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Title **TRAFFIC PREDICTION FOR INTELLIGENT TRANSPORTATION SYSTEM**

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TRAFFIC PREDICTION FOR INTELLIGENT TRANSPORTATION SYSTEM

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Abstarct:

People in today's era usually have the tendency of using their own private vehicles for commutation rather than using public transit and this result in large number of private vehicles on road. It leads to traffic congestion at every roads. In such scenario one cannot restrict individual to limit the usage of their private vehicles but we can able to manage traffic flow in a way that it doesn't alleviate congestionissues. The traditional traffic management approach works efficiently only if the traffic is less, but if the density of vehicles on a particular side of road increases on one side than other side, this approach fails. Hence, we aim to redesign the traffic signal system from static switching to dynamic signal switching, which can perform instant-time signal monitoring and handling. There are many projects emerging in order to convert the current transport system of cities to 'Smart system', by introducing Intelligent Transport System. Many initiatives are taken to design a system that can perform instant monitoring of traffic signals i.e., the traffic signal switching time will depend on the count of vehicles on each side of the road instead of predefined switching time. The switching time of signal will be decided based on vehicle detection in day-today traffic scenarios with good accuracy. This practice can prove its effectiveness in releasing the congested traffic at an efficient and faster rate.

INTRODUCTION

Various Business sectors and government agencies and individual travellers require precise and appropriately traffic flow information. It helps the riders and drivers to make better travel judgement to alleviate traffific congestion, improve traffific operation effificiency, and reduce carbon emissions. The development and deployment of Intelligent Transportation System (ITSs) provide better accuracy for Traffific flflow prediction. It is deal with as a crucial element for the success of advanced traffific management systems, advanced public transportation systems, and traveller information systems.

The dependency of traffic flow is dependent on real-time traffic and historical data collected from various sensor sources, including inductive loops, radars, cameras, mobile Global Positioning System, crowd sourcing, social media. Traffic data is exploding due to the vast use of traditional sensors and new technologies, and we have entered the era of a large volume of data transportation. Transportation controland management are now becoming more data-driven.

However, there are already lots of traffific flflow prediction systems and models; most of them use shallow traffific models and are still somewhat failing due to the enormous dataset dimension. Recently, deep learning concepts attract many

persons involving academicians and industrialist due to their ability to deal with classifification problems, understanding of natural language,dimensionality reduction, detection of objects, motion modelling. DL uses multi-layer concepts of neural networks to mining the inherent properties in data from the lowest level to the highest level.

They can identify massive volumes of structure in the data, which eventually helps us to visualize and make meaningful inferences from the data. Most of the ITS departments and researches in this area are also concerned about developing an autonomous vehicle, which can make transportation systems much economical and reduce the risk of lives. Also, saving time is the integrative benefifit of this idea. In current decades the lots of attention have made towards the safe automatic driving. It is necessary that the information will be provided in time through driver assistance system (DAS), autonomous vehicles (AV)and Traffific Sign Recognition (TSR) .

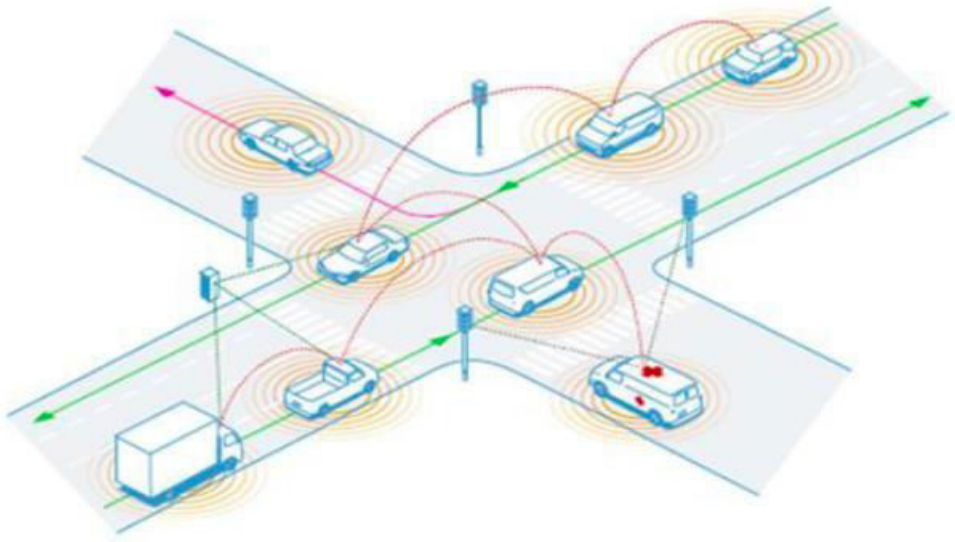


Fig. 1. Intelligent Transportation SystemAlthough already many

Although already many algorithms have been developed for predicting the traffific flow information. But these algorithms are not accurate since Traffific Flow involves data having a vast dimension, so it is not very easy to predict accurate traffific flow information with less complexity. We intend to use Genetic, Deep Learning , Image Processing, Machine Learning and also Soft Computing algorithms for prediction of traffific flflow since a lot of journals and research paper suggests that they work well when it comes to Big-Data.

LITERATURE SURVEY:

Intelligent Transportation system (ITS) is adopted in world congress held in Paris, 1994. the ITS has used the application of computer,electronics, and communication technology to provide traveller information to increase the safety and effifiiciency of the road transportation systems. The main advantage of ITS is to provide a smooth and safe movement of road transportation. It's also helpful in the perspective of environmentfriendliness to reduce carbon emission. It provides many opportunities for automotive or automobile industries to enhance the safety and security of their travellers.

Irrespective of vehicles increases on roads, the traffific also increases. And the available road network capacity is not feasible to handle this heavy load. There

are two possible approaches to resolve this issue. The fifirst one is to make
new roads and new highway lanes for the smooth functioning of vehicles. It requires extra lands and also the extensive infrastructure to maintain it, and due to this, the cost of expenditure also high. Sometimes many problems came into the network like in the urban area. This land facility is not available for the expansion of the roads and lanes. The second approach uses some control strategies to use the existing
road network effificiently. By using these control strategies, the expenditure also reduces, and it is cost-effective models for the government or the traffific managers. In this control, strategies identify the potential congestions on the roads, and it directed to the passengers to take some alternative routes to their destinations.
Deep learning is a part of machine learning algorithms, and it is a compelling tool to handle a large amount of data. DL provides a method to add intelligencies in the wireless network with complex radio data and large- scale topology. In DL, use concepts of a neural network, by using this feature, it is benefificial to fifind network
dynamics (such as spectrum availability, congestion points, hotspots, traffic bottleneck.
The travel time is the essential aspect in ITS and the exact travel time forecasting also is very challenging to the development of ITS. Support VectorMachine (SVM) is one of the most effective classififiers among those which are sort of linear. It is
advantageous to prevent overfifitting of data. SVM is great for relatively small datasets with fewer outliers. Another algorithm (Random Forest, Deep Neural Network, etc.) require more data but always came up with very robust models. SVM support linear and nonlinear regression that we can refer to as support vector regression, instead of trying to fifit the most signifificant possible roads between two classes while limiting margin violation. Support Vector Regression (SVR) tries tofifit as many instances as possible on the road while limiting margin violations.

Existing System

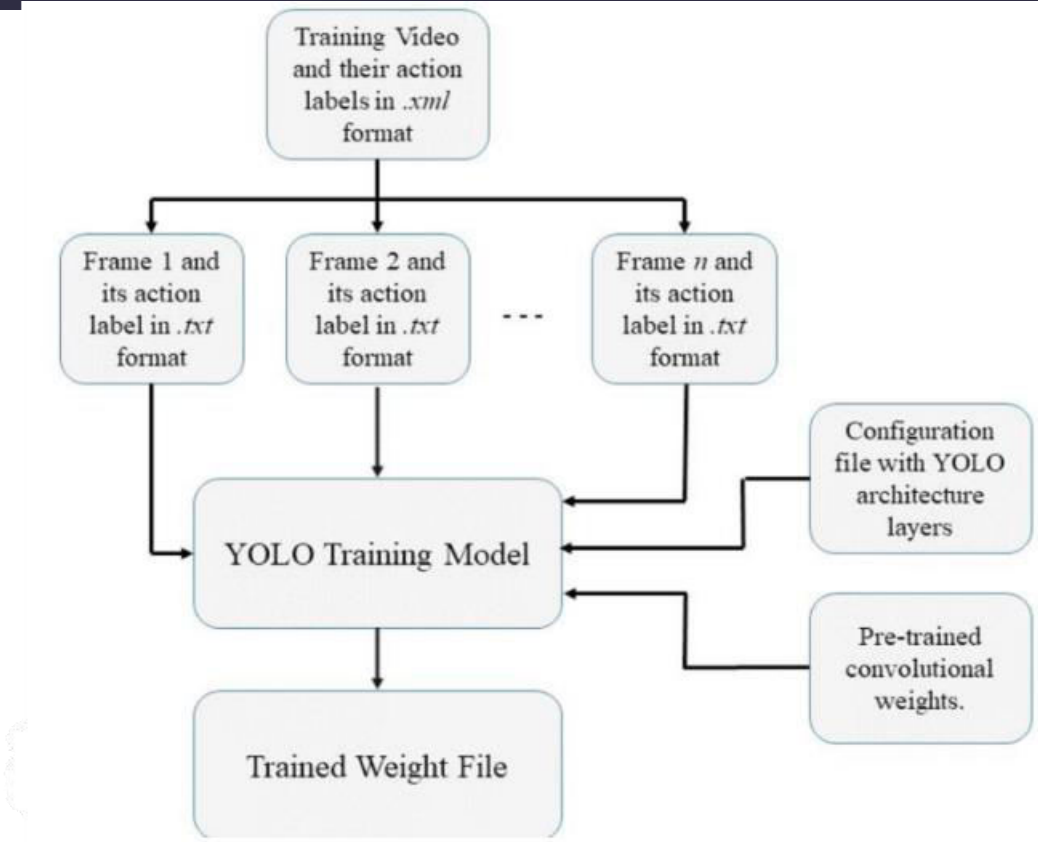
With the highly rising traffic congestion all around the world, and it's management by traditional approach are not efficient for smooth commutation purpose hence there is a need to come up with a solution which can be globally accepted and would lead for the better management of traffic. In today's world where technology has transcended all barriers it has now become easy to solve most human problems and one of these problems include Traffic Congestion.
Traffic congestion has increased drastically over the years and has had negative impacts that include road rage, accidents, air pollution, wastage of fuel and most importantly unnecessary delays. The fact that encouraged proposing new solution is that in many cities of the world, the traffic signal allocation is still based on timer. The Timer Approach has a drawback that even when there is a less traffic in one
of the roads, green signal is still allocated to the road till its timer value falls to 0, whereas the traffic on another road is comparably more faces red signal at that time. This causes congestion and time loss to commutators. Most of the present systems are not automated and are prone to human errors. There are many projects emerging in
order to convert the current transport system of cities to 'Smart system' and there are many initiatives under this, one of this is Intelligent Transport System. Many initiatives were taken to design a system that can perform real-time monitoring of traffic signals i.e., the traffic signal switching time will not be predefined one, instead the switching time will depend on the count of vehicles on each side of the road.

Proposed System:

Our aim is to design and develop a machine learning model to handle the traffic signal switching by depicting the number of vehicles present in a road along with detection of different types of vehicles present in the road. The proposed system helps to develop a solution that analyses the presence of vehicles on the road and handles the traffic congestion issues, resulting in a better managed, more coordinated and smarter use of traffic networks. This can be done using the analysis of vehicle count data obtained from source like CCTV Cameras present in highways or in traffic signals, using a trained machine learning model called **YOLO**. YOLO is an OpenCV based machine learning model which does the Object Detection and counts the number of vehicles in a lane. The recorded data is then sent into the predefined python program where the machine learning model is already written and based on the obtained vehicle count data – we can dynamically switch the signal among the lanes. Thereby, round the clock safety and hassle-free traffic management can be obtained using Proposed Intelligent Traffic Management System. Implementation of our project will eliminate the need for traffic personnel at various junctions for regulating traffic. Thus, the use of this technology is valuable for the analysis and performance improvement of road traffic. Also, priority to emergency vehicles has been the topic of some research in the past which can be enabled with further training of our machine learning of our model.

METHODOLOGY:

In this section, some relevant algorithms in traffic flow detection are reviewed that involve the background of YOLO and DeepSORT. In addition, we also describe our corresponding improvements to the original YOLO and DeepSORT to make them work well on the edge device. A. YOLO Object Detection The You Only Look Once (YOLO) object-detection algorithm is an end-to-end state-of-the-art deep-learning approach that does not use region proposals. It was proposed by Joseph Redmon et al. in 2016. The main idea of YOLO [37] is as follows. The algorithm regards object detection as a regression problem. It directly obtains the border of the target and the probability of the category from the image pixel information [38]. The input images just pass through the neural network once, as its name implies (You Only Look Once). Then, the network outputs the detected bounding boxes and class probabilities in the prediction.



Flowchart of training of YOLO

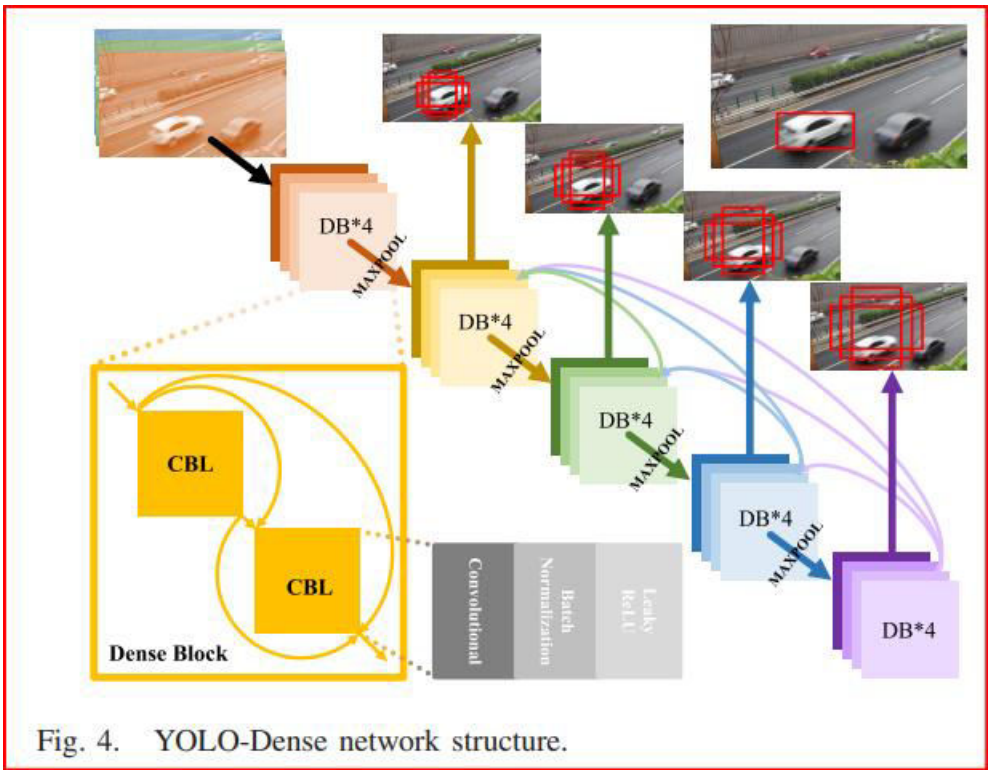


Fig. 4. YOLO-Dense network structure.

UML DIAGRAMS:

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modeling language.
5. Encourage the growth of tools market.
6. Integrate best practices.

Class diagram:

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.

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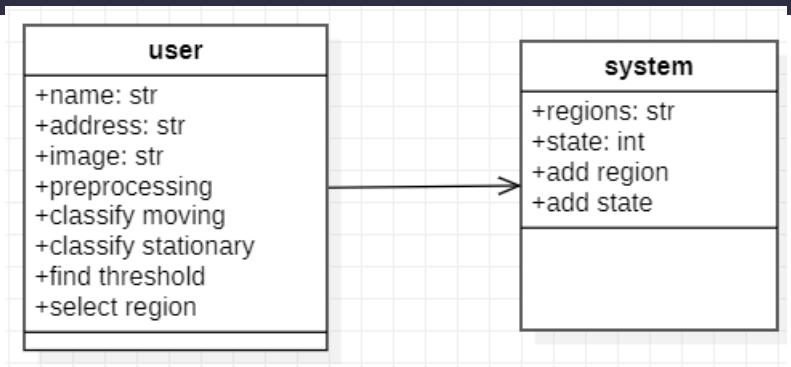
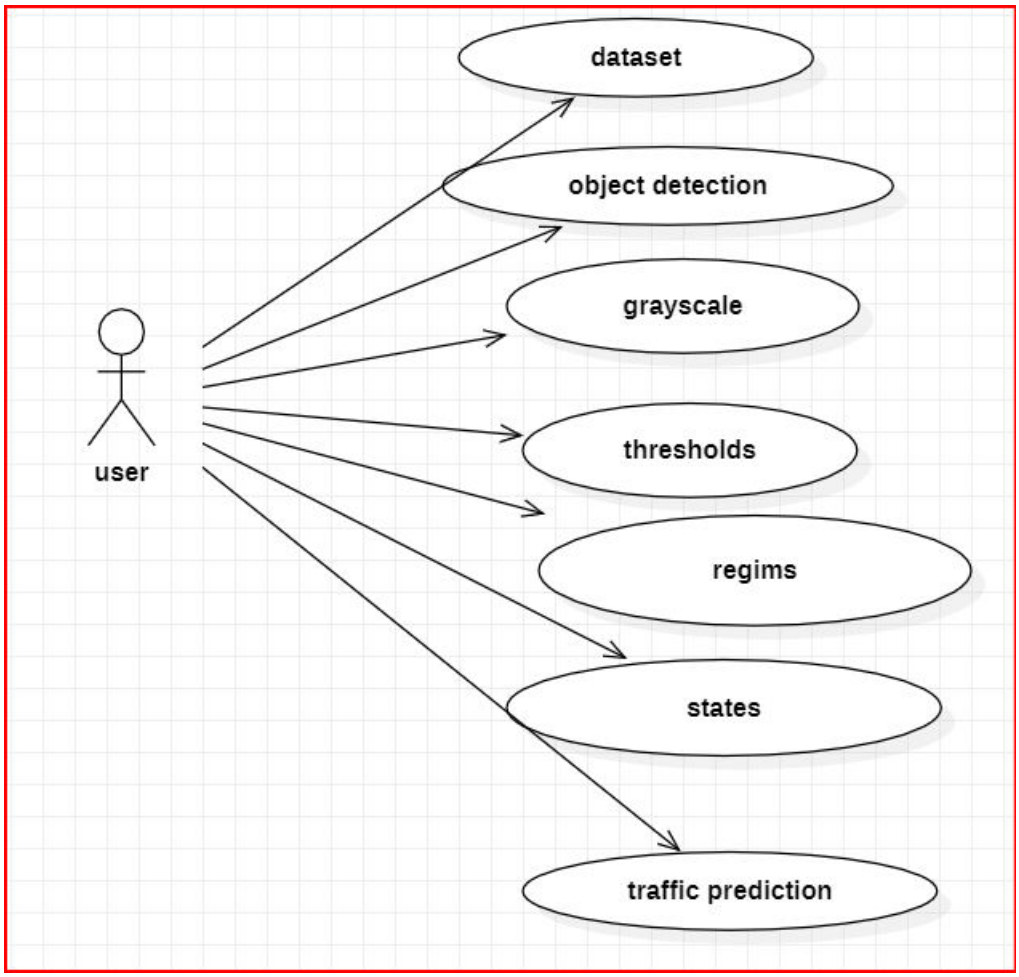


Usecase diagram:

A use case diagram in the Unified Modeling Language (UML) is atype of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



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Sequence diagram:

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams

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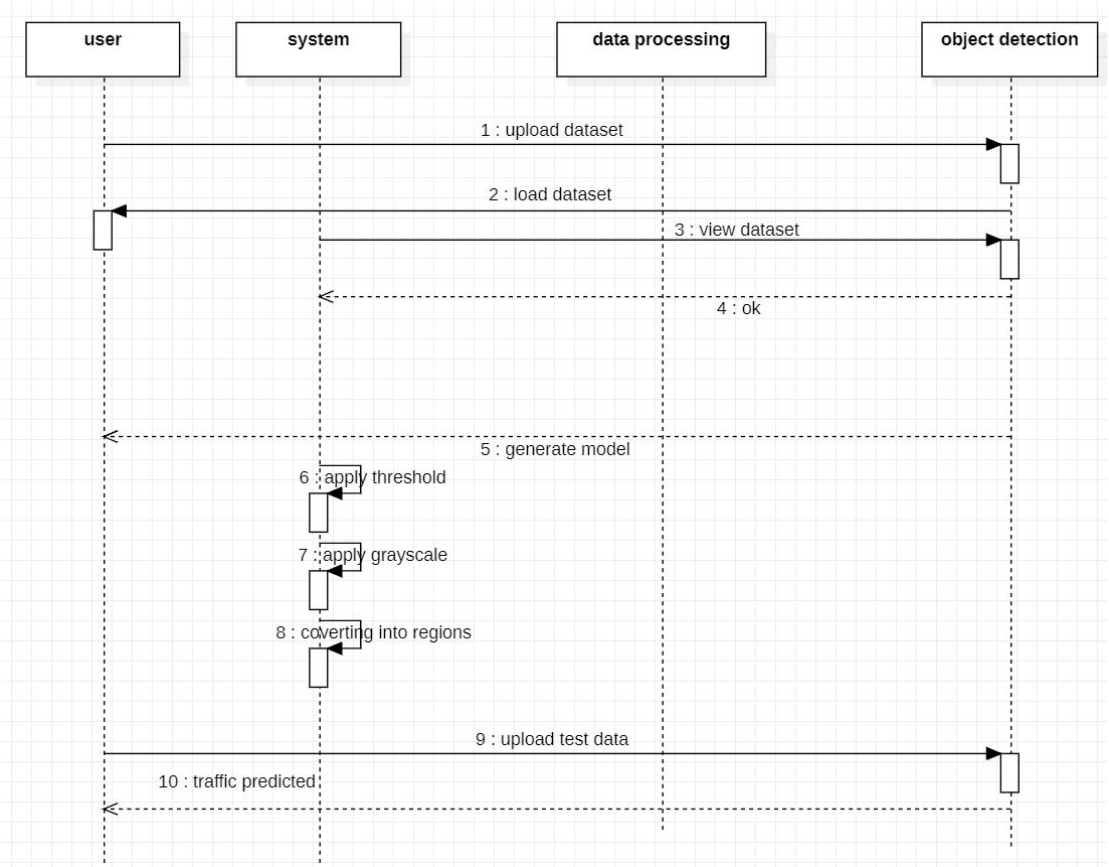
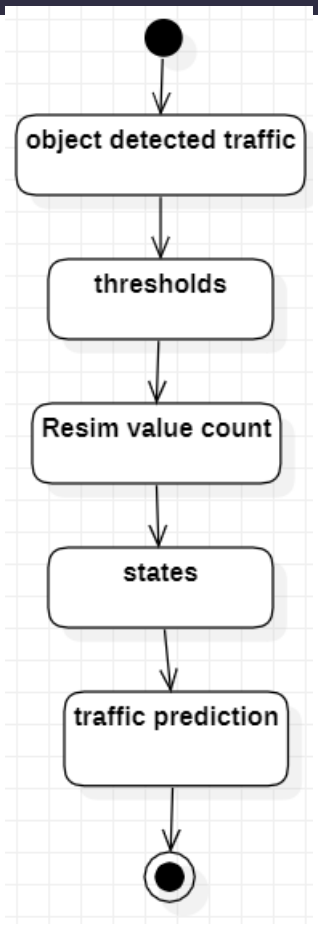
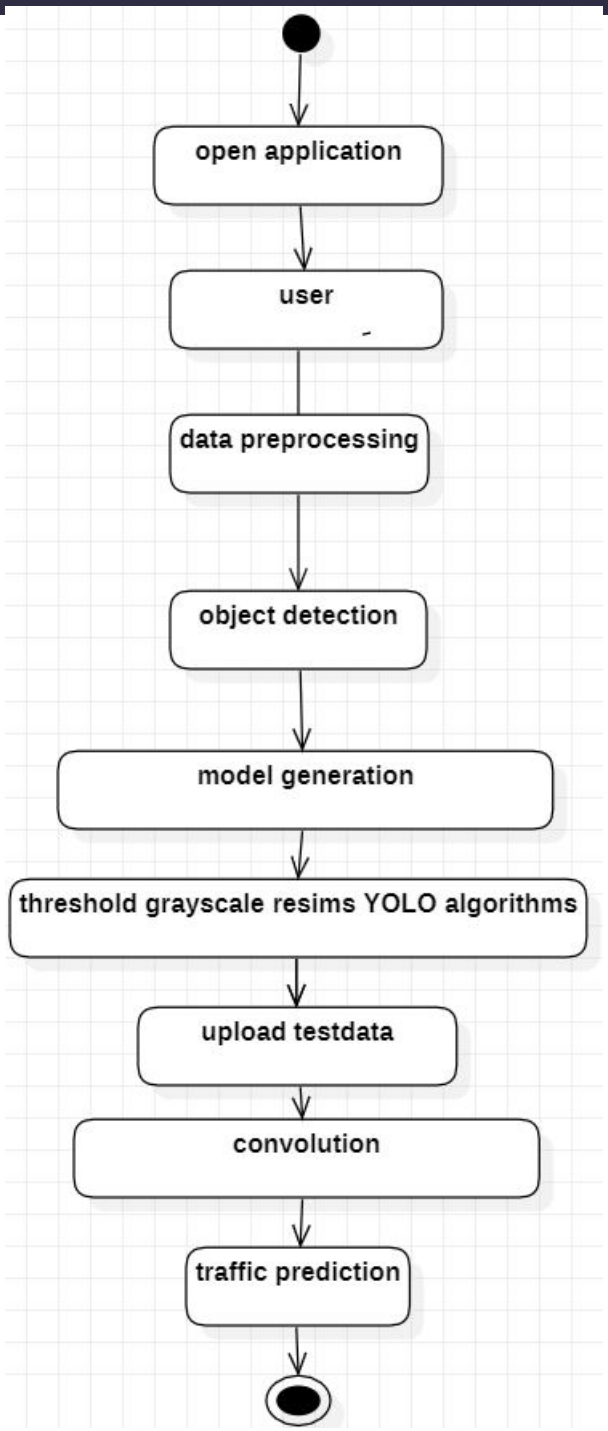


ACTIVITY DIAGRAM:

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.



Statechart diagram:



Component diagram:

The component diagram represents the high-level parts that make up the system.This diagram depicts,at a high level, what components from part of the system and they are interelated. A component diagram depicts the components culled after the system has undergone thye development or construction phase
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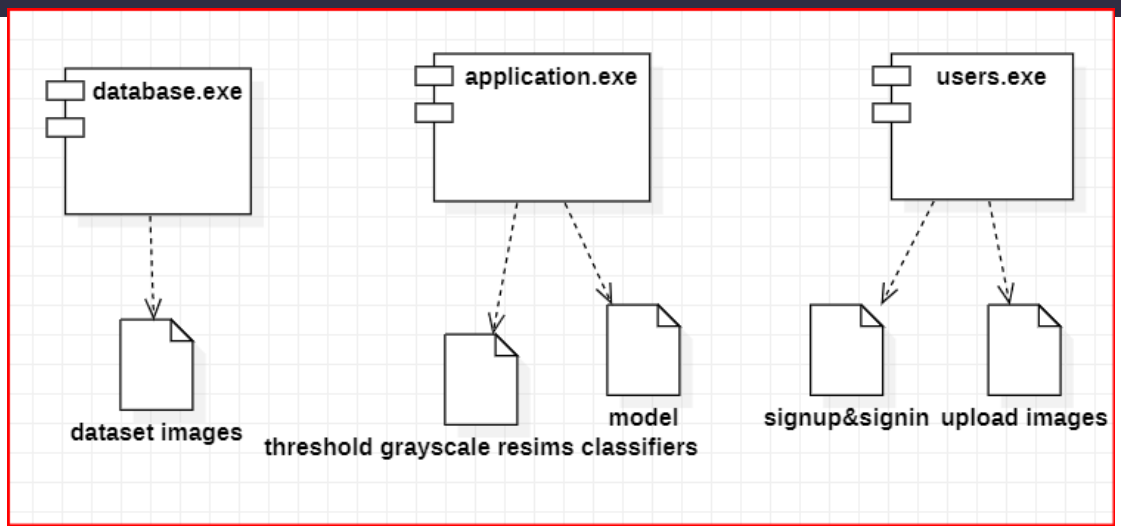
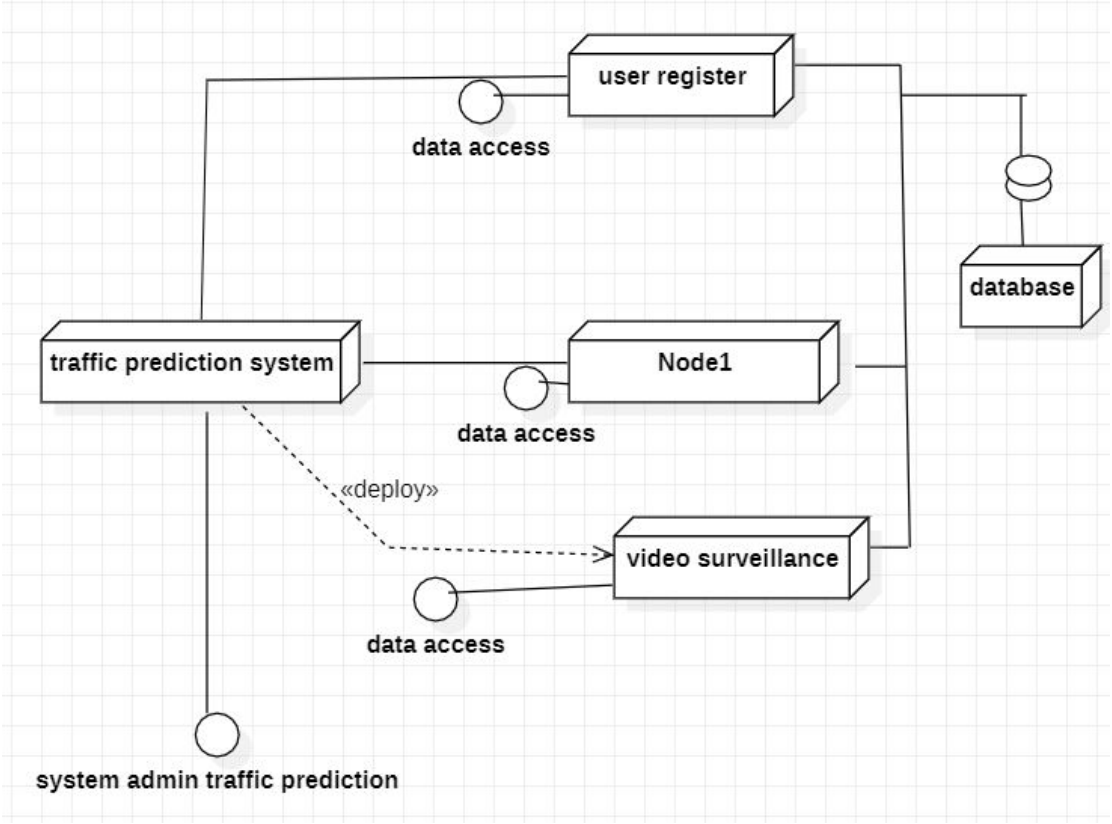


Deployment diagram:



SYSTEM TEST

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software

system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

TYPES OF TESTS

Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

Systems/Procedures : interfacing systems or procedures must be invoked.

White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot "see" into it. The test provides inputs and responds to outputs without considering how the software works.

Unit Testing

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and

requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

CONCLUSION:

Although deep learning and genetic algorithm is an important problem in data analysis, it has not been dealt with extensively by the ML community. The proposed algorithm gives higher accuracy than the existing algorithms also, It improves the complexity issues throughout the dataset. Also we have planned to integrate the web server and the application. Also the things algorithms will be further improved to much more higher accuracy.

REFERENCES:

[1] Fei-Yue Wang et al. Parallel control and management for intelligent transportation systems: Concepts, architectures, and applications. *IEEE Transactions on Intelligent Transportation Systems*, 2010.

[2] Yongchang Ma, Mashrur Chowdhury, Mansoureh Jeihani, and Ryan Fries. Accelerated incident detection across transportation networks using vehicle kinetics and support vector machine in cooperation with infrastructure agents. *IET intelligent transport systems*, 4(4):328–337, 2010.

3] Rutger Claes, Tom Holvoet, and Danny Weyns. A decentralized approach for anticipatory vehicle routing using delegate multiagent systems. *IEEE Transactions on Intelligent Transportation Systems*, 12(2):364–373, 2011.

[4] Mehul Mahrishi and Sudha Morwal. Index point detection and semantic indexing of videos - acomparative review. *Advances in Intelligent Systems and Computing, Springer*, 2020.

[5] Joseph D Crabtree and Nikiforos Stamatiadis. Dedicated shortrange communications technology for freeway incident detection: Performance assessment based on traffific simulation data. *Transportation Research Record*, 2000(1):59–69, 2007. [6] H Qi, RL Cheu, and DH Lee. Freeway incident detection using kinematic data from probe vehicles. In *9th World Congress on Intelligent Transport SystemsITS America, ITS Japan, ERTICO (Intelligent Transport Systems and Services-Europe)*, 2002.

[7] Z. Zhao, W. Chen, X. Wu, P. C. Y. Chen, and J. Liu. Lstm network: a deep learning approach for short-term traffific forecast. *IET Intelligent Transport Systems*, 11(2):68–75, 2017.

[8] C. Zhang, P. Patras, and H. Haddadi. Deep learning in mobile and wireless networking: A survey. *IEEE Communications Surveys Tutorials*, 21(3):2224–2287, thirdquarter 2019.

[9] Chun-Hsin Wu, Jan-Ming Ho, and D. T. Lee. Travel-time prediction with support vector regression. *IEEE Transactions on Intelligent Transportation Systems*, 5(4):276– 281, Dec 2004.

[10] Yan-Yan Song and LU Ying. Decision tree methods: applications for classifification and prediction. *Shanghai archives of psychiatry*, 27(2):130, 2015.