D Y PATIL
INTERNATIONAL
UNIVERSITY
AKURDI PUNE

TRAFFIC LIGHTS MANAGEMENT SYSTEM

Project report

submitted to D Y Patil International University, Akurdi, Pune
in partial fulfilment of full-time degree.

BTech Computer Science and Engineering

AIML

Submitted By:

Hrithik Sinha 20190802040

Under the Guidance of

Dr. Samarjit Roy

Department of Computer Science and Engineering

D Y Patil International University, Akurdi,Pune, INDIA, 411044

[Session 2019-23]

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AKURDI PUNE

CERTIFICATE

This is to certify that the project entitled **Traffic Lights Managemen System** submitted by:

Hrithik Sinha 20190802040

is the partial fulfillment of the requirements for the award of degree of Bachelor of Technology in Computer Science and Engineering is an authentic work carried out by them under my supervision and guidance.

Samarjit Roy 16/6/23.
Dr. Samarjit Roy
(Mentor)

16.6.23

D Y PATIL INTERNATIONAL UNIVERSITY ★ AKURDI, PUNE-44. ★

Director
School of Computer Science Engineering & Application
D Y Patil International University, Akurdi
Pune, 411044, Maharashtra, INDIA

DECLARATION

We, hereby declare that the following report which is being presented in the Major Project entitled as **Traffic Lights Management System** is an authentic documentation of our own original work to the best of our knowledge. The following project and its report in part or whole, has not been presented or submitted by us for any purpose in any other institute or organization. Any contribution made to the research by others, with whom we have worked at D Y Patil International University, Akurdi, Pune or elsewhere, is explicitly acknowledged in the report.

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Hrithik Sinha 20190802040

ACKNOWLEDGEMENT

With due respect, we express our deep sense of gratitude to our respected guide and coordinator (Dr. Samarjit Roy), for his/her valuable help and guidance. We are thankful for the encouragement that he/she has given us in completing this project successfully.

It is imperative for us to mention the fact that the report of major project could not have been accomplished without the periodic suggestions and advice of our project supervisor (Dr. Samarjit Roy) and project mentor (Dr. Samarjit Roy).

We are also grateful to our respected Director, Dr. Bahubali Shiragapur and Hon'ble Vice Chancellor, DYPIU, Akurdi, Prof. Prabhat Ranjan for permitting us to utilize all the necessary facilities of the college.

We are also thankful to all the other faculty, staff members and laboratory attendants of our department for their kind cooperation and help. Last but certainly not the least; we would like to express our deep appreciation towards our family members and batch mates for providing support and encouragement.

Hrithik Sinha (20190802040)

Abstract

The goal of the project is to create a dynamic traffic light system based on density. Upon detecting the volume of traffic at the intersection, the signal timing adjusts itself automatically. In many major cities throughout the world, traffic congestion is a serious issue that has turned commuting into a nightmare. Traditional traffic signal systems are based on a set time concept that is assigned to either side of the junction and cannot be changed to account for changes in traffic density. The designated junction times are set. When compared to the regular allocated time, extended green times are occasionally necessary due to higher traffic density on one side of the intersection.The goal of the project is to create a dynamic traffic light system based on density. Upon detecting the volume of traffic at the intersection, the signal timing adjusts itself automatically. In many major cities throughout the world, traffic congestion is a serious issue that has turned commuting into a nightmare. Traditional traffic signal systems are based on a set time concept that is assigned to either side of the junction and cannot be changed to account for changes in traffic density. The designated junction times are set. When compared to the regular allocated time, extended green times are occasionally necessary due to higher traffic density on one side of the intersection. Keyword:-Machine Learning,Image Processing,Feature Extraction,Segmentation

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1. INTRODUCTION

In the past few decades, traffic congestion in the major cities has gotten significantly worse. The motorization of society and the widespread use of the automobile, which has raised the demand for transportation infrastructure, are particularly linked to congestion. But the availability of transport infrastructure has frequently lagged behind the expansion of mobility. Increased delays, vehicle operating expenses including fuel consumption, pollution emissions, and stress are all symptoms of traffic congestion concerns. This is especially true as traffic volumes get close to a road's capacity. More individuals than ever before are stuck in traffic jams around cities.When demand exceeds the capacity of the roads, traffic congestion results. There are various factors that contribute to congestion; the majority of them diminish the road's capacity at a certain location or over a specific distance, such as when people park on the road or when the number of vehicles increases. Traffic signals also contribute to traffic congestion. When there is little to no road traffic, the traffic light still displays the same traffic time, which causes other lanes' traffic to increase and cause traffic congestion. The ambulance, police vehicles, and fire trucks occasionally arrive at their destinations late due to this issue.

1.1. MOTIVATION OF THE PROJECT

Traffic management systems (TMS) based on machine learning have been presented as a solution to this issue. The suggested system focuses on keeping an eye on the moving vehicles to shorten the amount of time they spend at traffic lights, spot and prevent traffic jams, and offer them alternate route

1.2. Objectives

Make a system for detecting real-time traffic analysis.

Giving real-time traffic reports on congestion and unexpected traffic occurrences is the goal. The project's objective is to develop a dynamic traffic signal system based on density.

The signal timing automatically changes in response to the detected level of traffic at the intersection.

1. This study's focus is on a video surveillance system with three primary modules: segmentation, vehicle classification, and vehicle counting. The background subtraction used in the segmentation is done using the Codebooks technique. The purpose of this

stage is to specify the geographic areas of interest related to cars. Our method employs support vector machine after oriented gradient histograms to categorise automobiles according to kind. The final duty will be to count and track all the automobiles. The resilience of a video surveillance system is directly impacted by the presence of partial occlusion, which results in a drop in the accuracy of vehicle segmentation and classification. As a result, a novel approach based on the vehicle categorization process has been devised to tackle partial obstructions.

1.3. Problem statement

In recent decades, large cities have experienced a severe problem with traffic congestion. The spread of the automobile and the concomitant motorization are notably linked to congestion, which has raised the need for transportation infrastructure. The availability of transport infrastructure, however, has frequently been unable to keep up with the rise of mobility. The effects of vehicle interference in the traffic stream, particularly as traffic levels approach a road's capacity, include increased delay, vehicle operational costs like fuel consumption, pollutant emissions, and stress. In cities around the country, more people are sitting in traffic jams than ever before.When demand exceeds existing road capacity, traffic congestion results.There are various factors that contribute to congestion; the majority of them diminish the road's capacity at a certain location or over a specific distance, such as when people park on the road or when the number of vehicles increases. Traffic signals also contribute to traffic congestion. When there is little to no road traffic, the traffic light still displays the same traffic time, which causes other lanes' traffic to increase and cause traffic congestion. The ambulance, police vehicles, and fire trucks may arrive at their location late due to this issue.

2. LITERATURE REVIEW

2.1. Literature Review

- Paper Name:Deep Reinforcement Learning for Traffic Light Control in Vehicular Networks Author:Xiaoyuan Liang, Xusheng Du Description :This article looks into how traffic light duration can be calculated using data from multiple sensors and vehicle networks. We recommend a deep reinforcement learning model to manage the traffic light. We can represent the complex traffic scenario as states in the model by gathering data and partitioning the entire intersection into small grids. The timing variations of a traffic light are the activities, which are characterised as a high-dimension Markov decision process. The compensation is the total waiting time difference between two cycles. In order to solve the model, a convolutional neural network is employed to map the states to the rewards. The proposed model consists of a variety of components that will improve performance, such as a duelling network, a target network, a double Q-learning network, and prioritised experience replay. Through the use of a simulation in a vehicular network called Simulation of Urban MObility (SUMO), we put our model to the test. The simulation's outcomes show how well our model manages traffic signals.
- Paper Name:Perception of a Multi-Traffic Scene Based on Supervised Learning. Author:LISHENG JIN1, MEI CHEN 1, YUYING JIANG2, AND HAIPENG XIA1 Description :The vision driver assistance systems incorporated into this system are designed to operate in all weather conditions.Classification is a procedure used to determine the types of optical features that are present in order to improve the efficacy of vision improvement algorithms. To improve machine vision in bad weather, a multi-class weather classification system based on various weather variables and supervised learning is offered.The underlying visual features are first extracted from several traffic scene images, and the feature is then expressed as an eight-dimensional feature matrix. Second, five supervised learning techniques are used to train classifiers. According to the investigation, classifiers have a high rate of recognition accuracy and flexibility, and derived features are capable of effectively representing the image semantics. The recommended method lays the framework for enhancing anterior vehicle detection in varying evening lighting conditions and increasing the driver's field of view on a foggy day. and any new innovations of existing/researched related topic)
- Paper Name:Active Discriminative Dictionary Learning for Weather Recognition Author:Caixia Zheng, Fan Zhang,1 Huirong Hou, Chao Bi, Ming Zhang, and Baoxue Zhang Description :This study presents a novel method for distinguishing diverse weather situations. The suggested method is superior than other algorithms in the

following ways. First off, our method extracts both the physical characteristics of the nonsky region and the visual characteristics of the sky region in ages. Because some of the present approaches only consider the features of the sky region, the retrieved features are therefore more comprehensive. In contrast to earlier approaches that utilised conventional classifiers (such as SVM and K-NN), we use discriminative dictionary learning as the classification model for weather..It might solve the shortcomings of earlier works. In order to avoid using a large number of labelled samples to train the classification model in order to get good performance of weather recognition, the active learning approach is also added into dictionary learning. On two datasets, experiments and comparisons are run to confirm the efficacy of the suggested method.

- Paper Name: Semi-automatic road extraction from digital images Author:Hamid Reza Riahi Bakhtiari, Abolfazl Abdollahi, Hani Rezaeian

  Description :In order to extract several road types from high-resolution remote sensing photos, this research suggests a semi-automatic method. The strategy is based on the mathematical morphology method, SVM, and edge detection. To begin with, the road's outline is discovered using a Canny operator. The Full Lambda Schedule merging method is then used to join neighbouring segments. Support Vector Machine (SVM) and a number of spatial, spectral, and textural elements were then used to classify the entire image as a road image. The quality of found roadways is finally enhanced by morphological operators. The programme was rigorously evaluated on a range of satellite images from Worldview, QuickBird, and UltraCam aerial photography. The accuracy evaluation's findings show that the suggested road extraction approach can extract various road types with high accuracy.

- Paper Name:MonoSLAM: Real-Time Single Camera SLAM Author:Andrew J. Davison, Ian D. Reid, Member, IEEE, Nicholas D. Molton, and Olivier Stasse. Description:We propose a real-time approach to follow the 3D trajectory of a monocular camera moving swiftly in an unfamiliar scene. Structure from Motion approaches are unable to match the real-time, drift-free performance of our system, which we name MonoSLAM. It is the first time the SLAM technique from mobile robotics has been successfully applied to the "pure vision" area of a single uncontrolled camera. The method's main goal is to create a sparse yet durable map of natural landmarks using an online probabilistic framework. Some of our major novel contributions include improvements for monocular feature initialization and feature orientation estimation, an active technique of mapping and measuring, and the use of a general motion model for fluid camera movement.These elements combine to produce a very effective and dependable algorithm that runs at 30 Hz with common PC and camera hardware. This advancement opens up new possibilities in addition to expanding the variety of robotic systems for which SLAM is relevant. With a hand-held camera and real-time 3D localization and mapping for a high-performance full-size humanoid robot, we show how MonoSLAM may be used for live augmented reality.

- Paper Name:Text Detection and Recognition on Traffic Panels from Street-Level Imagery Using Visual Appearance Author:A´ lvaro Gonza´lez, Luis M. Bergasa.

  Description:-For a very long period, detection and recognition of traffic signs have been intensively investigated. Due to the variety of traffic panel types and the extremely variable information they convey, traffic panel detection and recognition is still a challenge in computer vision. The technology presented in this paper can be applied to intelligent transportation systems (ITS) to identify traffic panels in street-level photographs and identify the data they carry. The primary goal may be to automatically inventory all traffic panels along a route in order to support road maintenance efforts and to benefit drivers. After using blue and white colour segmentation, our proposal extracts local descriptors at several important interest sites. Images are represented as a ”bag of visual words” and then classified as such using Nave Bayes or support vector machines. Modern traffic panel detection technology employs a cutting-edge strategy known as visual appearance categorization. Our exclusive text detection and recognition approach is applied to those photos where a traffic panel has been found in order to automatically read and record the data provided in the traffic panels. We propose a somewhat dynamic dictionary-based language model for a restricted geographic area using a reverse geocoding service. The effectiveness of the suggested strategy is demonstrated by experimental results on actual Google Street View photographs, opening the door to the use of street-level images for various ITS applications.

- Each information should be properly sited.

2.2. Drawbacks of existing system

Training and data requirements: Implementing a machine learning-based traffic light management system necessitates a substantial amount of training data. This data needs to be collected and labeled, which can be a time-consuming and expensive process. Moreover, as traffic patterns evolve over time, the system may need to be retrained periodically to adapt to these changes, further increasing the data requirements.

Complexity and computational resources: Machine learning models used in traffic light management systems can be complex and computationally demanding. Deploying such models may require powerful hardware and infrastructure capable of handling real-time decision-making for multiple intersections simultaneously. This complexity can escalate the cost of implementation and maintenance.

Interpretability and transparency: Many machine learning algorithms, particularly deep neural networks, are often regarded as ”black boxes” due to their lack of interpretability. Understanding the decision-making process of these models can be challenging, making it difficult to explain or justify their actions. This lack of transparency may raise concerns, especially in critical systems like traffic management where the reasoning behind decisions is important.

Sensitivity to data quality and biases: Machine learning models are highly sensitive to the quality and representativeness of the training data. If the training data is biased or does not adequately capture the diversity of traffic patterns, the model's performance may be suboptimal or exhibit unfair behavior. For example, certain groups of road users may experience unequal distribution of green lights due to biases in the training data.

Adversarial attacks and system vulnerabilities: Machine learning models can be vulnerable to adversarial attacks, where malicious actors intentionally manipulate the system's inputs to disrupt traffic flow. By introducing perturbations or deceptive inputs, attackers can mislead the model and cause undesirable outcomes. Ensuring the robustness and security of the system against such attacks poses a significant challenge.

Lack of adaptability to unforeseen scenarios: Machine learning models are typically trained on historical data, which may not encompass all possible scenarios. When the system encounters situations that significantly differ from the training data, it may struggle to make accurate decisions. Adapting the system to handle previously unseen or uncommon traffic conditions can be challenging, as the model's ability to generalize beyond the training data is limited.

Dependency on continuous data input: Machine learning-based traffic light management systems rely on real-time data inputs such as traffic flow, pedestrian movement, and environmental conditions. If there are disruptions or delays in data collection or transmission, it can impact the system's performance and responsiveness. This dependency on continuous data can introduce vulnerabilities and risks if the data stream is interrupted or compromised.

Considering these drawbacks is crucial when evaluating the implementation of a machine learning-based traffic light management system. Hybrid approaches that combine machine learning with traditional traffic control techniques can often mitigate some of these limitations by incorporating the interpretability and reliability of conventional methods while leveraging the predictive capabilities of machine learning.

2.3. Objective

The objective is to provide real-time traffic updates on traffic congestion and unusual traffic incidents. The goal of the project is to create a density-based dynamic traffic light system.

Create a real-time traffic analysis detecting system.

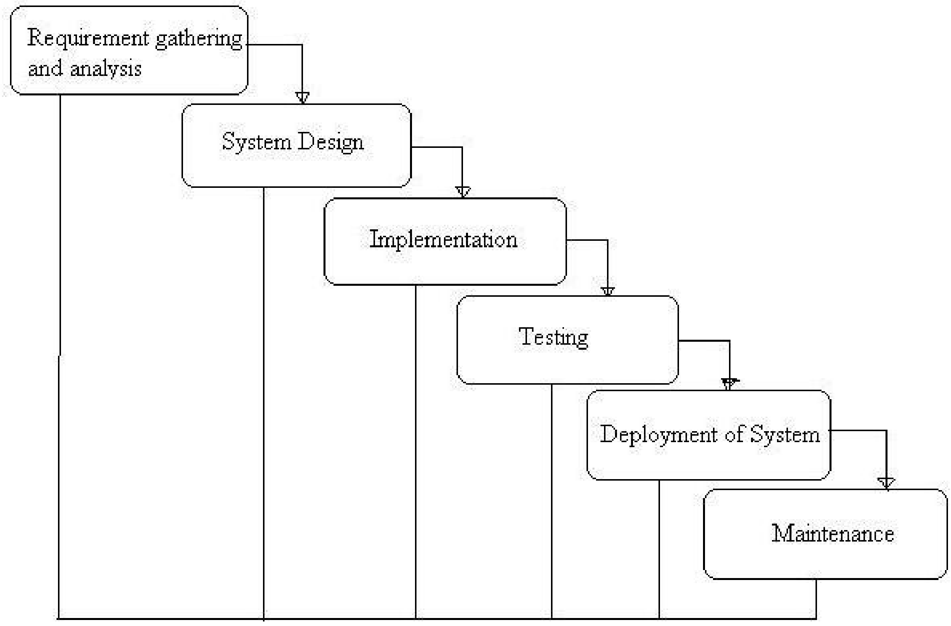
When the traffic intensity at the intersection is detected, the signal time adjusts automatically.

3. PROPOSED METHODOLOGY

3.1. PROPOSED METHODOLOGY

Gathering and analysing needs: In this waterfall step, we determine what requirements are necessary for our project, such as the necessary software and hardware, databases, and interfaces.

General Overview of "Waterfall Model"



System Design: In this phase of system design, we create a system that is user-friendly and simple to understand for end users. To comprehend the system flow, system module, and execution sequence, we construct several UML diagrams and data flow diagrams. Implementation: During the project's implementation phase, we put numerous modules into place that were necessary to achieve the desired results at the various module levels. The system is initially built in tiny programmes known as units with input from the system design, and is then combined in the following phase. Unit testing is the process of developing and evaluating each unit for functionality.

Testing: To determine whether the project module is delivering the anticipated outcomes within the estimated timeframe, the numerous test cases are executed. All the units produced during the implementation phase are assembled into a single system after each unit has been tested. After integration, the entire system is checked for flaws and defects. 5. System Deployment: The product is either released to customers or deployed in their environments following functional and non-functional testing. Six. Upkeep There are a few issues with the client environment. Patches are released to fix specific issues. Furthermore, updated versions of the product are released. Maintenance is done to bring about these modifications in the client's surroundings.

The"Waterfall Model" gets its name because the following phase doesn't begin until the prior phase's established set of goals have been met and it has been approved. Phases do not cross over in this model.

OUTCOME

In order to receive real-time notifications of the traffic situation, we may combine our system with a programme that examines official traffic signals. In the worst case, as soon as the console's results are shown on the websites, our system will be able to notify consumers of traffic-related incidents.

3.2. Testing

To determine whether the project module is delivering the anticipated outcomes within the estimated timeframe, the numerous test cases are executed. All the units produced during the implementation phase are assembled into a single system after each unit has been tested. After integration, the entire system is checked for flaws and defects. 5. System Deployment: The product is either released to customers or deployed in their environments following functional and non-functional testing. Six. Upkeep There are a few issues with the client environment. Patches are released to fix specific issues. Furthermore, updated versions of the product are released. Maintenance is done to bring about these modifications in the client's surroundings.

3.3. Risk Management

Risk Identification To reduce this risk, we are attempting to employ a complete and properly organised dataset. 2. Security - To combat and enhance security, we employ layered security, such as user access rights. Risk Recognition: 1. Have the project's top software and customer management made a formal commitment to support it? Answer: Not practicable. 2. Are the system's or product's intended users enthusiastically devoted to the project? Answer: Unknown at the moment. 3. Does the software engineering team and its clients have a thorough understanding of the requirements? Ans-Yes 4. Were consumers completely involved in the requirements definition process? Ans: Not relevant

Are end users' expectations reasonable? Ans: Not relevant 6. Is the team's skill mix appropriate for software engineering? Ans-yes Are the project's requirements consistent? Ans: Not relevant

8. Does the project team have enough members to complete the task? Answer: Not relevant 9. Do all customer/user constituencies concur on the project's significance and the specifications for the system/product to be developed? Ans: Not relevant

3.4. Management reporting and communication

Management reporting and communication For developing this project, first finalise the project topic after reviewing the multiple project topics. After that we gather the requirements about this project. Then we make the synopsis, SRS, PPT and report for sem1. For all above requirements, our team member and our guide discuss with each other. Every time we maintain all the details about whatever activities are performed by us.

3.5. Tools Used

Python is a popular interpreted, high-level, and general-purpose programming language. It was created by Guido van Rossum and was first released in 1991. Python's design philosophy emphasizes code readability, utilizing significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear and logical code for projects of all sizes.

One of Python's notable features is its dynamic typing and garbage collection. It supports multiple programming paradigms, including structured (procedural), object-oriented, and functional programming. Python is often referred to as a "batteries included" language due to its comprehensive standard library.

Python was developed in the late 1980s as a successor to the ABC language. The release of Python 2.0 in 2000 introduced new features such as list comprehensions and a garbage collection system with reference counting. A major revision, Python 3.0, was released in 2008. However, Python 3.0 was not completely backward-compatible, and as a result, much Python 2 code required modifications to run on Python 3.

The official discontinuation of Python 2 occurred in 2020, with the final release being Python 2.7.18. This marked the end of Python 2, and no further security patches or improvements were provided for it. From that point forward, Python 3.6.x and later versions are the only ones officially supported.

Python interpreters are available for various operating systems. The development of the CPython reference implementation, which is free and open-source, is managed by the Python Software Foundation. This organization oversees the resources and direction for both Python and CPython development.

Guido van Rossum conceived Python in the late 1980s at Centrum Wiskunde Informatica (CWI) in the Netherlands. The language was designed as a successor to the ABC language, with the ability to handle exceptions and interface with the Amoeba operating system. Implementation of Python began in December 1989. Guido van Rossum initially led the project as the sole developer until July 12, 2018, when he announced his decision to step down from his responsibilities as Python's Benevolent Dictator For Life. A steering council consisting of five members was elected to lead the project.

In addition to Python, there is also Anaconda, a free and open-source distribution of the Python and R programming languages. Anaconda simplifies package management and deployment, particularly for scientific computing, data science, machine learning applications, and large-scale data processing. Anaconda includes data science packages suitable for Windows, Linux, and macOS. It is developed and maintained by Anaconda, Inc., founded in 2012 by Peter Wang and Travis Oliphant.

Anaconda distribution, also known as Anaconda Individual Edition, comes with over 250 packages pre-installed. It utilizes conda as its package manager, which manages package versions and dependencies. Additionally, Anaconda includes Anaconda Navigator, a graphical user interface (GUI) for package and environment management. An alternative to Anaconda is Miniconda, a minimal version that includes only conda, Python, a few essential packages, and can be expanded with additional packages as needed.

AnaConda, the package manager used in Anaconda, differs from the pip package manager in how it manages package dependencies. anaconda tackles the challenge of managing dependencies in Python data science by ensuring compatibility and avoiding conflicts between packages. Unlike pip, which installs packages and their dependencies without checking for conflicts, conda considers the state of the existing installation and resolves dependency conflicts. This helps prevent issues where different packages require conflicting versions of dependent libraries.

Visual Studio Code, commonly known as VS Code, is a source code editor developed by Microsoft using the Electron Framework. It is available for Windows, Linux, and macOS operating systems. The editor offers a wide range of features designed to enhance developers' productivity.

Some of the notable features of Visual Studio Code include:

Editor: Visual Studio Code provides a multi-language editor environment. It includes a function/class browser, real-time code analysis tools (such as pyflakes, pylint, and pycodestyle), automatic code completion (using jedi and rope), and the ability to split the editor horizontally or vertically. It also allows users to navigate to the definition of a code element easily.

Interactive console: Developers can leverage the power of multiple IPython consoles within Visual Studio Code. These consoles offer full workspace and debugging support, providing a user-friendly graphical interface. Users can run their code line by line, execute individual cells, or execute an entire file. Visualizations and plots can be rendered directly in the output or in interactive windows.

Documentation viewer: With the integration of Sphinx, Visual Studio Code enables real-time rendering of documentation for classes or functions. Whether the documentation is external or user-created, developers can view it seamlessly within the editor or the console.

Visual Studio Code allows users to customize various aspects of the editor, including themes, keyboard shortcuts, and preferences. Additionally, it offers an extension marketplace where developers can find and install extensions to enhance the functionality of the editor.

By providing a rich set of features and extensibility options, Visual Studio Code aims to improve the coding experience and streamline the development workflow for programmers.

I hope this revision meets your requirements. Let me know if there is anything else I can help you with!

HARDWARE RESOURCES REQUIRED

System : Intel I5 Processor. Hard Disk : 500 GB. Ram : 8GB

Operating system : Windows 7 onwards Coding Language : Python IDE : pycharm Database : MySQL

3.6. Advantage & Disadvantage

3.7. Advantages

The key features of a traffic management system, depending on the city's size and the scope of governmental policies, can be integrated into an intelligent system. These features include:

Traffic Jam Detection: Utilizing cloud connectivity, sensors, and CCTV cameras, intersections can be continuously monitored in real-time from the city's traffic control room. This remote monitoring allows technicians to identify traffic congestion and take appropriate actions to alleviate it.

Connected Vehicles: By employing IoT technology, a smart traffic system can establish communication between intelligent vehicles and intersections through roadside tracking devices. This connectivity enables efficient traffic management and improves overall transportation effectiveness.

Modular Control: Real-time detection of congestion triggers dynamic adjustments in the traffic management system. This includes making on-the-fly changes to traffic lights, express lanes, and entry alarms to optimize traffic flow and reduce congestion.

Emergency Navigation: An advanced traffic management system with edge data processing and programmatic alerting capabilities can quickly identify car crashes or collisions. It can promptly alert response units such as the police, ambulance, and tow trucks, reducing the response time and ensuring timely assistance to injured drivers or passengers.

Road Safety Analytics: By utilizing pattern detection capabilities, the system can identify and flag instances of high cruising speeds, reckless driving, or inappropriate pedestrian behavior. This enables proactive measures to enhance road safety and enforce traffic regulations.

Digital Payments: Commercial traffic management systems can facilitate quick and secure electronic transactions in real-time. This feature allows for convenient payment options, such as toll fees or parking charges, ensuring smooth and efficient financial transactions while maintaining data security.

By incorporating these features, a traffic management system can significantly improve the efficiency, safety, and overall management of urban transportation. The utilization of advanced technologies and real-time data analysis enables prompt decision-making and enhances the overall traffic experience for both drivers and pedestrians.

3.8. Disadvantages

One major drawback of this system is the lack of guarantee for a timely response to specific hardware events. While careful coding can minimize the duration of interrupt disabling, it does not ensure precise timing for interrupt code execution. This limitation can be problematic in scenarios where strict timing requirements are necessary.

Another significant weakness is the potential complexity in adding new features to the system. As the system grows and more functionality is added, algorithms that require significant processing time must be carefully divided into smaller portions to ensure that only a small piece is executed during each iteration of the main loop. This decomposition process can increase the complexity of the system and make it more challenging to maintain and extend.

However, one strength of this system lies in its simplicity. For small software applications, where the main loop executes rapidly, the lack of predictability in timing may not be a critical concern, and the system's simplicity can be advantageous.

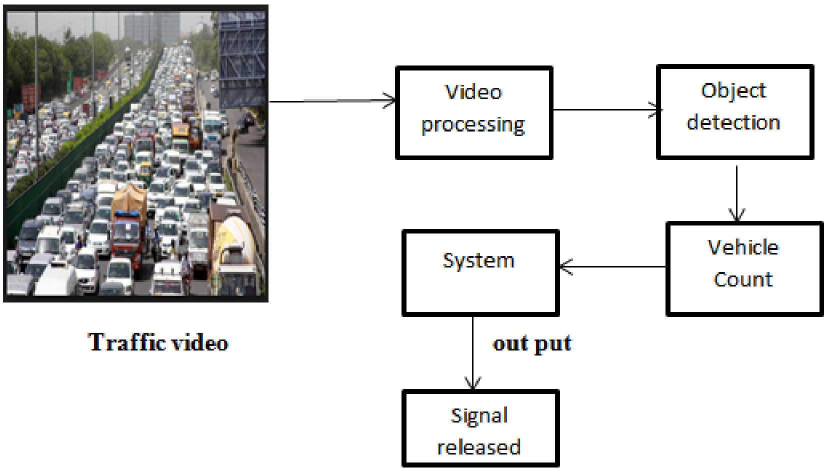
Additionally, this system guarantees that the software will run without relying on a complex operating system. By removing the dependency on an operating system, developers have full control over the behavior of the software and can eliminate potential issues caused by interactions with an operating system.

It's important to note that while this system offers simplicity and control, it may not be suitable for all types of applications. Depending on the specific requirements and constraints of a project, other systems or approaches that prioritize real-time response, predictability, and modularity may be more appropriate.

Overall, the trade-offs between simplicity, predictability, and extensibility should be carefully considered when choosing a system architecture for a particular software application.

4. ANALYSIS AND DESIGN

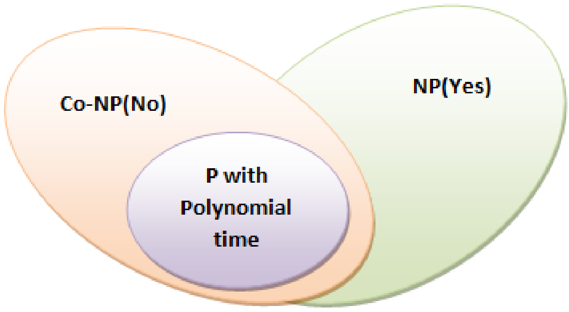
4.1. SYSTEM ARCHITECTURE



MySQL is a relational database management system (RDBMS) developed by Oracle that is based on structured query language (SQL). A database is a structured collec- tion of data. It may be anything from a simple shopping list to a picture gallery or a place to hold the vast amounts of information in a corporate network. In particular, a relational database is a digital store collecting data and organizing it according to the relational model. In this model, tables consist of rows and columns, and relationships between data elements all follow a strict logical structure. An RDBMS is simply the set of software tools used to actually implement, manage, and query such a database.

1. Design a real-time detection system for traffic analysis. 2. Signal Timing change as per the vehicle arrival. 3. Remove manual work when traffic arrived. 4. System tack self-decision to change signal time as per vehicle count on that particular lane. 5. To avoid traffic related problem like traffic jam,

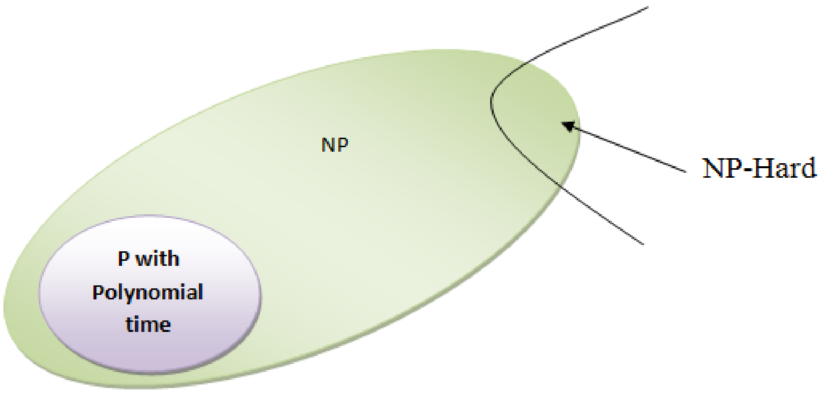
What is P? • P is set of all decision problems which can be solved in polyno- mial time by a deterministic. • Since it can be solved in polynomial time, it can be verified in polynomial time. • Therefore P is a subset of NP. P: We are motivated from the drawbacks of existing system. The existing techniques on is only detect the traffic but the proposed system releases the signal



as per the vehicle detection.

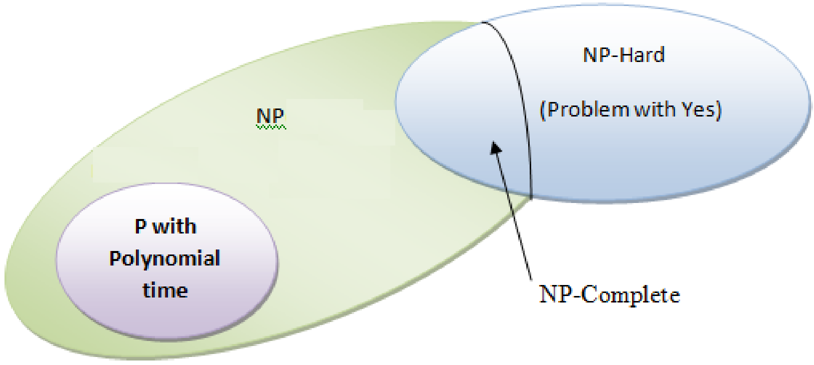
Describe NP. • ”NP” stands for ”we can break the usual rules of step-by-step computing and solve it in polynomial time.” NP Hard is what? If an algorithm for addressing a problem can be used to solve any NP-problem (nondeterministic polynomial time) problem, then the problem is NP-hard. Therefore, the term ”NP-hard” denotes ”at least as difficult as any NP-problem,” while it may actually be more difficult. Np-Hard: In many major cities throughout the world, traffic congestion is a serious issue that has turned commuting into a nightmare. Traditional traffic signal systems are based on a set time concept that is assigned to either side of the junction and cannot be adjusted to account for changes in traffic density. The designated junction times are set.Sometimes higher traffic density at one side of the junction demands longer

green time as compared to standard allotted time. The object detection in the traffic signal is processed and converted into simulator then its threshold is calculated based on which the contour has been drawn in order to calculate the number of vehicles present in the area. After calculating the number of vehicles we will came to know in which side the density is high based on which signals will be allotted for a particular side.



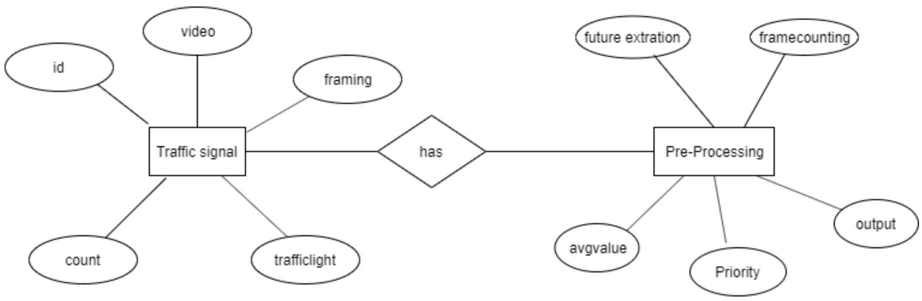
Describe NP-Complete. • Since this incredible ”N” computer is capable of performing any task that a standard computer can, we can infer that ”P” issues likewise exist in ”NP”. The simple issues are therefore in ”P” (and ”NP”), but the extremely complex ones are *only* in ”NP,” and are referred to as ”NP-complete.” It is comparable to asserting that there are things that People (”P”), Super People (”SP”), and *only* Super People (”SP-complete”) can do. NP-Complete: In many major cities throughout the world, traffic congestion is a serious issue that has turned commuting into a nightmare for residents of these areas.

The designated junction times are set. When compared to the regular allocated time, extended green times are occasionally necessary due to higher traffic density on one side of the intersection. Pattern-growth concepts in uncertain environments: Two different algorithms are created using the concepts of pattern-growth in uncertain environments to find all STP candidates with support values for each user. That offers a compromise between accuracy and effectiveness. The traffic signal's object detection is analysed, translated to a simulator, and then its threshold is determined.

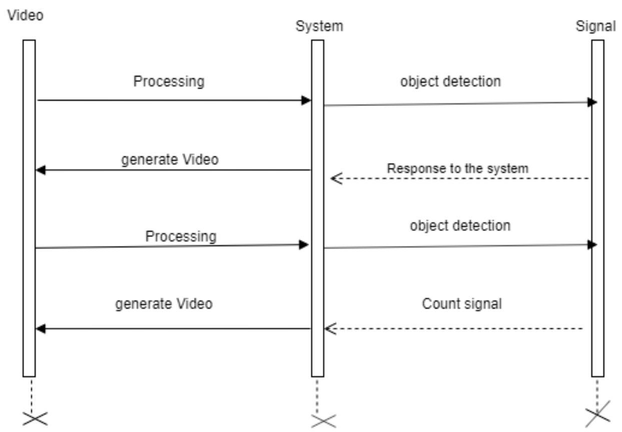


4.2. Subsection 1

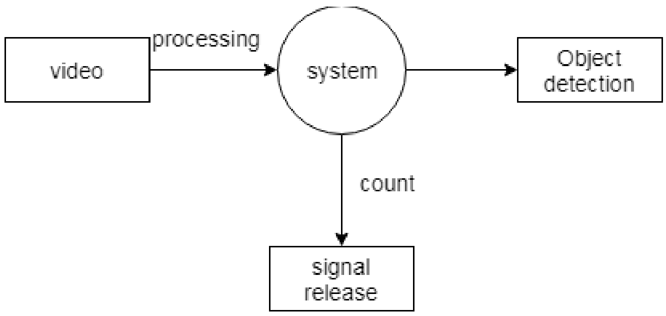
4.3. ER diagram (if applicable)

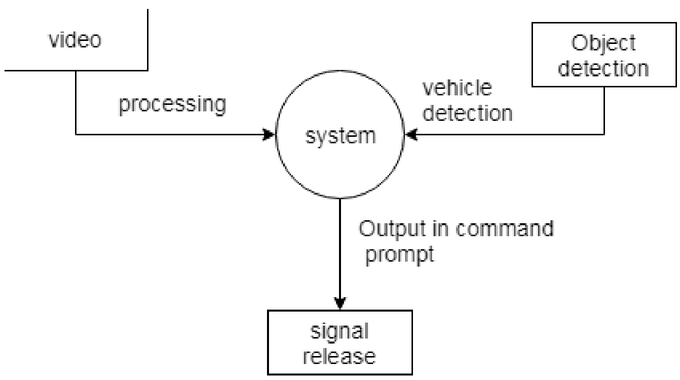


4.4. Class & Object Diagram



4.5. Data flow diagram

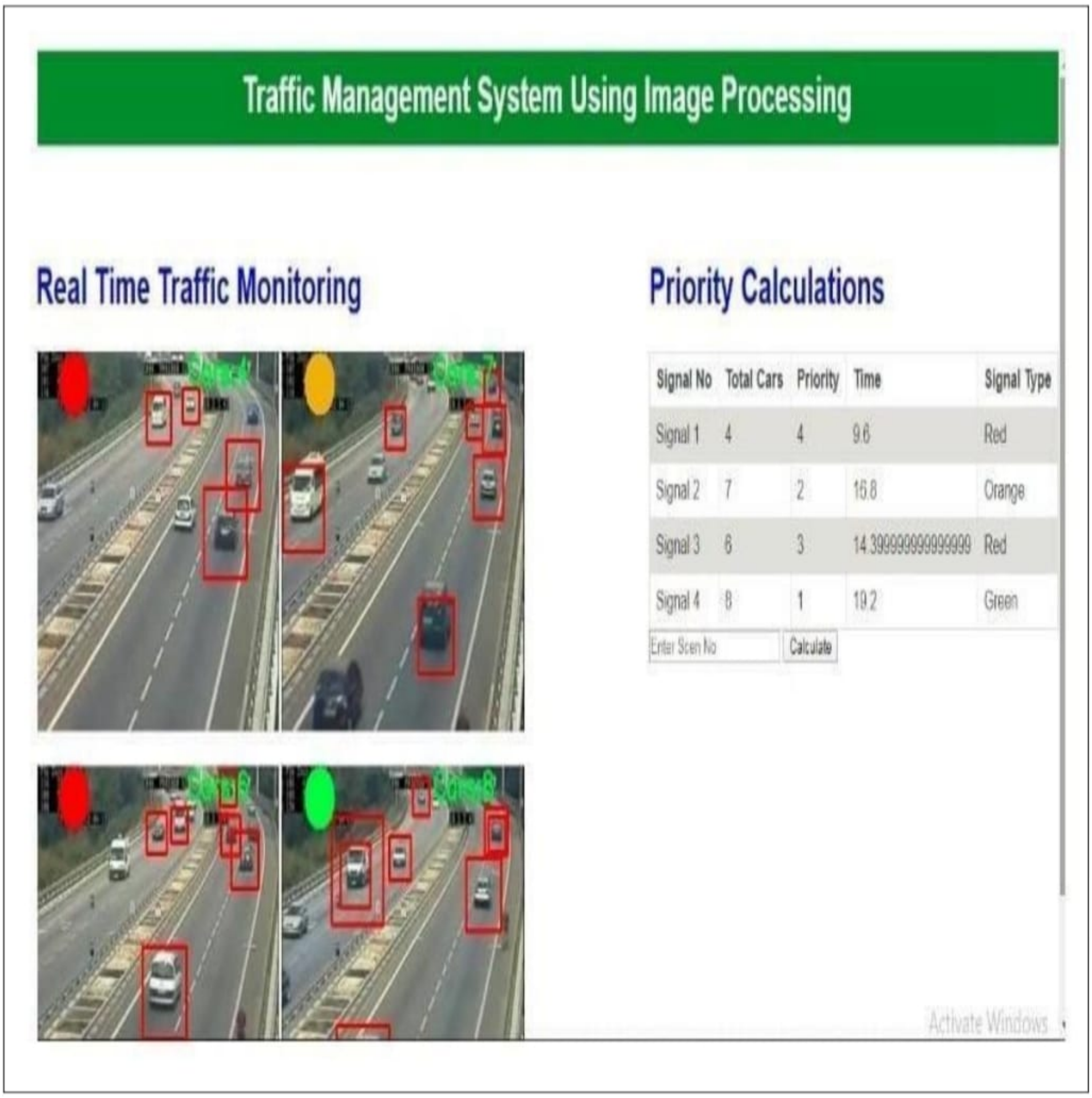




4.6. RELEVANT MATHEMATICS ASSOCIATED WITH THE PROJECT:

Let S be the Whole system S= I,P,O I-input P-procedure O-output Input(I) I= Traffic Video Where, Video -¿ Vehicle count Procedure (P), P=I, Using I System perform video processing, object detection after that system count vehicles and released signal. Output(O)- O=System released signal.

5. RESULTS AND DISCUSSIONS


Traffic Management System Using Image Processing
Real Time Traffic Monitoring
Priority Calculations
Signal No
Total Cars
Priority
Time
Signal Type
Signal 1
4
4
9.6
Red
Signal 2
7
2
16.8
Orange
Signal 3
6
3
14.399999999999
Red
Signal 4
8
1
19.2
Green
Enter Scen No
Calculate
Activate Windows

6. CONCLUSION

We may integrate our approach with a programme that monitors official traffic signals in order to record real-time alerts of traffic conditions. In the worst-case scenario, our system will be able to notify users of traffic-related events as the console displays the findings on the websites. In addition, we are investigating the feasibility of connecting our system with a more complex traffic sensor infrastructure. This infrastructure might include both sophisticated physical sensors and social sensors, such as social media feeds. Social sensors may provide low-cost extensive coverage of the road network, particularly in places lacking traditional traffic sensors (such as urban and suburban areas).

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