Air Quality Tracking and Traffic Flow Prediction in Cities

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ABSTRACT: Traffic flow forecasting is one of the most important use cases related to smart cities. In addition to assisting traffic management authorities, traffic forecasting can help drivers to choose the best path to their destinations. Accurate traffic forecasting is a basic requirement for traffic management. We propose a traffic forecasting approach that utilizes air pollution and atmospheric parameters. After collecting, it presents an ambient air quality monitoring and prediction system. The system consists of several distributed monitoring stations that communicate wirelessly to a backend server using machine-to-machine communication protocol. Each station is equipped with gas- eous and meteorological sensors as well as data logging and wireless communication capabilities. The backend server collects real time data from the stations and converts it into information delivered to users through web portals and mobile applications. We also collect real time Air Quality Index is using real time API in different area of smart city and show the pollution of that city.Suggesting path to travel from current place to that particular place on the map. The system designs common process of traffic organization and management for different large special events The experimental results show that the model proposed in this paper can achieve better performance than the performances of other benchmarks.

KEYWORDS: K-Nearest Neighbors (KNN), Traffic Prediction, Pollution, Route, Air Quality Index, Cities.

I. INTRODUCTION

Industry is growing rapidly these days; the greatest problem for any nation would be the environmental protection. Industries and vehicles which are producing poisonous gases are creating challenges. Predicting the presence and density of harmful gases, finding the right predictive value, and raising notifications in real-time are the biggest challenges. Importance of finding such solution derives from the current problems faced by the smart city road traffic, such as congestions, pollution, security issues. In this respect, the term 'traffic management' involves all measures which control the flow (speed and volume) of traffic. They usually aim to reduce traffic congestion and inefficiency of flow and hence have a knock-on effect in some way on vehicle emissions. When evaluating the air quality impacts of traffic management, the temporal variability of the data in response to changing emissions will determine the necessary measurements needed in time. We can analysis on traffic data, after analyzing find out traffic areas in smart cities. We also analyses the air quality of particular area. Then we can also predict how much traffic increase in next few days or year and how to control them and also find out air quality monitoring system different area in smart city as well as system shows less traffic and less air quality shortest distance of route on map . We also avoid going in particular area for at time of large special events.

II. PROBLEM DEFINITION

Traffic flow is most popular issue in current days because, In cities traffic flow is more as compare to other urban city area as well as other rural area so traffic. Importance of finding a solution derives from the current problems faced by the urban road traffic, such as congestions, pollution. Also there is no control of management of increasing traffic flow on the basis of traffic and pollution.

III. GOAL AND OBJECTIVE

Goal :-
- The main goal of this project is traffic flow prediction and air quality monitoring in the smart city.

Objective :-
- View Future traffic
- View Air Quality of different place
- Recommendation of route
- View Cameras file

IV. LITERATURE SURVEY

Weitiao Wu et.al[1] states the improvement of traffic location innovation, ongoing exploration is coordinated to another age of sign control framework bolstered by new traffic information. One of these bearings is dynamic prescient control by joining momentary expectation ability. This system centers on examining of dynamic company scattering models which could catch the inconstancy of traffic stream in a cross-sectional traffic identification condition. The dynamic models are applied to foresee the development of traffic stream, and further used to deliver sign planning plans that record not just for the present condition of the framework yet additionally for the normal transient changes in rush hour gridlock streams. We explore variables influencing model exactness including time-zone length, position of upstream traffic identification gear, street segment length, traffic volume, turning rates, and calculation time. The effect of these elements on the model execution is represented through a reenactment examination, and the calculation execution of models is talked about. The results show that both the dynamic speed-shortened ordinary dissemination model and dynamic Robertson model (DRM) with components beat their specific static variations, and that they can be also applied for dynamic control.

GU Jin-gang et al. [2] proposed each coin has different sides, when the huge unique occasion brings benefits for holders and members, yet in addition brings the negative impacts for street traffic and incredible weight for urban traffic the executives division. In perspective on the distinctive scale, traffic association plan forms for huge uncommon occasions are planned in this s. These examinations have a specific simplification, and furthermore have significant job for controlling the act of traffic association of enormous unique occasions. In any case, with the residential enormous extraordinary occasion is ending up increasingly famous, make a general traffic association standard for huge uncommon occasion has the significant reasonable hugeness and application esteem, the following stage requires further breaking down more sorts of huge exceptional occasions, and concentrate the traffic activity attributes, unique offices plan, association undertaking process, etc., as to build the establishment for the development of traffic association standard of huge uncommon occasion

Yuan Ma and Joe Lemieux [3] proposed that worldwide streamlining of the vitality utilization of double power source vehicles, for example, half and half electric vehicles, module mixture electric vehicles, and attachment in energy component electric vehicles requires information of the total course attributes toward the start of the outing. One of the principle attributes is the vehicle speed profile over the course. The profile will make an interpretation of straightforwardly into vitality necessities for a given vehicle. In any case, the vehicle speed that a given driver picks will shift from driver to driver and occasionally, and might be slower, equivalent to, or quicker than the normal traffic stream. On the off chance that the particular driver speed profile can be anticipated, the vitality utilization can be advanced over the course picked. The motivation behind this paper is to inquire about the utilization of Deep Learning systems to this issue to distinguish toward the start of a drive cycle the driver explicit vehicle speed profile for an individual driver rehashed drive cycle, which can be utilized in an enhancement calculation to limit the measure of petroleum product vitality utilized during the outing.

Youness Riouali et.al [4] introducing the system exhibits an expansion of clump petri net to show the conduct of traffic frameworks especially for complex cases, for example, crossing points and need streets. The all-inclusive model handles the uncontrolled occasions issue by including nondeterministic time based advances that speak to the conditions between framework elements and outer conditions, for example, give way runs the show. Besides, we saw that triangular bunches Petri net displaying doesn't handle the situation where occasions, that change the traffic state, can happen inside streets. Along these lines, we have proposed to separate streets into segments so as to find occasions, for example, mishaps and speak to their impacts on the frameworks conduct. As a piece of future research, we plan to: Focus on powerful development of traffic flow and test the consistence of the proposed model with various practices of transportation framework; Enhance firing rules by acquainting factual highlights with arrangement with spatial-fleeting connections of streets, for example, parting a traffic flow at forks.

Yue Shan Chang et.al [5] introducing With the development of industry, air quality (AQ) is progressively getting more awful. There are progressively AQ screens gadget has been sent around nation for observing air-quality throughout the entire year. To assess and anticipate AQ, for example, PM (particulate matter) 2.5, become a significant issue for government to improve individuals' personal satisfaction. As we can know, there are numerous elements can influence the AQ, for example, traffic, production line exhaust discharges, climate, cremation of trash, etc. In most well-created nations, these contamination sources are observed for future ecological arrangement making. Right now, will propose a semantic ETL (Extract-TransformLoad) system on cloud stage for AQ expectation In the stage, we misuse metaphysics to concretize the relationship of PM 2.5 from

different information sources and to blend those information with a similar idea yet extraordinary naming into the bound together database. We actualize the ETL structure on the cloud stage, which incorporates figuring hubs and capacity hubs. The processing hubs are utilized to execute information digging calculations for foreseeing, and capacity modes are utilized to store recovered, preprocessed, and broke down information. We use serene web administration as the front end API to recover examined information, lastly we misuse program to demonstrate the imagined outcome to show the estimation and expectation. It shows that the enormous information get to structure on the cloud stage can function admirably for air quality examination.

Leyre azpilicueta et.al [6] proposed an elective methodology for proliferation forecast in vehicular conditions was exhibited. The new procedure depends on a 3-D RL strategy that can consider the development of various vehicles in the thought about situation, prompting V2V or V2I conditions, which are not a simple errand to dissect because of channel impedances. In particular, this work introduces the appraisal of an ultra-high-frequency (UHF) radio-frequency identification (RFID) framework for vehicular applications. The epic strategy gives Doppler move and Doppler spread outcomes, which can be helpful to investigate the effect of the framework on this perplexing explicit condition. Reenactment just as estimation results were exhibited, indicating great understanding, with application to a connection spending examination of a RFID framework. Results demonstrate that by considering radio arranging errands in the vehicular applications, the general framework execution can be firmly enhanced, decreasing force utilization just as no desired impedance levels.

Nico Piatkowski et.al [7] introducing circumstance ward course arranging accumulates expanding enthusiasm as urban areas become swarmed and stuck. We present a framework for individual excursion arranging that fuses future traffic perils in directing. Future traffic conditions are figured by a Spatial-Temporal Random Field dependent on a flood of sensor readings. Also, our methodology gauges traffic flow in regions with low sensor inclusion utilizing a Gaussian Process Regression. The molding of spatial relapse on transitional forecasts of a discrete probabilistic graphical model permits to join authentic information, gushed online information and a rich reliance structure simultaneously. We show the framework with a certifiable use-case from Dublin city, Ireland.

V. ALGORITHM

1. Stop words Removal Algorithm
A stop word is a commonly used word that (the, is, a, about, more etc.) a search engine has been programmed to ignore, both when indexing entries for searching and when retrieving them as the result of a search query. This algorithm is used in search engine, Natural language processing (NLP)

Input: - Place name
Output: - View all the traffic details according to place name.

A dictionary based approach is been utilized to remove stopwords from document. A generic stopword list containing 600 stopwords created using hybrid approach is used.

2. NAIVE BAYES
Using this algorithm we can classify the traffic according to category after classification we predict traffic category.

Input: - Traffic related numbers
Output: - Traffic accord to category.

Naive Bayes is a basic system for developing classifiers: models that appoint class names to issue occasions, spoke to as vectors of highlight esteems, where the class marks are drawn from some limited set. There is certifiably not a solitary calculation for preparing such classifiers, yet a group of calculations dependent on a typical guideline: all innocent Bayes classifiers expect that the estimation of a specific element is autonomous of the estimation of some other component, given the class variable.
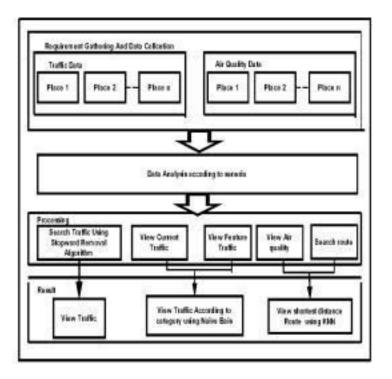
3. K-Nearest Neighbour
Euclidean distance is the straight line distance between two points. Euclidean space becomes a metric space. This algorithm is used for finding optimal distance on map.

Input: - Source and destination location name.
Output: - Shortest path on map

In pattern recognition, the k-nearest neighbours' algorithm (k-NN) is a non-parametric method used for classification and regression. In both cases, the input consists of the k closest training examples in the feature space. ... If k = 1, then the object is simply assigned to the class of that single nearest neighbour.

VI. PROPOSED SYSTEM APPROACH

Fig.1 System Architecture Diagram of Proposed System

In proposed system consists mainly 2 admin and user modules. Admin play most important role in our traffic prediction system with performing their functionality like upload traffic dataset, upload route dataset, view user and traffic information Admin also add information of real time air quality of different area in a smart city. In proposed system User can search the traffic with different scenario like search by location, search by season. In proposed system, collect the raw data of traffic flow of different areas in smart city x. The system designs common process of traffic organization and management for different large special events, proposes the static and dynamic traffic organization methods and management strategies, and designs the activity steps, which give a reference and direction to the traffic association practice of enormous extraordinary occasions. After collecting, analysing, predict how much traffic increase in next few days or year and how to control them. User can view area wise current traffic as well as area wise future traffic. According to the system user also view the air quality index of particular area. System suggests the shortest distance of route to user. In view of characterizing and grouping the huge uncommon occasions, this framework investigates the traveller stream dispersion qualities of enormous unique occasions, considers the spatial and fleeting appropriation of street traffic stream encompassing the occasion regions also find traffic of particular areas.

VII. COMPARATIVE RESULTS

In our experimental setup, as shown in table 6.1, user search traffic in particular area. This traffic were then divided into three main categories; among which 23 places were Low, 30 places were Medium, 17 were places High.

Sr. No	Traffic Type	Number of Traffic
1	Low	25
2	Medium	31
3	High	37

Table 6.1: Classification of traffic category

VIII. RESULTS

From above data, as shown user search traffic in particular area. The numbers of search traffic found to be Low traffic were 31 places, Medium traffic were 50 places and rest High traffic were 19 places.

VIII. CONCLUSION

The traffic jam and air pollution in smart city is most famous topic in present days. Different kind of peoples are faced problem of urban road traffic, road accident such as congestions, pollution, security problems .Due to this reasons, road traffic is increased day by day. To solve existing problem, to develop a new proposed system, in that can requirement gathering of the system and collect the raw data of traffic jam as well as air quality of pollution data of different places in smart city. After collecting, analysing, predict how much traffic increase in next few days as well as air quality in air for each year and how to control them. In light of portraying and requesting the colossal one of a kind events, this system separates the explorer stream allotment characteristics of tremendous extraordinary occasion, thinks about the spatial and worldly dissemination of street traffic stream encompassing the occasion territories and give direction to the traffic association routine with regards to expansive exceptional occasions.

IX. ACKNOWLEDGMENT

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