JOURNAL OF OPTOELECTRONICS LASER
Volume 41 Issue 8, 2022 ISSN: 1005-0086

Canny Edge Detection Algorithm: A Modern Traffic Control System using

Dr. B. Rajalingam, Dr. R. Santhoshkumar, Dr. P.Deepan, P. Alexander
[1,2] Associate Professor, [3,4]Assistant Professor
[1,2] Computer Science and Engineering, St. Martins Engineering College, Secunderabad
[4]Information Technology, St. Martins Engineering College, Secunderabad
[3]Computer Science and Engineering (AI &ML), St. Martins Engineering College, Secunderabad
[1]rajalingam35@gmail.com, [2]santhoshkumar.aucse@gmail.com [3]deepanp87@gmail.com

ABSTRACT
The ever-increasing traffic jams in urban areas makes it necessary to make use of cutting- edge technology and equipment in order to advance the state of the art in terms of traffic control. The currently available solutions, like time visitors or human control, are not adequate to alleviate the severity of this crisis. The findings of this investigation have led to the proposal of a system for the control of traffic that makes use of canny edge detection and digital image processing to determine, in real time, the number of vehicles present. The above imposing traffic control advanced technologies offers significant advantages over the existing systems in real - time, transportation management, robotization, reliability, and efficiency. In addition, the complete process of digital image acquisition, edge recognition, as well as green signal assignment is demonstrated with accurate blueprints, and the final outcome are stated by hardware. All of this is done with four separate photographs of various traffic scenarios.

Keywords - Intelligent Traffic Control, Density-based Signalization, Edge Enhancement

1. OVERVIEW

The ever-increasing number of cars and trucks that are driving around today, combined with the limited resources supplied by the existing infrastructure, is contributing to the worsening of traffic problems. Those making use of a public route for the purpose of travel may include pedestrians, riding or herding animals, automobiles, trolleybuses, or other conveyances. Traffic on roads may take place in either direction. The laws that govern traffic and regulate cars are referred to as traffic laws, but the rules of the road include not only the laws but also any unofficial regulations that may have emerged over the course of time in order to make the flow of traffic more orderly and efficient. Road signs, often known as traffic signs, are signs that are put along the sides of roadways in order to offer information to drivers.

1.1 Traditional Traffic Management Systems

1.1.1 Human based Control Systems

It requires a significant amount of manpower to manually control the instance name, and it also requires manual control of the traffic. The number of traffic police officers that are assigned to a certain city or region is determined by the countries and states in which the location is located. In order to maintain order and control the flow of traffic, the police officers will be equipped with tools such as sign boards, sign lights, and whistles. In order for them to effectively regulate the traffic, they will be given the instruction to dress in particular uniforms.

1.1.2 Mandatory Control Systems

Timers and electrical sensors work together to regulate the automatic traffic signal. At the start of each new step of the traffic signal, the time limit is programmed with a consistent numerical number. The lamps will switch on and off through automatically once the valuation of the clock is adjusted so that it could be set to the desired duration. It will collect the allocation of the vehicle and also signals on each phase while using electrical sensors; guess it depends on the sensor, the lights will quickly change between the ON and OFF positions.

1.2 Disadvantages

More man power is required for the system that relies on human controls. Due to a lack of available personnel in our traffic police force, we are unable to manually regulate the traffic flow in any part of a town or city at this time. Therefore, we require a more effective strategy to manage the traffic. On the other hand, an automatic traffic control system utilises a timer for each phase of the traffic signal. Another approach is to make use of electronic sensors thatcan identify vehicles and then emit a signal to warn drivers that they are wasting their time byproceeding through a green light while the road is empty. Congestion in the traffic also occurred while the electronic sensors were being used to manage the traffic.

1.3 Image processing is essential for effective traffic control

The author developed image-processing-based traffic light control. Instead of implantedelectronic sensors, pictures will identify automobiles. Traffic light cameras will be placed. Image sequences are captured. Image processing is better for controlling traffic light states. It reduces traffic congestion and prevents wasting time on an empty route with a green signal. Because it uses traffic photos, it detects vehicles more consistently. It visualizes reality, thusit works better than devices that detect metal content.

Today 's greatest cities across the world are facing a significant challenge in the form of congestion. As per research conducted by the World Bank over the course of the past ten years, the average speed of vehicles in Dhaka has decreased from 20 kilometres per hour to 7 kilometres per hour. Decrease provincial competitiveness and reallocate economic growth by slowing growth in county global production or overall economic growth in metropolitan region employment because more and more automobiles enter an already congested traffic system. This is an urgent need for a completely new traffic control system that uses sophisticated techniques to improve the most of the already existing infrastructures.

In terms of traffic data collection, these strategies have had good results. However, the estimation of the number of motor vehicles may generate wrong result if the intravehicular distance is very narrow, and it may not consider rickshaws or auto-rickshaws as vehicles, despite the fact that these are the most common form of transportation in South Asian nations. There are also drawbacks to this approach, such as the fact that it can count insubstantial objects like pavement or pedestrians. Some of the work has suggested that time should be allocated based merely on traffic density. However, this may be a disadvantage to individuals who travel in less-frequently travelled roads. In order to retrieve the necessary traffic data from CCTV camera images, an edge detection approach must be used to separate the desired information from the remaining image. There are a variety of methods fordetecting the edges of objects. Their noise reduction, detection sensitivity and accuracy areall different. Prewitt, canny, Sobel, Roberts, and LOG are among of the most well-known names in the industry. Comparing the Canny edge detector to other methods, it has beenfound to be more accurate at picking out objects with more entropy, better PSNR, MSE (Mean Square Error), and execution time. The following chart compares the performance of various edge detection methods.

2 IMAGE PROCESSING

As long as the input is an image, the term "image processing" applies to any kind of signal analysis that has used image as an input. Some of the most common image-processing methods used to process images as two-dimensional signals in typical signal processing. Although digital image processing is the general, optical and analogue image processing is feasible as well. All of them can benefit from the information in this article, which focuses onbroad principles. An image's acquisition (the act of creating an input image) is referred to as an imaging process.

2.1 Image Acquisition

The procedure of acquiring images is always the very first step in any operation involving image processing. Once the image has been captured, a variety of processing techniques can be applied to it in order to complete the myriad of jobs that are necessary in the modernworld. Even with the assistance of various types of picture improvement, the goals may notbe attainable if the image has not been acquired in an adequate manner. This is true even if the image has been improved. The generation of digital photographs, often taken from a real- world setting, is referred to as "digital image acquisition." It is common practise to presume that the phrase implies or includes the compression, printing, storage, processing, and showing of images of this kind. Although the use of a digital camera for digital photography is by far the most common approach, alternative approaches are also frequently utilised.

2.2 RGB to Gray

Conversion A grayscale or grayscale digital picture is a photograph or digital image in which each pixel's value is a single sample, containing solely information on the image's intensity. Tones ranging from black to white make up the entirety of a black-and-white image, also known as a grayscale image. Photographs in grayscale are unique from those in black and white with only two tones: black and white, or one-bit bi-tonal. Many different hues of grey can be shown in grayscale images. It is also known as monochromatic, which denotes the existence of just one colour in the image. Enhancement of the image Image processing techniques allow you to improve the signal-to-noise ratio and draw attention to specific aspects of an image by altering its colours or intensities. In picture enhancement, you performthe following actions:

- Picture denoising
- Gadget hue management
- Reshape an image
- Conversion of an image to another image format

2.3 Persistence of the Outer and Inner Limits

Edge detection, for example, is a key tool in feature detection and feature extraction, which look for areas in digital images where brightness fluctuates sharply or contains singularities. Detecting singularities in a one-dimensional signal is the same as identifying steps. Sharp changes in image intensity are necessary to capture important events and changes in the quality of the world. The general presumptions of a model are likely to be part of brightness discontinuities in an image.

- Interferences in depth
- Disparities in the orientation of the surface
- Properties of materials can change over time.
- Differences in the lighting of the scene.

Edge detection with the aid of software to an image should produce, in an ideal world, a setof connected curves that show object and surface marking borders as well as interferences in surface orientation boundaries. Because an edge detection method can exclude information deemed unimportant while keeping the image's structural features, it can drastically reduce the amount of data to processIt is possible that the overall response of deciphering the original image's content may be greatly simplified if the edge detection process is successful. Images of modest richness rarely yield perfect profit margin in real life. It is common for non-trivial images to suffer from separation, which indicates that the side contours are not linked, omitted side segments and also false sides that do not correspond to considerable incidences in the image – making the subsequent task of analyzing the visual data quite difficult.

2.4 Image Matching

In edge-based matching, two individuals who are considered to be representatives of the sameitem are matched up with one another. When comparing and analysing two images and its illustration on one image is judged in relation to all of the edges on the other image. The Prewitt operator was utilised in order to perform edge detection on the source image and the current image. After that, these edge-detected photos are compared, and the time span that each traffic light remains on can be adjusted accordingly.

3. RELATED WORK

Those who live in non-static cities with heavy traffic know all too well the annoyances that come with being stuck in traffic. Accurate vehicle detection is essential for both manual and computerised traffic management. In this paper, a vehicle detection model for traffic control employing image processing has been proposed. In the beginning, the HSV images are converted from RGB photos. In order to determine whether a picture is day or night, it compares its value readings to a predefined threshold parameter that has been calculated. Vehicles of both day and night can be detected using two separate methods at this point. When it's daylight, a comparison of the front and back views of the same image is made to identify the vehicles. After that, the automobiles are counted using an object counting technique. To distinguish between headlights and ambient light, the intensity of the image is analysed at night. Finally, the number of automobiles is counted using another object counting methodology. Tested on a variety of data sets, this model has an average accuracyof 95% for both day and night [1].

The goal of road transportation strategy is to minimize traffic, but it's not clear when this widespread byproduct of ancinet living actually harms the economy. Based on frame data collected in the United States from 88 census tracts (1993-2008), the impact of overcrowding on employment levels is estimated (2001 to 2007). Job growth appears to be hindered above these levels if the regional freeways have an ADT of over 11,000 per lane and a commute time of around 4 minutes each way. There is no indication that heavy traffic disruptions have such a negative effect on economic growth. A more effective strategy for dealing with congestion's financial drag could be to give priority to economically significant trips or to provide additional travel ability to allow people to get where they need to go even if there is traffic [2].

Using image processing algorithms, it is possible to learn more about a subject. traffic congestion on roadways, and a model for controlling traffic lights is proposed here based on images taken by video cameras. The actual sum of pixel volume covered by moving vehicles in a camera shot is calculated rather than the amount of vehicles on the road. Each route has its own unique traffic cycle and weighting are set as output parameters, and traffic lights are controlled sequentially [3].

The city's population and automobile fleet are both growing at an alarming rate. Controlling roads, highways, and streets has become a big problem as the population of cities grows. The main cause of today's traffic problem is the

JOURNAL OF OPTOELECTRONICS LASER
Volume 41 Issue 8, 2022 ISSN: 1005-0086

usage of traffic management strategies. As a result, current traffic management systems are inefficient because they don't take into account the current traffic situation. The Mat Lab software has been used to construct this project, which attempts to reduce traffic congestion. In addition, Image Processing is employed to implement this project. At first, a camera records footage of a roadway. We install a web camera in a traffic lane to record traffic flow on the road we're trying to manage. These photos are then analysed in an efficient manner so that traffic density can be determined. The controller will instruct the traffic LEDs to display a specific time on the signal to regulate traffic based on the processed data from mat lab [4].

In lossless image encoding, the Gradient Adjusted Predictor (GAP) and the Gradient Edge Detection (GED) predictor introduce a new picture edge detection approach with dynamic threshold control that is based on the Multidirectional Gradient Edge Detection Predictor (MGEDP) template. From the centre outward, the image is sliced into four equal pieces, and each of these portions can be run concurrently by the MGEDP template in a different direction of four different ways to calculate the error values using parallel technology. These feedback values are used by the algorithm to generate a forecast error image, which is then used to determine the threshold values using the Otsu algorithm.

Finally, the algorithm produces a final image representation by classifying and refining the corners of a mistake image. [5] Tests have shown an algorithm that uses parallel innovation not only diminishes the amount of time it takes to process the image, and also generates chamfered edges and much more characteristics. For object extraction using satellite remote sensing photographs from Indian Remotely Sensed sensors LISS 3, LISS 4, as well as Cartosat1, and also Google Earth, this paper presents a comparison of numerous corner detection and band-wise analysis of these algorithms [6]. Edges are what define boundaries and are therefore a problem of practical importance. As the challenge of urban congestion worsens, it is imperative that advanced innovation and machinery be deployed to improve traffic control mechanism. Because of the increasing number of vehicles on the road and the limited resources given by existing infrastructure, today's traffic congestion is getting worse. Traffic lights can be easily programmed to employ a timer for each part of the cycle.

Detecting vehicles and generating a signal that cycles is another option. The traffic light can be controlled using image processing. It will use photographs rather than sensors placed in the pavement to identify automobiles. The traffic light will be equipped with a camera. It can record video clips. With a reference image of a deserted road as a starting point, the photographs acquired are compared using image comparison. The edge detection (Prewitt) operator have been used for this purpose, and the proportion of matching traffic light timings can be used to control [7].

When it comes to traffic monitoring and control, there is a growing need for sensor networks and accompanying infrastructures. These devices enable authorities to keep tabs on the flow of traffic at detection points while also providing them with pertinent real-time data (example: traffic loads). Automated tracking units that encapsulate and perceive photos captured by one or more pre-calibrated webcams are illustrated in this research, which uses a network of automated tracking units (ATUs). In addition to monitoring traffic in highway tunnels and aeroplane parking lots, the suggested system is adaptable, scalable, and suited for a wide range of applications. Other objectives include testing and evaluating a variety of image processing and information fusion methods will be used in the actual system. By utilising the outcome of the image analysis unit, a range of data for each movable object inthe scene is transmit to a distanced traffic control centre. This information includes thespeed, target ID, location, and classification of the moving vehicle. Through the analysis of these data, real-time output can be produced.

In image processing and computer vision, the term "edge detection" is critical. There are a number of edge detection operators you need to know in order to be able to identify objects in images. Comparative evaluations of image processing edge detection operators are offered here. The results of this study show that the canny edge detection operator outperforms other edge detection algorithms in terms of image presentation as well as the location of object boundaries MATLAB [9] is the software tool that has been used.

In attempt to choose a species of shark fish to use as a case study, one must first have a solid understanding of the concepts that lie beneath the surface of the various filters, and then one must use these filters to analyse the shark fish. In this article, the various approaches to edge detection are discussed and analysed. MATLAB is the tool that is utilised throughout the development of the programme. The two most crucial steps of image processing are calledthe Gradient and Laplacian operators. The Laplacian-based segmentation method, the Canny edge detector, and the gradient-based Roberts, Sobel, and Prewitt edge detection operators are some of the filters that are utilised in the case study that focuses on the classification of shark fish using image processing. This research [10] examines the benefits and drawbacks ofusing these filters in depth.

The goal of this project is to build a traffic light system that automatically adjusts its timing based on the amount of traffic at a given intersection. In most major cities across the world, traffic congestion is a major concern, and it's time to switch to an automated system that can make decisions. When just one lane of a roadway is active at any given moment in the currenttraffic signalling system, it can be inefficient. As a result, we've developed a design for an For the purpose of resolving this matter, an intelligent traffic management system was developed. Occasionally, a higher volume of traffic necessitates a longer green period than the typical allocated time at a junction. As a result, we propose a method in which the amountof time spent with the red light and the green light at any given intersection would be determined by the volume of traffic that is present at any given moment. Using PIR, this can be done (proximity Infrared sensorsAfter that the intensity has been computed, the microcontroller will tell the green light when to start glowing at the appropriate time. The information that is provided to the microcontroller by the sensors on the roadside that detect the presence of vehicles allows the microcontroller to make decisions such as when to swap over the lights or how long a flank will be open for. In the following sections, we'll explain how this framework works [11].

Congestion in the area's roads is one of the region's most pressing issues. A known contributor to traffic jams is the amount of time drivers spend at traffic lights. As a result, traffic volume has no bearing on when the traffic light will change. Since traffic density is more important than time, traffic control simulations and optimizations are needed. Efforts are made to minimise traffic congestion caused by traffic signals in this system. A density- based traffic control system was created as part of this project to address this issue. Programming an Arduino using the Arduino enables traffic lights to offer the right of access to the road by picking the lane with the most cars. For example, the sensor can identify an automobile and signal the Arduino to regulate the traffic lights for that vehicle's specific path. As long as none of the four sensors detects a sign, the traffic lights continue to operate under the auspicious assumption that nothing is amiss. The sensor's average response time was 0.39 seconds. A lot more study is needed before the device can be manufactured in big quantitiesto be used on all of the country's highways [12].

Most cities throughout the world suffer from severe traffic congestion, which has turned into a nightmare for the people who live there. If the signal is delayed or traffic signals are timed incorrectly, this can happen. The traffic light's delay is preprogrammed and does not change based on traffic. As a result, a growing need for systematic, rapid, and automatic traffic control systems has emerged. Dynamic traffic signal control for dense areas is the goal of this work. The timing of the traffic light changes based on the amount of traffic at the intersection. This project uses an arduino microcontroller. Whenever a vehicle comes close enough, it activates and receives the signal.

The transportation system relies heavily on traffic light control systems to manage and keep track of its many moving parts. The city's busiest roads are the primary focus of thesedevices. Multiple traffic signal systems at nearby crossings must be coordinated, but this is a difficult task. We're getting closer to the idea of a traffic volume control system. The traffic system in this area is monitored by counting the number of vehicles on the road. Sensors will be used to count the quantity of vehicles. Touch line sensors and laser sensors are the two types of sensors available. Heavy vehicles can easily damage the touch line sensors, making it difficult to tally the number of vehicles. Those with high directivity [14] are the ones most often chosen.

The development of a vibrant traffic light system is intended to be the result of this project that is dependent on density. The timing of the traffic light changes based on the amount of traffic at the intersection. Many major cities across the world suffer from severe traffic congestion, making daily commuting a misery for residents. In the traditional traffic light system, the time allowed to each side of the intersection is set and cannot be adjusted in response to changes in traffic density. The assigned junction times are set in stone. Some junctions require longer green times due to increased traffic density on same side of the intersection than the typical permitted time. It is necessary to process and convert a colour image collected at the signalinto a grayscale image before drawing a contour line to determine the image's vehicle count. Inorder to figure out which side of the road has the most traffic, we'll need to know how many vehicles are on the road. As a microcontroller, the Raspberry pi provides signal timing dependent on traffic density.

The conventional traffic system assigns a predetermined and fixed green light time to every road lane. When there is a lot of traffic on the road, it does not change. This method is inefficient for dealing with traffic in metropolitan and smart cities. Due to the lack of a priorityfactor and other considerations, the current method does not take the number of cars in relation to congestion into account. As part of this technique, we submit the current traffic image to the programme, which extracts edges from images; if the image has more traffic, there will be more white colour edges; if the image contains less traffic, there will be less white colour edges.

4 PROPOSED SYSTEM

Using this approach, traffic density is estimated by comparing knowledge about the current traffic situation superimposed on an image of an open road serving as a source images. The percentage of traffic signal duration that matches the authorised time can be modified. Traffic signals will be more effective and practical with this new design. A density-based system means that it will give.

- Priority to the lane which has comparatively a greater number of vehicles.
- Image processing is the method that will be used for calculating the density

Algorithm: Canny edge detector,

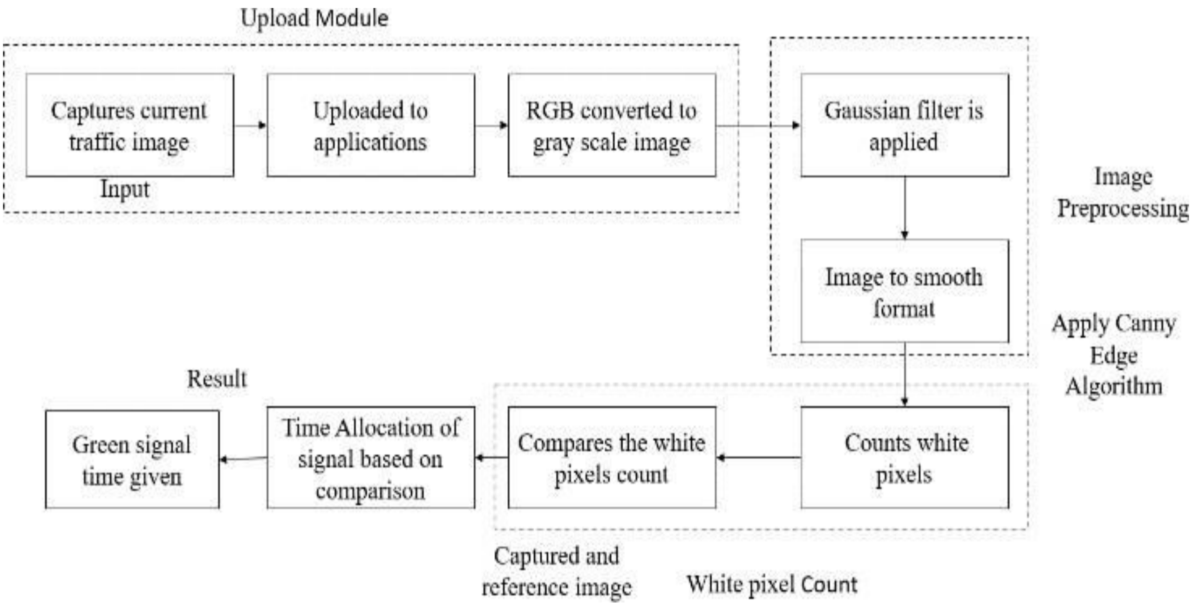


Fig 1: Detailed Design

5 IMPLEMENTATIONS

In this section, we'll go through how to formulate a problem, as well as the underlying principles and simulation methodology. We used PyCharm to write the code for this project because we needed to work in a python environment.

5.1 PyCharm IDE

One of the most often used IDEs for computer programming (especially Python) is PyCharm. JetBrains, a Czech firm, developed it. A unit tester that is implemented, in addition to interaction with version control systems (VCSes) are only some of the features it offers, in addition to code analysis and a graphical debugger. There are versions for Windows, Mac OS X and Linux of PyCharm, making it cross-platform. Both the Community Edition and the Professional Edition come with additional features and are published under a proprietary licence. The Apache License governs the Community Edition.

- Many of these operations can be done in Python by just changing the name of an existing function or removing it entirely.
- The web frameworks Django, web2py, and flask are all supported by this module.

- Integrated debugger for the Python programming language Line-by-line code coverage for integrated unit testing.
- Python development for Google App Engine.
- User interfaces for Mercurial (Git), Subversion (SVN), Perforce (Perforce), and CVSare all merged into a single user interface.

Aside from the more general Komodo, it competes with different Python IDEs, such as Eclipse's PyDev and Komodo itself. It's possible to write your own plugins to extend PyCharm's features using the PyCharm API. Plugins from other JetBrains IDEs can also be used in PyCharm. Plugins for PyCharm can be found in over a thousand different repositories.

- Several licence options are available for PyCharm Professional Edition, each with theirown set of features, pricing point, and terms of use.
- The cost of an Academic licence is significantly reduced or perhaps waived.
- The source code for PyCharm Community Edition may be found on GitHub and is given under the Apache 2 licence.

The template is intended for up to six authors, but this is not a requirement. All conference papers must have at least one author. The names of the authors should be listed sequentially from left to right, then down the page. citations and indexing services use this sequence of authors in the future. Do not put names in columns or organise them based on affiliation. Please be as concise as possible when describing your affiliations (for example, do not differentiate among departments of the same organization).

5.2 Python

Python is a powerful programming language which may be handled in a number of different ways and utilised for a wide variety of applications. The extensive use of underlining throughout demonstrates that its design philosophy focuses a significant emphasis on the accessibility of the code. Its object-oriented methodology and language components arecreated to aid programmers in generating code that is not only understandable but also sensiblefor a wide variety of various kinds of projects. The programming language Python is dynamically structured and also collects garbage automatically. It is appropriate for a wide number of development methodologies, such as programming language (in particular, scripting language), object-oriented programming, and functional programming. Because of its comprehensive and very well standard library, it is usually referred to as a "battery packs included" language.

In the late 1980s, Guido van Rossum started developing Python as a programming language that would succeed ABC. He first made Python available to the public in 1991 with the version *number 0.9.0. New capabilities* were made available with the release of Python version 2.0 in the year 2000. Python 3.0 was a *important* change of the language that was launched in 2008 and was not fully backward-compatible with earlier versions of the programme. Python 2 was officially retired with the release of version 2.7.18 in the year 2020.

A. Upload Image

To produce pixels with black and white values, the current traffic image will be uploaded to the programme and converted to a Gray Scale image format.

B. Pre-process

This module uses Gaussian Filtering to smooth out images that have been uploaded. A Canny Edge Detection filter will be added to the image after it has been filtered. White colour pixels will be used by vehicles, whereas black colour pixels will be used by non-vehicles.

C. White Pixel Count

To achieve a complete traffic count, we'll use this method to count white pixels in the cannyimage.

D. Canny Edge Detection Algorithem

It is considered by many to be the best edge detector. Clean, narrow edges are well related to the adjacent edges. Image processing software is likely to include a function that does it all.In this section, I'll go into more detail about how they function specifically. A multistage edge detection algorithm, it is based on this principle. Here are the steps:

- Pre-processing

- Gradients calculation
- Non-maximum reduction
- The use of repetition in Thresholding

The algorithm's two most important parameters are the higher and lower thresholds. In order to distinguish between real and fake edges, the upper threshold is used. Faint pixels that are actually part of an edge can be found at the lower threshold. The following are some of the most common edge detection criteria: Edge detection with a low error rate indicates that as many of the image's edges as feasible should be reliably caught by the detection process. The operator should be able to properly locate the centre of the edge by detecting the edge point. There should be no fake edges in the image if possible, so that a given edge can only be marked once. Canny used the calculus of variations — a method for finding the optimal function for a given functional – to meet these conditions. It is possible to approximate Canny's detector's optimal function by taking the first derivative of a Gaussian. The Canny edge detection algorithm is one of the most precisely specified approaches yet developed for edge identification that delivers good and dependable results. It quickly rose to the top of the list of the most often used edge detection algorithms due to its high performance in terms of meeting the three edge detection criteria and its ease of implementation.

6. EXPERIMENTAL RESULTS

Loss value is also taken into consideration in the evaluation of work prediction accuracy. You may monitor the performance of your classifier as it is being tested on a dataset. Here, True Negative signifies the number of correct negative occurrences, True Positive denotes the number of positive events, and False Positive denotes mistakenly anticipated positive events. The number of accurately anticipated negative events that actually occurred isrepresented by the term "False Negative." Figure 5: General consternation matrices

Predicted_Class \ Actual Class		
	True_Positive	False_Positive
	False_Negative	True_Negative

Figure 5: Table for Confusion Matrix

The performance indicators for the proposed categorization model are described on this page.According to Equation 1, the accuracy of classification problems is the total number of valid predictions made by the three machine learning models.

$$Accuracy = \frac{tp+tn}{tn+fp+tp+fn} \quad (1)$$

$$Recall = \frac{tp}{tp+fn} \quad (2)$$

$$FScore = 2\,\frac{Precision\ X\ Recall}{Precision+Recall} \quad (3)$$

$$Specification = \frac{tn}{tn+fp} \quad (4)$$

$$Precission = \frac{tp}{tp+fp} \quad (5)$$

Video analytics may be used to read licence plates and reduce theft with the suggested system, which could restrict traffic based on density everywhere. A real-time analysis of the movement of a specific vehicle (asset tracking) could be performed using it for improved vehicle security. It is possible to execute homogeneous emergencies in the long term. We have employed a lean hardware strategy and software capabilities to offer efficiency in order to make the project profitable. The proposed effort has the potential to have a significant impact because of its effectiveness, accuracy, and cost-effectiveness in traffic monitoring. As soon as the system is up and running, we will be able to analyse previous traffic patterns and provide useful information to the police. Using it, we can locate potholes (with simple tweaks to the cameras) and send that information to the appropriate authorities in a timely manner.

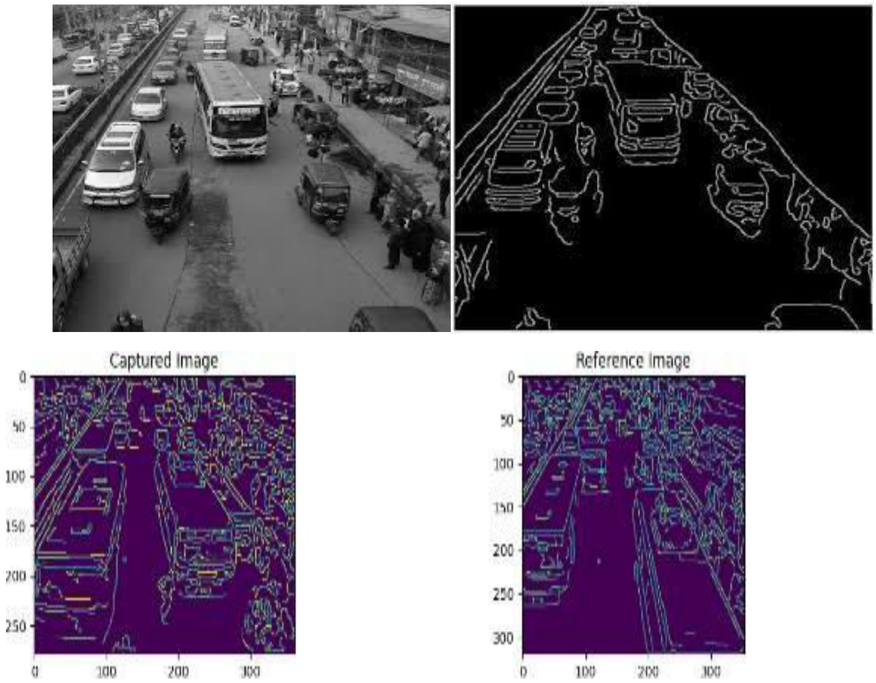
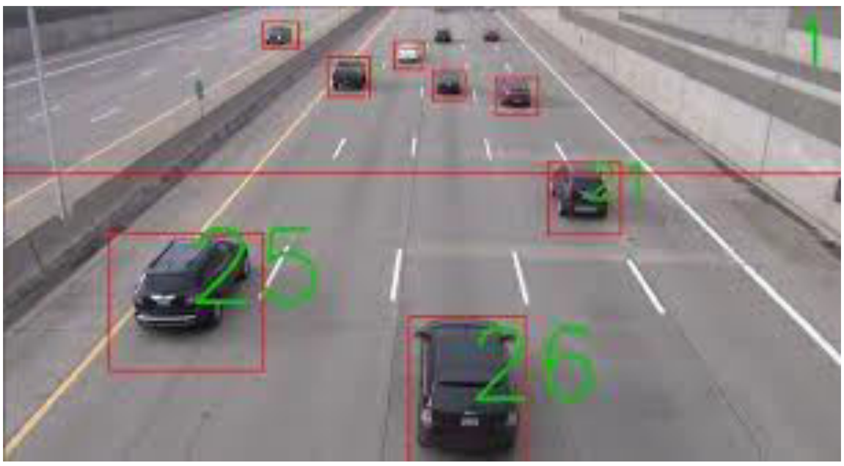


Fig 4: Image uploaded and click image processing using canny edge detection



7. CONCLUSION

The home location, the mentioned place, and the tweet location are all taken into account when analysing tweet data. Geolocation prediction becomes more difficult when Twitter data is taken into account. It's difficult to read and evaluate tweets because of the nature of the language and the limited number of characters. In this study, we used machine learning techniques to identify the location of a person based on their tweets. For the geolocation prediction challenge, we've implemented three algorithms, and we've chosen the best one. The results of our experimentation show that decision trees may be used to analyse tweets and forecast their location. Other techniques such as user buddy networks and social networks such as Facebook and Tumblr will be used in the future to infer locations. Several fresh avenues for further study have been opened up by the current findings. Allowing peopleto express themselves in their local language would significantly enrich the system.

REFERENCES

[1] Md. Munir Hasan, Gobinda Saha, Aminul Hoque and Md. Badruddoja Majumder, "Smart Traffic Control System with Application of Image Processing Techniques", 3rd International Conference on Informatics Electronics & Vision Dhaka, May 2014.

[2] Vismay Pandit, Jinesh Doshi, Dhruv Mehta, Ashay Mhatre and Abhilash Janardhan, "Smart Traffic Control System Using Image Processing", International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), vol. 3, no. 1, January - February 2014.

[3] S.K. Katiyar and P.V. Arun, "Comparative analysis of common edge detection techniques in context of object extraction", IEEE Transactions on Geoscience and Remote Sensing, vol. 50, no. 11b.2014

[4] Jiaqiao He, Liya Hou and Weiyi Zhang, "A Kind of Fast Image Edge Detection Algorithm Based on Dynamic Threshold Value", Sensors & Transducers, vol. 24, pp. 179-183, August 2014.

[5] Weibin Rong, Zhanjing Li and Wei Zhang, "An improved canny edge detection algorithm", IEEE International Conference on Mechatronics and Automation, August 2013.

[6] M. Sweet, "Traffic Congestion's Economic Impacts: Evidence from US Metropolitan Regions", Urban Studies, vol. 51, no. 10, pp. 2088-2110, Oct. 2013.

[7] G.T. Shrivakshan and C. Chandrasekar, "A Comparison of various Edge Detection Techniques used in Image Processing", International Journal of Computer Science Issues, vol. 9, no. 5, September 2012.

[8] Pinaki Partum Acharjya, Ritaban Das and Dibyendu Ghoshal, "Study and Comparison of Different Edge Detectors for Image Segmentation", Global Journal of Computer Science and Technology Graphics& Vision, vol. 12, no. 13, 2012.

[9] Tr. Choudekar Pallavi, Banerjee Sayanti and M. K. Muju, "Implementation of image processing in real time traffic light control", in3rd International Conference on Electronics Computer Technology, April, 2011.

[10] Lei Yang, Dewei Zhao and Xiaoyu Wu, "An improved Prewitt algorithm for edge detection based on noised image", 4th International Congress on Image and Signal Processing, October 2011.

[11] T. Semertzidis, K. Dimitropoulos, A. Koutsia and N. Grammalidis, "Video sensor network for real-time traffic monitoring and surveillance", The Institution of Engineering and Technology, vol. 4, no. 2, pp. 103-112, June 2010.

[12] Wenshuo Gao, Xiaoguang Zhang and Lei Yang, "An improved Sobel edge detection", in3rd International Conference on Computer Science and Information Technology, July 2010.

[13] Intelligent Traffic Signal Control System Using embedded System" by Dinesh Rotake and Prof. Swapnili Kar More, "Innovative Systems Design And Engineering,), Vol. 3,No. 5, 2012.

[14] Abbas N, Tayyab M, Qadri MT. Real Time traffic density count using image processing. International Journal of Computer Applications. 2013; 83(9):16–9.

[15] Dharani SJ, Anitha V. Traffic density count by optical flow algorithm using image processing. Second National Conference on Trends in Automotive Parts Systems and Applications (TAPSA-2014). India International Journal of Innovative Research in Science, Engineering and Technology. 2014 Apr; 3(2):501–7.

[16] Aishwarya S, Manikandan P. Real time traffic light control system using imageprocessing. IOSR-JECE. 1–5.

[17] Dangi V, Parab A, Pawar K, Rathod SS. Image processing based intelligent traffic controller. UARJ. 2012; 1(1):1–6.

[18] Kannegulla A, Reddy AS, Sudhir KVRS, Singh S. Thermal Imaging system for Precise Traffic Control and Surveillance. International Journal of Scientific & Engineering Research. 2013 Nov; 4(11):464–7.

[19] B.Rajalingam, R. Santhoshkumar, "Security and privacy preservation using Edge intelligence in beyond 5G networks harnessing Federated Machine Learning and Artificial Immune Intrusion Detection System" Computers and Electrical Engineering, Pergamon, Elsevier, 2021

[20] R. Santhoshkumar, M. Kalaiselvi Geetha, J. Arunnehru, 'SVM-KNN based Emotion Recognition of Human in

Volume 41 Issue 8, 2022 ISSN: 1005-0086

Video using HOG feature and KLT Tracking Algorithm, International Journal of Pure and Applied Mathematics, vol. 117, No. pp.621-624, ISSN: 1314-3395, 2017.

[21] R. Santhoshkumar, M. Kalaiselvi Geetha, J. Arunnehru, 'Activity Based Human Emotion Recognition in Video', International Journal of Pure and Applied Mathematics, vol. 117, No. 15, pp.1185-1194, ISSN: 1314-3395, 2017

[22] R. Santhoshkumar, M. Kalaiselvi Geetha, 'Deep Learning Approach for Emotion Recognition from Human Body Movements with Feed forward Deep Convolution Neural Networks',*Procedia Computer Science,* Vol.152, pp.158-165, Elsevier, ISSN 1877-0509, 2019.

[23] R. Santhoshkumar, M. Kalaiselvi Geetha, 'Deep Learning Approach: Emotion Recognition from Human Body Movements', *Journal of Mechanics of Continua and Mathematical Sciences (JMCMS),* Vol.14, No.3, pp.182-195, ISSN: 2454-7190, 2019.

[24] R. Santhoshkumar, M. Kalaiselvi Geetha, 'Vision based Human Emotion Recognition using HOG-KLT feature' *Advances in Intelligent System and Computing, Lecture Notes in Networks and Systems*, Springer, Vol.121, pp.261-272, ISSN: 2194-5357, 2020

[25] R. Santhoshkumar, M. Kalaiselvi Geetha, 'Emotion Recognition on Multi View Static Action Videos using Multi Blocks Maximum Intensity Code (MBMIC)', *Lecture Notes in Computational Science and Engineering ,*Springer, ISSN 1439-7358, 2020