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AN EFFICIENT TRAFFIC CONTROL SYSTEM BASED ON DENSITY

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Abstract: - The project is designed to develop a density based dynamic traffic signal system. The signal timing changes automatically on sensing the traffic density at the junction. Traffic congestion is a severe problem in many major cities across the world and it has become a nightmare for the commuters in these cities. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Junction timings allotted are fixed. Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time. After calculating the number of vehicles the system will come to know in which side the density is high based on which signals will be allotted for a particular side. However it does not consider high density vehicles at junction are move first and another next. To deal with this problem the proposed system was introduced. The proposed system considers high density of vehicles in the road move first according to the traffic signal. Here also consider emergency vehicles move first. If any accident will be present in the road, the message is displayed. The proposed system reduces the traffic congestion. The experimental results of proposed system are high compared to the existing system.

Introduction

Image processing is processing of images by using any form of signal processing for which the input is an image and output is either an image or set of parameters associated to the image. Image processing is a technique to develop raw images obtained from cameras/sensors placed on satellites; pictures are taken in standard life for numerous purposes. Diverse methods have been improved in image processing over past five years. Most of the techniques are developed to improve the images received from unmanned spacecrafts, gap probes and armed scouting flights. Image processing is used to reduce the noise levels associated with various electro-optical devices to almost negligible levels, one noise source can never be eliminated and therefore forms the restrictive case while all other noise sources are eliminated.

Images are often degraded by noise issues in most of the applications. Noise issue can arise during image confine, transmission and traffics. Noise reduction is an important chore in image processing to progress the quality of image [1]. Image processing is used in various applications such as martial purpose, medicinal imaging, movie production, text processing and printing manufacturing. In current life, the image processing has problems such as traffic

congestion which becomes severe. To overcome this issue, the embedded system focused to reduce the traffic based on the higher density.

The embedded system is described as way of working, arranging or implementing one or several tasks according to a fixed group of rules, agenda and plan. The instance of embedded system is time show organism of watch, automatic cloth washing scheme (washing machine). There are three major embedded constituents in the embedded system which is given further. Embeds hardware to provide computer like functionalities and embeds major purpose software commonly to flash memory and application software executes concurrently the number of tasks (emd). It embeds an authentic time operating system which manages the application software jobs executing on the hardware and supervises the processes to network resources according to priorities and timing conditions of tasks in the system.

Related work

Vivek Tyagi et.al [2] presented vehicular traffic density evaluation problem by using the information cues. This scenario used the method which provides significant features of the cumulative roadside acoustic signal to categorize the traffic density state. The classification approach such as support vector machine (SVM) and bayes algorithms are used for evaluation process. However this scenario has issue with slow process. Yang Wang [3] discussed new fuzzy bus signal priority control system design based on wireless sensor networks. This research is used transit signal priority control system to improve the efficiency. It uses the concept of fuzzy control for proper decision making and reduces the average vehicle delay. However this scenario has issue with expensive and in some cases it degrades the system.

Ashwini et.al [4] is presented the design of ARM7 based traffic control system in this research scenario. Traffic jamming is a main issue in several current municipalities around the globe. The main objective of this research is to improve an efficient process to classify the traffic which attempts to reduce the traffic signals. This scheme provides uppermost precedence to urgent situation vehicles to pass them. However it has problem along with congestion term in few cases. Rashid hussian et.al [5] suggested the wireless sensor network applications in automatic traffic control scheme. In this scenario, the novel approach for increasing vehicle people in the entire progressing and improved nation calls to a key expansion and modernism in the active traffic signalling methods. This scheme utilizes wireless sensor networks expertise to intellect vehicles and a microcontroller based steering algorithm planned for outstanding travel administration. In some cases this scenario has issue with time delays.

Arif A et.al [6] presented image processing based on adaptive traffic control technique to give an expansion in existing traffic direct scheme at junction. The system is arranged more experienced with computation of intellect by means of simulated visualization using image processing techniques to estimate original traffic. However this research has issue with computational cost. Ganiyu R.A. et.al [7] suggested the development of a micro controller based traffic signal approach in this research scenario. This method discovers the plan and functioning of a microcontroller-based traffic signal method for road junction control. Furthermore, the improved scheme is used as a training kit in knowledge traffic signal control devise and development. It can be used as an instruction support in schools for diverse highway users.

Dinesh Rotakel et.al [8] discussed about intelligent traffic signal control system using embedded system. This research scenario is able to deal the issues of conventional traffic light system. Genetic algorithm is focused on the detection of traffic volume. Emergence vehicle detection is utilized but still it has computational complexity. Malik Tubaishat et.al [9] presented adaptive traffic control with wireless sensor networks. The purpose of this approach is developing the flow of vehicles and decrease the waiting time when maintaining fairness between the other traffic lights. However this method is not giving importance to VIP vehicles.

Methods

1. Image acquisition: The primary process is to obtain the input image. The image acquisition is done along with the web camera support. Initially, road image is captured while there is no traffic on the road. This null image of the road is saved as reference image in a specific position at the coding.

2. Pre-processing

The main objective of the pre-processing is to develop the contrast of input image and to reduce the noise rates in the specified image. This process is used to increase the operation speed. In pre-processing RGB image is transformed to gray level image then converted to binary image. The contrast enhancement is done through the histogram equalization and contrast stretching. There are several filters used to eliminate the noise levels from the input image.

2.1 RGB to gray conversion

In this process, the captured input image is in the form of RGB. The initial step of pre processing is to transform RGB image to gray scale. RGB is then converted into gray conversion on the reference image.

2.2 Noise Removal by median Filter

The main aim of this filtering is to eliminate the noise and distortion from the image. The noise occur when camera capturing due to the climate conditions. The iterative bilateral filter is focused on the reduction of noise. Median filter is a non-linear smoothing method that reduces the blurring of edges, by using the median of the brightness in its neighbourhood. Individual noise points not harm the median of the brightness in the neighbourhood and median smoothing reduces impulse noise rather well.

3. Image matching using edge detection

In this module, edge detection of real time images of the road is done through prewitt edge detection operator. The key features are such as edges, lines and points detected from the unexpected change at gray points. Image matching is done by using edge detection which contains the operator named as prewitt. It is used to locate the pixels in the given image which correspond to the edges of objects. The outcome is binary image along with the detected edge pixels. Scientifically, the operator utilizes 3X3 kernels which are convolved along with the real image to compute derivations.

4. Vehicle moving method based on density

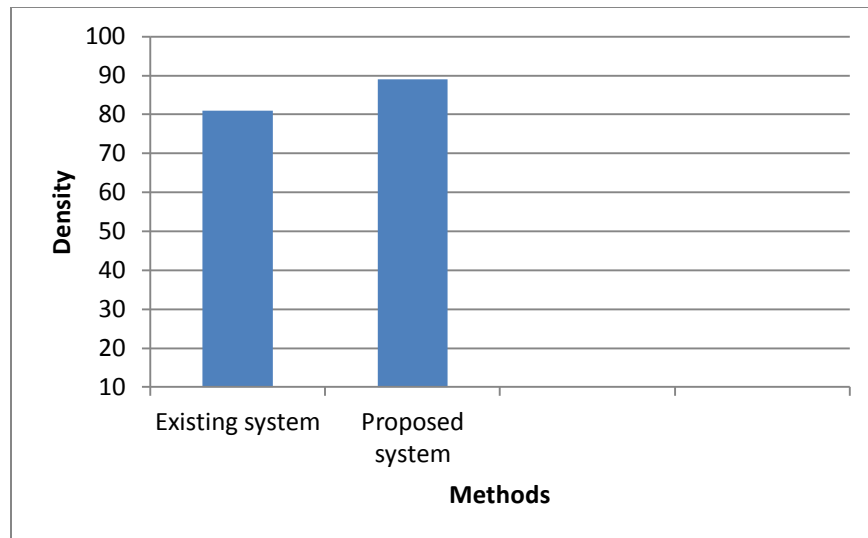
In this module, we have to perform the vehicle moving method based on the density to deal the several issues such as traffic congestion. The main issue leading for traffic congestion is the huge number of vehicle which is caused through the population and the expansion of financial system. In this approach, the total number of vehicles is computed in the junction. In few cases, the traffic density at one side of junction is higher and another side of junction has low traffic density. Then, the approach is used to compute the number of vehicles. This research scenario is used to identify which side the density is high based on which signals will be allotted for a particular side. For instance, consider four roads, the high density vehicles in junction are moved first. Based on the density signal time, the emergency vehicle is considered as first preferences. If any accident will be present in the road, the message will be displayed.

5. Performance evaluation

In this section, the performance metrics are evaluated by using existing and proposed methodologies. The performance metrics are such as density, priority and delay metrics which are evaluated by using density based traffic system.

Density

The system is called better when the density of the system is higher.

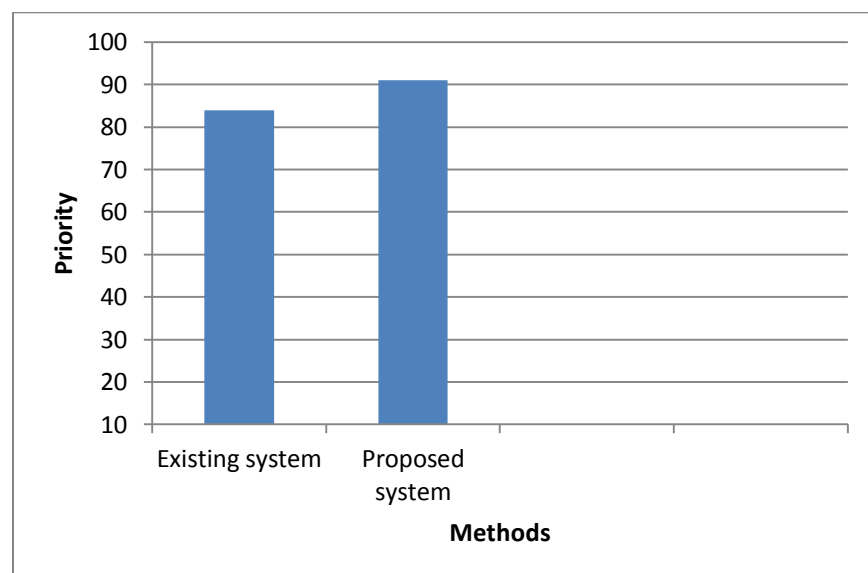


From the above graph we can observe that the comparison of existing and proposed system in terms of density parameter. In x axis we plot the methods and in y axis we plot the density values. The density values are lower by using existing algorithm. The density value of existing scenario is 81. The density value is higher by using the proposed method. The density value of proposed scenario is 89. From the result, we conclude that proposed system is superior in performance.

Priority

Priority is determined based on the following:

- If two or more roads of equal high priority any one road is opened.
- If all roads are having no traffic, yellow signal appears.
- No roads are allowed to be closed continuously for more than maximum duration.
- Without considering the density

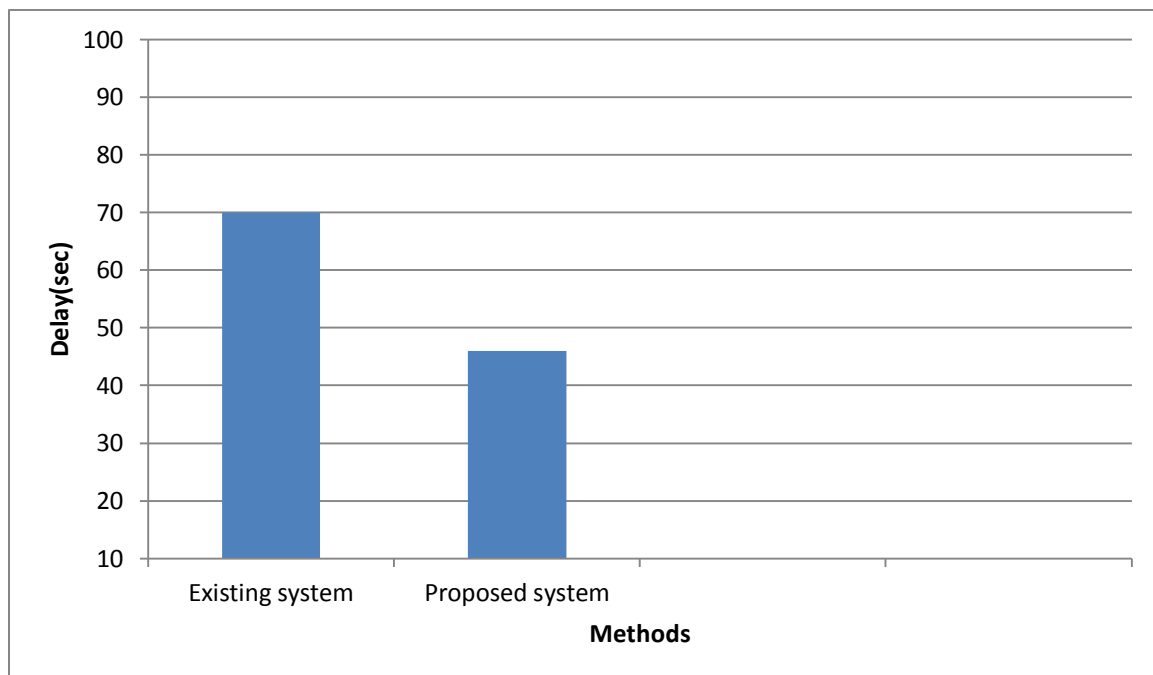


From the above graph we can observe that the comparison of existing and proposed system in terms of priority parameter. In x axis we plot the methods and in y axis we plot the priority values. The priority values are lower by using existing algorithm. The priority value of existing scenario is 84. The priority value is higher by using the proposed method. The priority value of proposed scenario is 91. From the result, we conclude that proposed system is superior in performance.

Delay

The delay of each road is chosen according to the density

- Low-20seconds
- Medium-30seconds
- High-60seconds



From the above graph we can observe that the comparison of existing and proposed system in terms of delay parameter. In x axis we plot the methods and in y axis we plot the delay values. The delay values are higher by using existing algorithm. The delay value of existing scenario is 70 sec. The delay value is reduced by using the proposed method. The delay value of proposed scenario is 46 sec. From the result, we conclude that proposed system is superior in performance.

Result and discussion

Conclusion

The system can estimate the density of the vehicle using mat lab tool by comparing the four side of the image which is given as input. The existing system extends the traffic signal timing depends on the density of vehicles. The proposed system considers high density of vehicles in the road move first according to the traffic signal. Here also consider emergency vehicles move first. If any accident occurs in the road means then message indication will be alerted. The proposed system reduces the traffic congestion. The experimental results of proposed system are high compared to the existing system.

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