Public Transport .Monitoring and Recommendations Based on GPS Data

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Abstract—Transportation has become part of our day-day life; since life originated on earth animals move from one place to other in search of food and shelter, the modern day scenario is such wherein we have different modes of transportation like buses, taxis, trains and planes etc., But monitoring and recommending vehicles is still a challenge. We propose a monitoring and recommendation based on GPS data-set. In metropolitan cities like bengaluru there are more than 5000 buses, it is difficult for a person to find the bus to his desired destination. Because he is unaware of the bus status this can be solved by intimating him about the status with the help of GPS; recommending the bus means informing the passenger about arrival and departure using an algorithm and also informing passengers on board about the location with help of existing bus voice system, in this paper we propose recommendations based on GPS data, handling such big data set is a problem; so we use map-reduce techniques to solve this problem.

I. INTRODUCTION

Public transportation is a part of human life; if a person in metro cities wants to travel from one place to another he has to relay on public transport. For example in Bangalore there are more than 5000 buses covering the entire city every day, it is difficult for a person to find the bus to a particular place in time without the knowledge of arrival and departure, so recommending the bus to the desired destination is the aim of this paper. If a person form different place is commuting in a bus and he is unaware of the routes, in such cases the buses are to be equipped with bus-voice and GPS. Based on GPS data every location is announced by bus-voice so that passengers are aware of every stop and can get down in his/her destination easily. And another aim of this paper is to lessen the waiting time of a passenger and recommend the exact location and time of arrival of any particular bus in a particular route so that in peak hours passenger gets correct information of the bus and can reach destination as early as possible. In current day scenario the bus voice and display systems are not based on GPS data it is just a manual or time stamp based.in this paper we recommend an algorithm called exact time of arrival (ETA) which exactly tells us time of arrival of any particular vehicle (bus), and GPS data collected at data centers are to be managed, so we use map-reduce techniques.

The following are key contributions of this paper:

- This paper recommends advanced searching of buses based on GPS dataset.
- It also gives an exact time of arrival (ETA) using algorithm.
- Using the GPS data location can be identified and displayed.

II. MOTIVATION

A. *bus voice*

Now a day's all buses are equipped with bus voice system, which announces current location and the next location.
But the existing system is a manually operated wherein driver has to press button such that current location is announced form the database that is already stored sequentially, based on this information the system announces the locations.

B. *display system*

The recommendations cannot be made to each person as the number of commuters are more hence recommendation are made at public places (busstop), as the information is displayed at stops based on GPS data and ETA. By this mechanism the commuters are aware of current status and location of the vehicle.

The data stored in the GPS base is huge and need to be managed using big data tools such as hdfs and map-reduce, here we use mapreduce model to manage data and nosql technique to retrieve required data from large data set, one such technique is the graph database. Here we use graph data base model to relate the entities, so that any query can be dynamically answered.

III. OVERVIEW OF THE PROPOSED SYSTEM

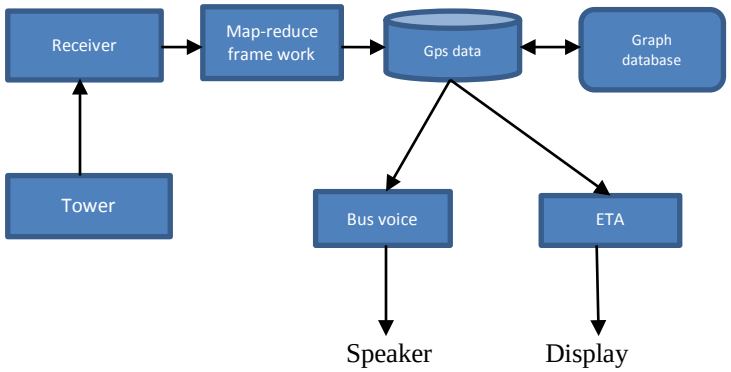

Figure: 3.1 overview of recommendation system.

As shown in figure 3.1 it consists of receiver, map-reduce frame work, gps database, and a graph database. The receiver gets the information about the vehicle from tower and processes it in a mapreduce frame work then it relates the entities with a graph database then the information is announced using a speaker also the information is processed and exact time is calculated and displayed.

Until this stage its not a big issue but to handle the data we need a mapreduce model which takes the key value pair and outputs the value. Our MapReduceMeasure model is mainly based on MapReduce, which is designed as a generic design and programming model for processing and generat-ing large datasets. MapReduce has two key operations: Map and Reduce. A dataset user speci-fies a Map operation that takes key=value pairs as input to generate a set of intermediate key=value pairs, and a Reduce operation that takes all interme-diate values associated with the same intermediate keys as inputs to generate a set of output values.

Even though sufficiently generic to perform many real world tasks, the two-phase MapReduce model is best at generating a set of values based on the same key. The impact of one key on the values generated by another key s difficult to evaluate in the current model.

Map : $(key_1; value_1)$! $Set[key_2; value_2]$;

Reduce : $(key_2; Set[value_2])$! $Set[value_2]$;

The map output will be the input for reduce phase and finally the large data set will be partitioned and merged accordingly.

IV. GRAPH DATABASE MODEL

The data being stored has to be managed without using a sql query technique as it is a time consuming method hence we use a graph database model which relates the entities in a data, so that it would be an efficient way to identify and retrieve the required information. For instance in a bus database and the information regarding bus such as number, status, etc. are related using directed arrows.

V. HOT SPOT SCANNING

This technique helps in identifying the vehicle in a Map each time when a vehicle traverse the path it is marked as hot spot and number of times that vehicle traverse in same region for more than one time then it is a hot spot zone for that vehicle by this the traffic flow can be managed there is an algorithm for marking hotspots

- Input: frequent surface TCM(x,y,z), F=(count(x,y)).
- Output: no. of hotpot zones, range of each hotspot zone, representative point.

If number of hotspot < range or F equal to zero;
Perform simple division on TCM;
Quadrant has to be generated;
For i->0 to 3
If any constant c not less than F
Create hot spot(x,y).

This algorithm is used to mark number of hot spots and range of each hot spot, where in this algorithm F may be the frequent surface where vehicle travelled and TCM be the trajectory of mobile trace vehicle in space.

VI. EXACT TIME OF ARRIVAL

The intension here is to notify the passenger with exact arrival and departure of vehicle hence the estimated time can be given using the amount of time taken by a vehicle to reach a particular place considering its average KMPH. But when in extreme condition such as traffic and other cases its difficult to predict arrival and departure so we propose ETA algorithm which exactly tells the arrival and departure time.
Here we consider the movement of vehicle in every fraction of second. For instance if a vehicle V travels from A to B (100m) it takes 10 seconds with a speed of 40kmph then if it takes 15 seconds for next 100meter so difference is calculated an exact time can be predicted .

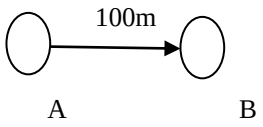

Figure: 6.1 time estimation from A to B

Similarly the reset of the distance is calculated using same mechanism and exact time can be displayed at the stops.

Let v be the vehicle And A, B the source and temporary destination respectively each time when the vehicle travels from A to B the time taken by it is calculated, when v reaches B the time is noted and B is made the new source it goes on till the vehicle reaches the desired destination.
Algorithm is as follows, let v be the vehicle and A, B be the source and temp.

For any given time t the distance traveled from A->B is x
A->B=x;
The average speed of vehicle v=p;

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Now, when vehicle reaches B;
        Value=x;
                B=temp;
                B->new source;
        B->next temp destination;
        Value=y;
Difference between A->B and B->t==z
        Return z;
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VII. CONCLUSION

The above proposed work helps in reducing the waiting time of any passenger at the stops, without having the knowledge of arrival and departures, the proposed ETA helps in calculating the exact time of arrival of the vehicle and its current location so that the passenger is aware of the current status of the vehicle. Any person onboard can know the current location, as the vehicles are GPS enabled and as in older system he may not rely on driver to press the button and announce the current location instead the proposed system takes the GPS data and announces the location for passengers convenience.

And the hotspot scanning helps in monitoring the traffic flow and identify the vehicle in the map, so that other vehicle in the same route can have a clear knowledge about the traffic and passengers as well; the mapreduce and graph database concepts helps in managing the large dataset and querying the required information can be made easy. The simple concept with a touch of technology helps people in finding the desired vehicle to reach the correct destination.

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