri, B. Dundar, S. Ganesh, C.- W. Tan, and P. Varaiya, "Activity estimation and vehicle classification with a solitary attractive sensor," Transportation Research Record, pp. 173–181, 2005.

[2] M. Kim, Y. Cui, S. Han, and H. Lee, "Towards productive outline and execution of a Hadoop-based disseminated video transcoding

framework," Multimedia and Ubiquitous Engineering, vol. 8, no. 2, pp. 213–224, 2013.

[3] P. Viola and M. Jones, "Quick protest recognition utilizing a helped course of straightforward components," in Proc. of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, vol. 1, 2001, pp. I–511–I–518.

[4] R. Cucchiara, M. Piccardi, and P. Mello, "Picture examination and tenet based thinking for an activity checking framework".

[5] S. Kamijo, Y. Matsushita, K. Ikeuchi, and M. Sakauchi, "Movement observing and mischance identification at crossing points".

[6] National Crime Records Bureau. Incidental passings in India. Recovered March 9, 2015.[Online]. Accessible: http://ncrb.nic.in/CD-ADSI-2012/coincidental passings 11.pdf.

[7] B. Coifman, D. Beymer, P. McLaughlin, and J. Malik, "An ongoing PC vision framework for vehicle following and activity reconnaissance," in Transportation Research Part C: Emerging Technologies, 1998, vol. 6, no. 4, pp. 271–288.

[8] R. Schmidt and M. Rella, "A methodology for handling extensive and nonuniform media objects on mapreduce-based bunches," Lecture Notes in Computer Science, vol. 7008, no. 2011, pp. 172–181, 2011.

[9] H. Straight, A. Ess, T. Tuytelaars, and L. V. Gool, "Surf: Speeded up strong components," Computer Vision and Image Understanding, vol. 110, no. 3, pp. 346–359, 2008.

[10] U. U. Sheik and S. A. R. Abu-Bakar, "Three-dimensional posture estimation from two-dimensional monocular camera pictures for vehicle grouping," in Proc. of sixth WSEAS International Conference on Circuits,Systems, Electronics, Control and Signal Processing, 2007, pp. 356–361.

[11] Lingyun Wang, Zhaohui Li, Dongmei Li, Tongyun Wu," An improved video object segmentation algorithm based on background reconstruction".

[12] M. Seki, H. Fujiwara, K. Sumi, "A Robust Background Subtraction Method for Changing Background," IEEE Japan, 2000.

[13] T. Ishikawa, S. Fukui, "Extraction of Moving Objects from Video Sequence Using Estimated Background Brightness," IAPR Workshop on Machine Vision Applications , Nara- ken New Public Hall, Nara, Japan, Dec. 11 - 13, 2002.

[14] T. Matsuyama, T. Wada, H. Habe, K. Tanahashi, "Background Subtraction under Varying Illumination," Systems and Computers in Japan, Vol. 37, No. 4, 2006.

[15] M. Tsuchikawa, A. Sato, H. Koike, A. Tomono, "A Moving-Object Extraction Method Robust Against Illumination Level Changes for a Pedestrian Counting System," IEEE Japan, 1995.