

SMART TRANSPORTATION SYSTEM USING BIG DATA ANALYTICS AND BROADBAND TELECOM NETWORK

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ABSTRACT:

In this research paper we will discuss how the broadband telecom network and big data analytics can be helpful for the building of smart cities. The role of telecom networks will play multi-role in a smart city. The objective is not just people-to-people communications, but creating an infrastructure that automatically responds to the citizens of the cities for their services. This automation can be achieved by the convergence of big data analytics with broadband telecom networks. In this paper I have proposed how we can implement Smart Transportation System using big data analytics, broadband telecom network for the cities of Uttar Pradesh like Lucknow, Kanpur.

Keywords—Smart city, Big data analytics, Broadband telecom network, Smart Transportation System; Managed Services.

I. INTRODUCTION

Many of us think smart cities means which uses technology to address service delivery challenges. However building smart cities varies from city to city and country to country, depending on the level of development, aspiration of city citizens. Information Technology Authority (ITA) represented by the Government eTransformation plan team of Uttar Pradesh organized a one-day workshop where they define concept of smart cities towards an improved citizen services and satisfaction by creating easy and efficient transport, health, energy and many more solutions for the entire society.[1]

A smart city brings together technology, government and society to enable following characteristics: [2]

- a smart economy
- smart mobility
- a smart environment
- smart people
- smart living

■ smart governance

Technologies associated with Smart Cities are numerous and include those available now and those in development but the backbone of all these is connectivity which must be faster, easy and always on. This connectivity provided by the telecom operators like Airtel which can be important stakeholders for the building of smart cities in India.

A smart city uses ICTs to enhance quality of services delivery at affordable costs to the entire population of the city. Be it governance, safety, transportation healthcare or waste management. Embedded telecom infrastructure across the smart city works as a backbone in which data flows seamlessly and enables tasks like managing traffic in real time or responding to an emergency in the quickest and shortest possible way.

Around the world cities like Songdo in South Korea, Masdar in UAE and Barcelona, London, Dubai already have smart solutions to run the cities.

Songdo has been designed with sensors to monitor temperature, energy use and traffic flow. These sensors, using Wi-Fi alert users, say at a bus stop, when a bus is due. Malmö, in Sweden, another smart city, plans to entirely run on renewable energy by 2030! [3]

II. BACKGROUND

A. Role of Broadband Telecom Network like Airtel

Uttar Pradesh has witness many events for the development of smart cities by government officials as well as telecom operators, some such events are mention below:

Airtel has launched a trial project that supports its growing base of customers by deploying Cisco Universal Small Cell Solutions into its mobile network. This small cell enables “five bars everywhere” which will optimize and monetizing consumer and business services on mobile devices. All vertical sectors in India are set to benefit from the trial project, especially hospitals and public

health facilities, malls and shopping complexes, airports and transport hubs and sports venues, hotels and convention centers. “As a result, the Sultanate is well-placed to leverage the emerging era of the Internet of Everything – the inter-connection of people, processes, places, and things – to further accelerate the pace of change with widespread connectivity. The biggest impact will be in the fields of government services, healthcare, education, and transportation system. [4]

Lucknow Municipality Leads Uttar Pradesh's Drive towards eTransformation by providing one of the first services the municipality has provided citizens over its smartphone interface Lucknow is the ability to book parking spaces. Car- owners select the hours and minutes they require and receive two text messages in response: one pinpointing a parking spot on a map with a red marker and another, five minutes before the reservation expires. Lucknow Municipality is emblematic of Uttar Pradesh's official drive to bring about a qualitative change in public service delivery and to improve the quality and simplicity of public services. [5]

B. Smart Data

We all know Big data comes with four aspects: data volume, data velocity, data veracity and data value. While first two deal with data generation and data storage the other two aspects deal with quality and usefulness of the data. The purpose of smart data to filter out the noise and hold meaningful data, which can be effectively used by the stakeholders for the building of smart cities. There can be many techniques which can be used to filter large amount of data to get valuable data are as follows: [6]

Cognitive Computing
Deep Learning
Machine learning
Artificial Intelligence
Predictive Analysis
Graph database
Object Recognition
Voice Processing

Semantic Technologies

Human Interface,

Big data Analytics,

Neuro computing,

Internet of Things,

Text Analysis.

RDF

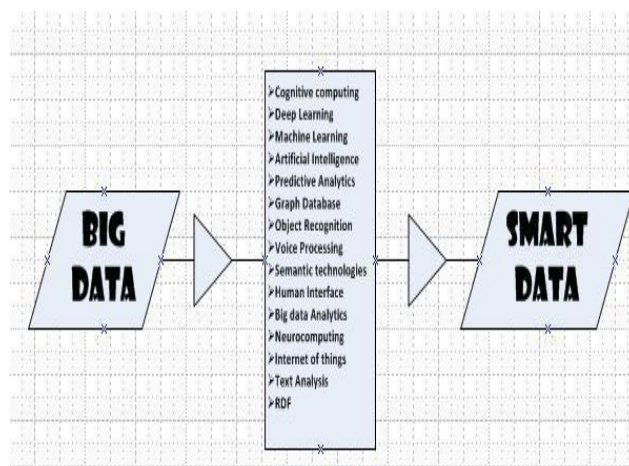


Fig 1: Techniques to filter large data into valuable data

C. Big Data Analytics:

Big data analytics is process of collecting organizing and analyzing large sets of data to discover patterns and valuable information. There are four types of analytics as shown in Fig-2.

Descriptive Analytics

Diagnostic analytics

Predictive Analytics

Prescriptive Analytics

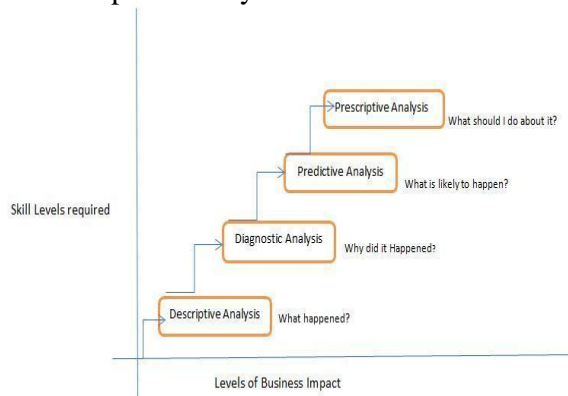


Fig 2: Levels of analysis of data sets.

Approach to analytics development:[7]

- Identify the data sources.
- Select the right tools and technology to collect, store aggregate the data.
- Understand the business domain.
- Identify tools and technology to process the data.
- Built mathematical model for the analytics
- Visualize
- Validate your result
- Learn, adapt, and rebuild your analytical model.

There are many tools and technologies available which can be used for the big data analytics as shown in Fig-3:

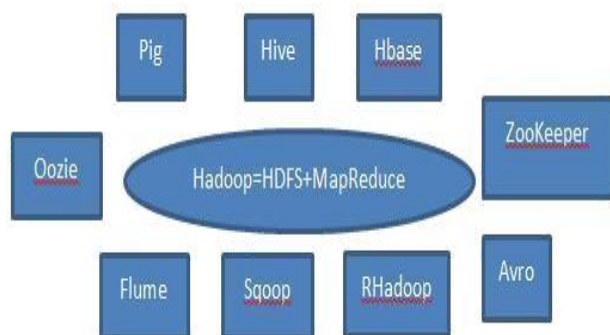


Fig 3: Big Data Analytics Tools & Technology [8]

Apart from above shown tools there are many software companies provide their services for the analytics of big data, examples of these are TCS sensor data analytics frame work as shown in Fig-4, Hp sensor data analytics etc.



Fig 4: Overview of the TCS center data analytics frame work [8]

III. SMART TRANSPORTATION SYSTEM FOR THE MIDSIZED CITIES LIKE KANPUR USING BIG DATA ANALYTICS AND BROADBAND TELECOM NETWORK

When smart transportation systems are discussed, we only think of big cities. But midsize cities like Kanpur, Lucknow face many of the same issues as larger cities, especially regarding forward-thinking planning for transportation systems. In fact, midsize cities are still a significant market for smart transportation systems.

Every year traffic increasing is increasing by 30 % and transportation system technologies are also evolving faster than overall government strategies. Adding to the public transport department 'chaos': the increasing of massive amounts of data related to transportation systems, including machine-generated big data. For the cities, data is a key asset for the planning, control and advancement of smart transportation systems.

When smart transportation systems take advantage of big data analytics, the value that results includes optimized infrastructure management and operations, as well as improved transportation services in terms of variety of modes, safety, reliability, and efficiency. Transportation data analytics also contribute greatly to real-time improvements to User.

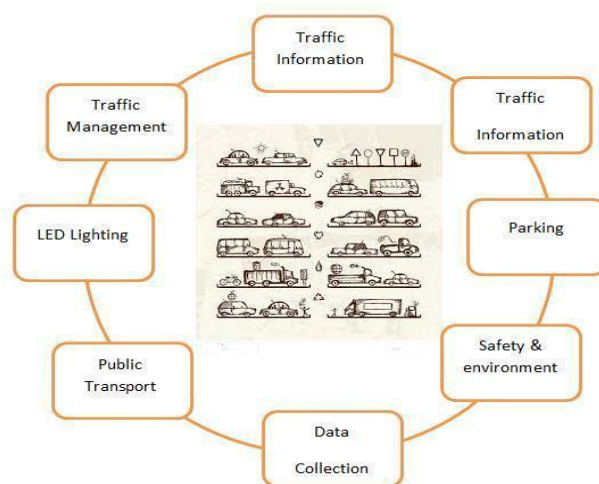


Fig 5: Transportation System of small cities

Types of transportation data include:

- Users of transportation's behavioral data – data from social media sources, video data, data by monitoring, data by conducting survey
- Transport demand and system use – data by monitoring data, data from machine-generated sources
- Socio-Economic data – use of land, demographics, income information
- Mode of Transportation services – frequently as machine-generated data from sensors and meters.
- Traffic management data – data primarily from machine-generated sources.
- Infrastructure – Railways, roadways, facilities, vehicle fleets
- Environmental impact –air pollution, local health concerns, other pollution.

We can store many forms of data using big data technique and using different analytics tool we can get some useful and valuable data which will help us to enhance overall transportation system as shown in Fig-6.

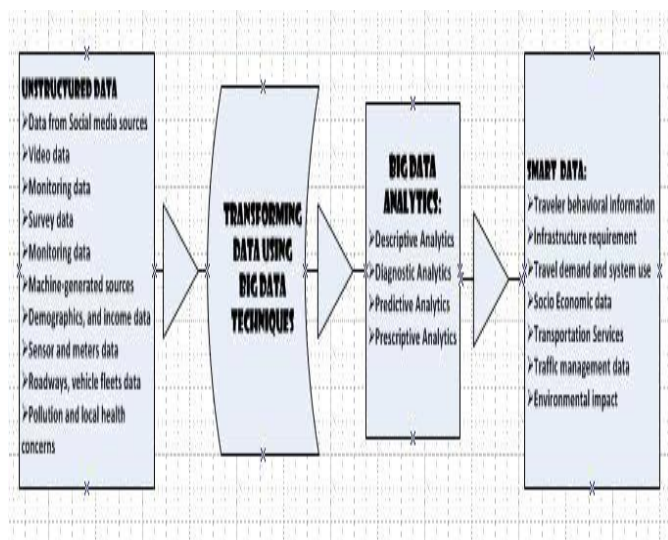


Fig 6: Conversion of big data into smart data

Cities transportation networks often exist in a bionetwork of transportation modes and other Transport management entities in order to consolidate overall vision, resources and functions, which can lead to better result for all. Data from different sources as shown in Fig-6 should support Smart transportation systems across modes, functions and stakeholders to show the value of collecting all relevant data, as well as being able to deliver data to different data management and analytics structures. A "stakeholders" aren't just humans it can be machines and automated systems

.These stakeholders are around-the-clock consumers of transportation data.

A. Managed Services for Smart Transportation Systems

Managed Service Providers (MSP) can make big difference by concentrating on specific job like backup, data recovery, security 24/7/365 days monitoring, user management, network management, system management and many more services for the creation of Smart Transportation system. By availing industry-specific services means developing in-depth expertise in Smart Transportation System, this will help to solve the problems that needed to be solved.

Managed services can be developed to help small cap cities to improve Smart Transportation Systems through the use of Big data analytics. The focus should be how we can provide effective services and solution to the user through cloud platforms, big data analytics tools, and broadband telecom network.

Apart from providing different services to govern and improve urban transportation, managed services providers can help small cap cities understand how to use valuable data to enhance transportation system in many ways:

- Interaction with user through Transportation system
- Promoting different transport modes
- Offering new services which can be used to generate new revenue
- Easing traffic congestion
- Quick and real time response to any action



- Measuring the effectiveness of current decisions and actions
- Suggestion to improve air pollution
- More safety measures
- Smart parking

Above mentioned services and solution should be tailor-made for small cap cities to keep costs down and provide exactly what these cities need for faster, more effective transportation systems to better serve their citizens.

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