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Survey of Traffic Prediction by LSTM Using Machine Learning Techniques

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Abstract-machine learning technologies are fast-growing domain for prediction. The main reason for traffic is traffic signals, accident, weather and road repair.In Real-time mostly traffic data are generated exponentially and we have to enhance data transportation using big data concepts. This fact encouraged as to build a better traffic flow prediction model. First, we should collect the large number of traffic prediction journals and study their work pattern or algorithm. In this work, we are planned to use machine learning and deep learning algorithm and LSTM algorithm.We are proposed artificial recurrent neural network (LSTM) for traffic prediction. We gathered large amount of data for analyzing traffic flow and based on that we compare best data flow then finally we got an expected prediction result.
We survived several authors' works and demonstrated our results in section III using python simulation. We improved 6-7% percentage throughput and minimized interference also.

Keywords—Long short termmemory (LSTM), Neural **network, Machine learning; Traffic prediction; data transportation...**

I. INTRODUCTION

In the course of recent many years Machine Learning has gotten one of the backbones of data innovation and with that, a somewhat focal, though typically covered up, part of our life. With the always expanding measures of information opening up there is valid justification to accept that shrewd information investigation will turn out to be significantly more unavoidable as a fundamental element for innovative advancement. AI is a constantly creating field. Along these lines, there are a few contemplations to remember as you work with AI procedures, or examine the effect of AI measures.

In the course of the most recent thirty years, we have seen the commencement, advancement, arrangement, and gigantic development of clever transportation frameworks (ITS) and their critical

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effect on our life and society. Today, transportation innovative work is not, at this point a field overwhelmed by common, mechanical, activities research, and other conventional designing and the executive's disciplines. Or maybe, PC sciences, control, correspondence, the Internet, and techniques created in man-made consciousness (AI), computational knowledge, web sciences, and numerous other arising data sciences and designing territories have framed the center of new ITS innovation and become necessary and significant pieces of current transportation designing.

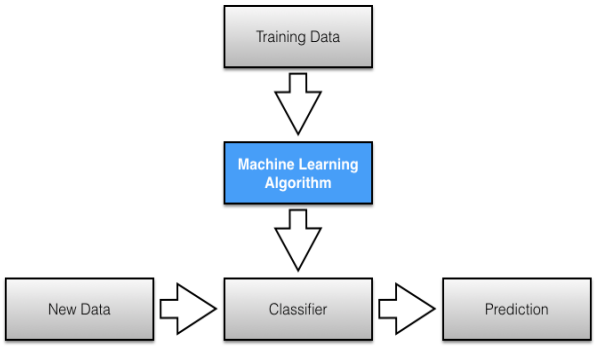

Fig 1: general prediction model

1.1 Machine Learning Methods

In AI, errands are for the most part characterized into general classifications.These classes depend on how learning is gotten or how criticism on the learning is given to the framework created..Two of the most broadly received AI strategies are directed realizing which trains calculations dependent on model info and yield information that is named by people, and unaided realizing which gives the calculation no marked information to permit it to discover structure inside its information**.**

Supervised Learning

In supervised learning, the PC is outfitted with model information sources that are set apart with their optimal yields. The explanation behind this procedure is for the count to have the alternative to "learn" by differentiating its genuine yield and the "trained" respects find botches, and adjust the model as requirements be. Regulated adjusting as such uses guides to anticipate name regards on extra unlabelled data. A regular use example of regulated learning is to use recorded data to expect truly likely future events. It may use chronicled protections trade information to anticipate approaching changes, or be used to filter through spam messages. In coordinated learning, named photos of canines can be used as data to orchestrate untagged photos of canines.

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Unsupervised learning

In unsupervised learning, information is unlabelled, so the learning calculation is left to discover shared traits among its information. As unlabelled information are more plentiful than named information, AI strategies that encourage solo learning are especially significant. The objective of solo learning might be pretty much as clear as finding covered up designs inside a dataset, yet it might likewise have an objective of highlight realizing, which permits the computational machine to naturally find the portrayals that are expected to arrange crude information. Solo learning is generally utilized for value-based information. You may have a huge dataset of clients and their buys, yet as a human you can likely not figure out what comparable ascribes can be drawn from client profiles and their sorts of buys. With this information took care of into an unaided learning calculation, it very well might be resolved that ladies of a particular age range who purchase unscented cleansers are probably going to be pregnant, and along these lines a promoting effort identified with pregnancy and infant items can be focused to this crowd to build their number of buys.

Without being told a "right" answer, solo learning strategies can take a gander at complex information that is more far reaching and apparently inconsequential to sort out it in possibly significant manners. Solo learning is regularly utilized for oddity recognition including for false Visa buys, and recommender frameworks that prescribe what items to purchase straightaway. In unaided learning, untagged photographs of canines can be utilized as info information for the calculation to discover resemblances and order canine photographs together.pervised Learning.

1.**2 Approaches**

As a field, AI is firmly identified with computational measurements, so having a foundation information in insights is valuable for comprehension and utilizing AI calculations.Connection and relapse are generally utilized strategies for exploring the relationship among quantitative factors Relationship is a proportion of relationship between two factors that are not assigned as one or the other reliant or free. Relapse at a fundamental level is utilized to analyze the connection between one reliant and one autonomous variable. Since relapse measurements can be utilized to expect the reliant variable when the autonomous variable is known, relapse empowers expectation abilities.

Approaches to machine learning are continuously being developed. For our motivations, we'll go through a couple of the well known methodologies that are being utilized in AI at the hour of composing.

1.2.1 k-nearest neighbor

The k-closest neighbor calculation is an example acknowledgment model that can be utilized for characterization just as relapse. Frequently contracted as k-NN, the k in k-closest neighbor is a positive whole number, which is normally little. In one or the other grouping or relapse, the information will comprise of the k

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nearest preparing models inside a space. We will zero in on k-NN characterization.In this technique, the yield is class support. This will dole out another item to the class generally basic among its k closest neighbors. On account of k = 1, the article is appointed to the class of the single closest neighbor.

1.2.2Decision Tree Learning

For general use, decision trees are utilized to outwardly address decisions and show or educate dynamic. When working with AI and information mining, decision trees are utilized as a prescient model. These models map perceptions about information to decisions about the information's objective worth. The objective of choice tree learning is to make a model that will anticipate the estimation of an objective dependent on input factors.

In the prescient model, the information's ascribes that are resolved through perception are addressed by the branches, while the decisions about the information's objective worth are addressed in the leaves. When "learning" a tree, the source information is separated into subsets dependent on a property estimation test, which is rehashed on every one of the determined subsets recursively. When the subset at a hub has the same incentive as its objective worth has, the recursion cycle will be finished.

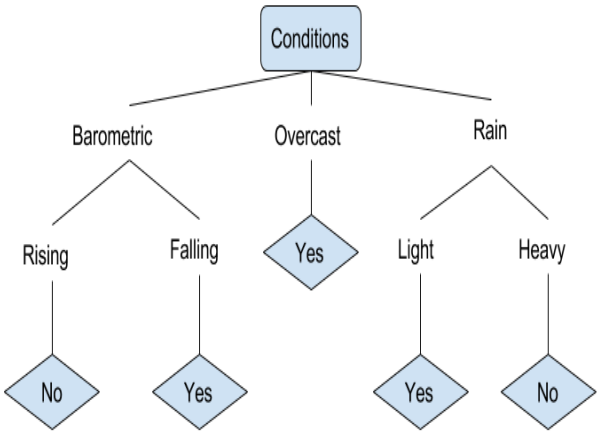

Fig 1: example of decision tree learning

1.2.3Deep Learning

Profound learning endeavours to mimic how the human cerebrum can deal with light and sound improvements into vision and hearing. A profound learning engineering is motivated by organic neural organizations and comprises of numerous layers in a fake neural organization comprised of equipment and GPUs. Profound learning utilizes a course of nonlinear handling unit layers to remove or change highlights (or portrayals) of the information. The yield of one layer fills in as the

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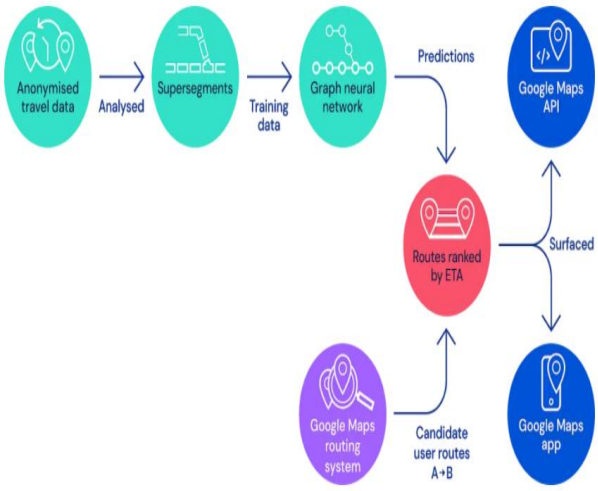
contribution of the progressive layer. In profound learning, calculations can be either regulated and serve to arrange information, or solo and perform design investigation.

Among the AI calculations that are as of now being utilized and grown, profound learning assimilates the most information and has had the option to beat people in some intellectual assignments. In view of these ascribes, profound learning has become the methodology with huge potential in the computerized reasoning space. PC vision and discourse acknowledgment have both acknowledged huge advances from profound learning draws near. IBM Watson is a notable illustration of a framework that use profound learning.

1.2 LSTM

Succession expectation issues have been around for quite a while. They are considered as perhaps the most difficult issue to address in the information science industry. These incorporate a wide scope of issues; from foreseeing deals to discovering designs in securities exchanges' information, from understanding film plots to perceiving your method of discourse, from language interpretations to anticipating your next word on your phone's console. With the new achievements that have been going on in information science, it is discovered that for practically these grouping forecast issues, Long transient Memory organizations, LSTMs have been seen as the best arrangement. LSTMs have an edge over ordinary feed-forward neural organizations and RNN from various perspectives. This is a direct result of their property of specifically recalling designs for long terms of time. The motivation behind this article is to clarify LSTM and empower you to utilize it, in actuality, issues.

1.4 Traffic prediction using neural network.



The greatest test to settle while making an AI framework to assess travel times utilizing Super fragments is a design one. a straight-forward approach that utilized the current traffic framework

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however much as could be expected, explicitly the current division of street organizations and the related continuous information pipeline. This implied that a Super fragment covered a bunch of street sections, where each portion has a particular length and relating speed highlights. isolated street networks into "Super sections" comprising of numerous contiguous fragments of street that share critical traffic volume.

As of now, the Google Maps traffic expectation framework comprises of the accompanying segments:

(1) A course analyzers that measures terabytes of traffic data to build Super sections and
(2) An epic Graph Neural Network model, which is advanced with various targets and predicts the movement time for every Super section.

II.RELATED WORK

This paper expects to build up an instrument for foreseeing exact and opportune traffic stream Information. Traffic Environment includes all that can influence the traffic streaming out and about, regardless of whether it's traffic lights, mishaps, rallies, in any event, fixing of streets that can cause a jam. In this work, we wanted to utilize AI, hereditary, delicate registering, and profound learning calculations to examine the huge information for the transportation framework with much-diminished intricacy. Likewise, Image Processing calculations are associated with traffic sign acknowledgment, which in the end helps for the correct preparing of self-ruling vehicles.
Creators have proposed the calculation for anticipating the gridlock which can be seen underneath

In this paper [2], Machine learning is a set of algorithms and statistical models which are used by computers to perform a required task. Machine learning can be used in face detection, speech recognition, medical diagnosis, statistical arbitrage, traffic prediction etc. In the previous few years, GPS route turned out to be very mainstream in enormous urban areas in deciding rush hour gridlock proportion with the assistance of focal traffic-overseeing workers. The data collected Could be used in construction of an idea showcasing current traffic in the city and could be used in future in making expectations of traffic and a blockage examination should be possible

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Algorithm 1 For identifying the congested situation

1. Collect the traffic data in every 5 min with features:
   A. Location (Measured with GPS)
   B. Direction
   C. Speed
   D. Start-End Junction
2. Group every 5 min interval with their corresponding data.
3. Calculate the distance between each vehicle with all another vehicles within specified junction.

if the distance is less than the specific threshold between two vehicles **then**
  those vehicles are considered to be the neighbourhood vehicles
else
  Not considered as neighbour vehicles.
end if

Dataset created doesn't have numerous highlights so it will not be a reasonable choice to utilize the profound l
earning and hereditary calculations. Following the proposed calculation we have tackled parcel of issues like Big-information issues, likewise the gigantic elements of dataset is decreased which keeps away from the over fitting of the model.

Steps engaged with usage are

1) Created the application which can give us the GPS

Directions.

2) Perform the proposed calculation

3) Evaluate the grid for the dataset

4) Divide the dataset into preparing and testing.

5) Analyze diverse AI calculations.

6) Predict the 45 min stretch boundaries through AI calculation

7) Conclude about the gridlock

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Algorithm 2 For classifying the congested situation

1. This will eventually give us the matrix A.
2. Now assign 1 to $A[i,j]$

if $A[i,j] < threshold$ **then**
  $A[i,j] = 1$
else
  $A[i,j] = 0$
end if

3. Count $A[i,j]$=1 and label i,j as neighbourhood vehicles
4. Repeat above steps in every 5 min for 45 min
5. Plot the graph between neighbourhood vehicles and time interval.

if the neighbourhood vehicles shows an increasing graph **then**
  the traffic congestion is identified
else
  No traffic
end if

In paper [2].This paper presents an outline of the foundation, ideas, fundamental techniques, significant issues, and current utilizations of Parallel transportation Management Systems (PTMS). Basically, equal control and the board is information driven methodology for displaying, investigation, and dynamic that thinks about both the designing and social intricacy in its cycles. The turns of events and applications portrayed here unmistakably demonstrate that PTMS is compelling for use in arranged complex rush hour gridlock frameworks and is firmly identified with arising advancements in distributed computing, social registering, and digital physical–social frameworks. A depiction of PTMS framework structures, cycles, and parts, including OTSt, DynaCAS, adapt, iTOP, and TransWorld is introduced and talked about.

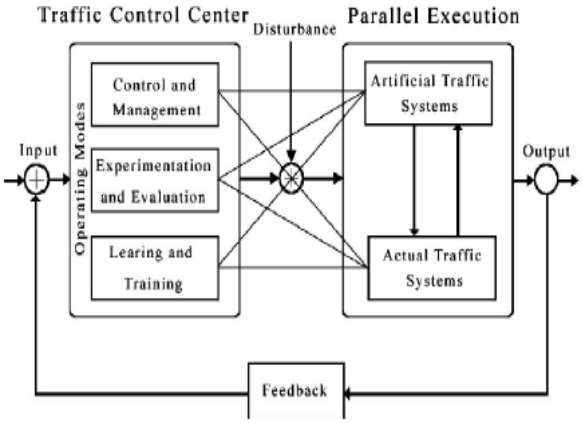

Fig ACP based parallel control and management for transportation

This paper summed up our innovative work exertion in the course of the most recent decade in setting up another instrument for the equal control and the board of complex transportation frameworks. This control and the executives instrument is the aftereffect of the reconciliation and combination of ideas and techniques created in AI, astute control, computational knowledge, savvy frameworks, insightful spaces, complex frameworks, intricacy hypothesis, social figuring, CPSS, and progressed

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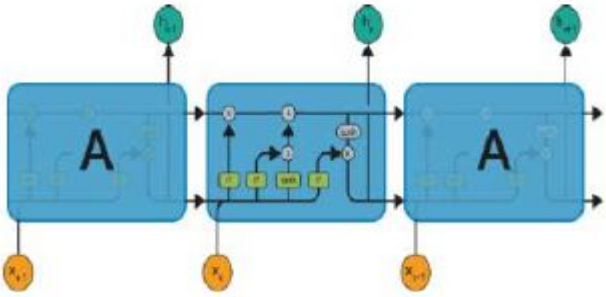
computational advancements, for example, specialist programming and distributed computing. We accept that it has opened another field toward another path that could altogether propel the viability and knowledge level of savvy transportation frameworks just as advance their future applications. Be that as it may, more endeavors are required in both exploration and applications before ideas and strategies in the ACP-based methodology, specifically, the equal framework approach, including both equal control and equal administration, can turn out to be grounded, viable, and broadly acknowledged in taking care of certifiable complex issues. Unmistakably, the idea of numerous issues in transportation has made them ideal for testing, assessing, and actualizing those ideas and strategies. The fundamental reason for this paper is to advance and call for more broad conversation, examination, and practices this new and interdisciplinary way inside ITS people group.

In paper3, creators have applied the usage of Long Short-Term Memory Networks (LSTM) for passing traffic stream figure. LSTM is a profound learning approach which is equipped for learning long haul conditions and non-liner traffic stream information. It recollects the data for a significant stretch of time which makes it a proper choice in busy time gridlock assessing.

LSTM structure:

LSTM have chain like construction. This design has many interfacing lines; each line passes on an entire vector, from one center point to the commitments of others.



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The best approach to LSTM is cell demonstrate, the even line moving direct to the high mark of the chart. It is a vehicle line which passes on all the information that is relevant to the past data. LSTM has the volume to excuse and attach information to the telephone state, mindfully constrained by structures called Gates. LSTM has three doors to guarantee and control the cell state, which help to let the information through.

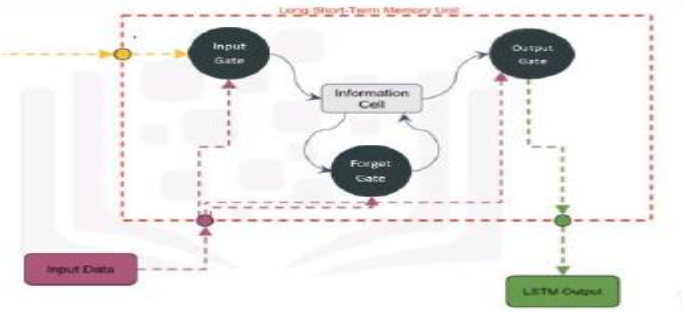

Fig gates guarding the cell gates

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The starting advance of LSTM is to erase the information from the cell state which are not helpful. This cycle of eliminating unuseful information is finished by sigmoid layer which is likewise called as fail to remember door layer

LSTM algorithm:

Step 1. Define network

The initial step is to make an example of the Sequential class. At that point you can make your layers and add them in the request that they ought to be associated. The LSTM repetitive layer involved memory units is called LSTM (). A completely associated layer that regularly follows LSTM layers and is utilized for yielding a forecast is called Dense ().

Step 2. Compile network

Aggregation is a proficiency step. It changes the straightforward arrangement of layers that we characterized into an exceptionally productive arrangement of grid changes in a configuration expected to be executed on your GPU or CPU, contingent upon how Keras is designed. Consider aggregation a recomputed venture for your organization. It is constantly needed in the wake of characterizing a model. Arrangement requires various boundaries to be indicated, explicitly custom-made to preparing your organization. In particular, the enhancement calculation to use to prepare the organization and the misfortune work used to assess the organization that is limited by the advancement calculation.

Step3. Fit network

Fitting the organization requires the preparation information to be indicated, both a grid of information examples, X, and a variety of coordinating with yield designs, y. The organization is prepared utilizing the back propagation calculation and streamlined by the advancement calculation and misfortune work determined when assembling the model. The back propagation calculation necessitates that the organization be prepared for a predefined number of ages or openings to the preparation dataset. Every age can be divided into gatherings of information yield design sets called clumps. This characterizes the quantity of examples that the organization is presented to before the loads are refreshed inside an age. It is likewise a proficiency streamlining, guaranteeing that not very many info designs are stacked into memory at a time.

Step4. Evaluate network

Assess the presentation of the organization on a different dataset, concealed during testing. This will give a gauge of the exhibition of the organization at making forecasts for concealed information later on. The model assesses the misfortune across the entirety of the test designs, just as some other measurements determined when the model was arranged, similar to grouping exactness. A rundown of assessment measurements is returned.

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Step 5. Prediction

Whenever we are happy with the exhibition of our fit model, we can utilize it to make forecasts on new information. This is pretty much as simple as calling the foresee () work on the model with a variety of new information designs.

In this paper [4] Accurate and constant grounds network traffic expectation is vital in network the executives. Focusing on security investigation of organization traffic and forecast issues brought about by the nonlinearity and multi-dimensional elements of grounds network traffic. An organization traffic forecast framework dependent on long haul/transient memory (LSTM) model is introduced for investigation of grounds clients' organization practices in the paper. The forecast framework utilizes interminable log examination device of Xijia Education to accumulate and pre-measure multi-source heterogeneous log information from different organization applications, and embraces an improved LSTM model to dissect and foresee network traffic of grounds clients.

Input: network traffic log *DataSource*
Output: Model structure and related parameters w

// Stage 1: Data preprocessing
1. $D_M \leftarrow Transfer(DataSource)$ // Use the Immortal tool to extract the feature from the multi-source heterogeneous network traffic log and output the multidimensional feature data set D_M.
2. $D \leftarrow ConvertSeriesToMatrix(D_M)$ // Normalize the data set D_M and convert it to a matrix form.

// Stage 2: model training
3. **for** iter < MaxIter **do**//Iterate training.
4. Take a random sample D_b from training dataset D.
5. Calculate the $L(y, p)$ via Equ. (2).
6. Update parameters with RMSProp optimizer.
7. **end for**
8. Output NTLSTM model structure and related parameters W.

. In this paper [5], the proposed model can gain proficiency with the significance of each past incentive to the current incentive from the long arrangement of traffic information at the past second, which makes it conceivable to extricate more important highlights. Developed a dataset utilizing the traffic information in the center segment of Wuhan for tests, and the exhibition of the improved model is contrasted and the first LSTM model. The outcomes show that when the info information grouping increments from 16 to 64, the MAPE of our proposed model is decreased by 3.76%, while the MAPE of the LSTM model is diminished by 1.51%, which demonstrates the viability of creators proposed strategy.

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IV. PROPOSED METHOD

A. ProblemStatement

- LSTM use low memory and its leads to poor efficiency
- Take more time to predicts output
- Low throughput

B. Proposed methodology

We are introduced enhanced LSTM using k-means clustering algorithm. First we have to collect the number of nodes and spilt into several clusters and then calculate distance between each node in each cluster. Finally select the less distance cluster and send into LSTM algorithm for prediction.

1. Data collection
2. Data preprocessing
3. Data analysis
4. Cluster formation
5. k-means algorithm
6. Enhanced LSTM prediction

C.existing result and analysis

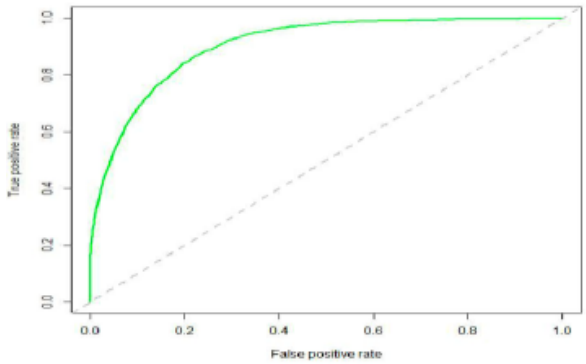

Fig analysis of true positive rate and false positive rate

VI. CONCLUSION

We were surveyed several numbers of journals for to traffic prediction using Enhanced LSTM. In order to achieve LSTM high throughput we are using K-means algorithm. In our proposed method we are previously analyzing the number of cluster and only selected clusters send as input data to LSTM algorithm. Finally expected results achieved and high throughput within short time. So we would achieve better traffic prediction than existing system.

REFERENCES

[1]. Gaurav Meena; Deepanjali Sharma; Mehul Mahrishi,"Traffic Prediction for Intelligent Transportation System using Machine Learning" 3rd International Conference on Emerging Technologies in Computer Engineering: Machine Learning and Internet of Things (ICETCE-2020), 07-08 February 2020, (IEEE Conference Record 48199

[2]. Fei-Yue Wang et al. "Parallel Control and Management for Intelligent Transportation Systems: Concepts, Architectures, and Applications."IEEE transactions on intelligent transportation systems, vol. 11, no. 3, september 2010

[3]. Pregyapoonia; v.k. jain," ahort term traffic flow prediction using LSTM"2008 2020 International Conference on Emerging Trends in Communication, Control and Computing (ICONC3) Mody University of Science and Technology, Lakshmangarh, Feb 21-22, 2020

[4]. Yue geng ; shuyu li,"A LSTM Based Campus Network Traffic PredictionSystem",IEEE 10th international conference on software engineering and service science (icsess) year: 2019 | conference paper | publisher: IEEE

[5]. Dejun Chen; Congcong Xiong; Ming Zhong," Improved LSTM Based on Attention Mechanism for Short-term Traffic Flow Prediction" 10th International Conference on Information Science and Technology Bath, United Kingdom, September 9-15, 2020

[6] H Qi, RL Cheu, and DH Lee. Freeway incident detection usingkinematic data from probe vehicles. In 9th World Congress on IntelligentTransport SystemsITS America, ITS Japan, ERTICO (IntelligentTransport 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 traffic forecast. IET IntelligentTransport Systems, 11(2):68–75, 2017.

[8] C. Zhang, P. Patras, and H. Haddadi. Deep learning in mobile andwireless 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 predictionwith support vector regression. IEEE Transactions on IntelligentTransportation Systems, 5(4):276–281, Dec 2004.

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

[11] Yiming He, Mashrur Chowdhury, Yongchang Ma, and Pierluigi Pisu.Merging mobility and energy vision with hybrid electric vehicles andvehicle infrastructure integration. Energy Policy, 41:599–609, 2012.

[12] Jason Brownlee. Bagging and random forest ensemble algorithms for machine learning. Machine Learning Algorithms, pages 4–22, 2016.

[13] Z. Zhao, W. Chen, and X. Wu, "LSTM network: a deep learning approachfor short-term traffic forecast," IET Intelligent Transport Systems,11(2), 2017, pp.68-75.

[14] R. Fu, Z. Zhang, and L. Li, "Using LSTM and GRU neural networkmethods for traffic flow prediction," 2016 31st Youth Academic AnnualConference of Chinese Association of Automation (YAC),2016, pp.324-328.

[15] W. Wei, H. Wu, and H. Ma, "An autoencoder and LSTM-based trafficflow prediction method," Sensors, 19(13), 2019, pp.2946.

[16] D. Bahdanau, K. Cho, and Y. Bengio, “Neural machine translation byjointly learning to align and translate,” arXiv preprint arXiv:1409.0473,2014.
[17] A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, and A.Gomez, “Attention is all you need,” Advancesin Neural InformationProcessing Systems, 30, 2017, pp. 5998–6008.
[18] Z. Hao, M. Liu, Z. Wang, and W. Zhan, “Human Behavior AnalysisBased on Attention Mechanism and LSTM Neural Network,” 2019 IEEE9th International Conference on Electronics Information and EmergencyCommunication (ICEIEC), Beijing, China, 2019, pp.346-349.
[19] Z. Wang, J. Poon, S. Sun, and S. Poon, “Attention-based Multi-instanceNeural Network for Medical Diagnosis from Incomplete and LowQuality Data,” 2019 International Joint Conference on Neural Networks(IJCNN), Budapest, Hungary, 2019, pp.1-8.