DEPARTMENT OF APEX INSTITUTE OF TECHNOLOGY

# PROJECT PROPOSAL

## 1. Project Title: - Traffic Flow Prediction

## 2. Project Scope: -

* With the increasing number of resident cars, the resulting road traffic congestion has become the focus of close attention[1]
* The rapid growth of population and vehicles originated several other problems (time spent in traffic, health issues related to stress, increase in fuel consumption, air and noise pollution and the number of accidents) creating an urgent need for intelligent vehicular systems that can efficiently manage and control traffic[2]
* ITS(Intelligent Transportation System)encompasses various components, including traffic forecasting (or estimation), optimization techniques, and real-time information dissemination to improve traffic conditions and minimize travel delays[3]
* The project aims to improve the spatial and temporal resolution of traffic flow predictions.
* This involves fine-tuning the models to capture intricate patterns and fluctuations in traffic flow at specific locations and times throughout the day.
* The project seeks to enhance the scalability and adaptability of the predictive models.
* As urban environments are dynamic and subject to constant changes, the ability to quickly adapt to new data and evolving conditions is crucial.
* By employing scalable machine learning algorithms and agile development methodologies, the project aims to build a flexible framework that can accommodate diverse urban landscapes and future technological advancements.
* The role of the vehicular traffic flow prediction system to ITS is to provide punctual continuous and precise road status information based on road condition (such as vehicular traffic flow trends and volume), which is the key to traffic control on road and resource integration for vehicular cloud.[4]
* Overall, the Traffic Flow Prediction project aspires to revolutionize urban transportation management by providing actionable insights and decision support tools to transportation authorities, city planners, and commuters alike.
* Through the development of advanced predictive models, the project aims to mitigate traffic congestion, reduce travel times, and ultimately improve the quality of life in urban areas.

## 3. Problem Formulation: -

* The difficulty with implementing a vehicular traffic flow prediction system into ITS can be divided into the following three parts: accuracy, efficiency, and on-line prediction.
* The existing literature encompasses numerous studies focusing on traffic flow estimation, prediction, and classification, with researchers striving to develop enhanced control strategies to mitigate the escalating traffic issues of the past few decades[5][6]
* Traffic flow represents the number of vehicles passing through a reference point per unit of time, while traffic density refers to the number of vehicles in a specific road section at a given moment. Mean speed indicates the average speed of vehicles in a particular road section[7]

## 4. Objectives of the Work: -

* This paper provides a comprehensive understanding of the whole process involved in traffic prediction and classification.
* This encompasses the data types used for traffic prediction and classification, data preprocessing techniques, prediction methods such as parametric models, deep learning models, and genetic programming, as well as classification models including clustering and classification approaches. [9]
* Furthermore, we discuss the evaluation metrics employed to assess the performance of prediction and classification models. By adopting a broader perspective, the present study fills a gap in the existing literature that mainly focuses on specific model types.[10]
* To overcome the above difficulties, we provide a new hybrid prediction model with parallel training strategy. [11]

## 5. References: -

1. R. More, A. Mugal, S. Rajgure, R.B. Adhao, V.K. Pachghare

Road traffic prediction and congestion control using artificial neural networks

2) B. Priambodo, A. Ahmad

Traffic flow prediction model based on neighbouring roads using neural network and multiple regression

3) A. Sinha, R. Puri, U. Balyan, R. Gupta, A. Verma

Sustainable time series model for vehicular traffic trends prediction in metropolitan network

4) Azzedine Boukerche, Jiahao Wang

A performance modeling and analysis of a novel vehicular traffic flow prediction system using a hybrid machine learning-based model

5) Z. Wang, P. Thulasiraman, R. Thulasiram

A dynamic traffic awareness system for urban driving

6) R. de Medrano, J.L. Aznarte

A spatio-temporal attention-based spot-forecasting framework for urban traffic prediction

7) J. Mena-Oreja, J. Gozalvez

On the impact of floating car data and data fusion on the prediction of the traffic density, flow and speed using an error recurrent convolutional neural network

8) L.N. Do et al.

An effective spatial-temporal attention based neural network for traffic flow prediction

9) Regional traffic flow combination prediction model considering virtual space of the road network

Yue Hou, Di Zhang, Da Li, Zhiyuan Deng

10) A performance modeling and analysis of a novel vehicular traffic flow prediction system using a hybrid machine learning-based model

Azzedine Boukerche, Jiahao Wang

11) N.G. Polson et al.

Deep learning for short-term traffic flow prediction

## 6. Requirements: -

* Hardware Requirements

1. Servers and Storage
2. Workstations
3. Strong Networking

* Software Requirements

1. Various Management systems such as software Management, Record Management, Billing, workflow etc.

2. Mobile Application

3. Tools for Analysis and Predictions.

**STUDENTS DETAILS**

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**APPROVAL AND AUTHORITY TO PROCEED**

We approve the project as described above, and authorize the team to proceed.

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| **Name** | **Title** | **Signature**  **(With Date)** |
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