iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** IV **Month of publication:** April 2021

DOI: https://doi.org/10.22214/ijraset.2021.33758

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue IV Apr 2021- Available at www.ijraset.com

Big Data Analytics in Government Sector, A Way to New Governance

Hiteshkumar Vora[1], Aastha Dani[2], Hardik Mirani [3]
[1, 2, 3]*Information Technology, Nirma University, Gujarat, India*

Abstract: ***In this new era of technology and development all the major fields are working on information technology. As new and new fields come in information technology, the data generation is reaching its spikes. In today's world a huge amount of data is generated regularly so it becomes too complicated to analyse those data. For this purpose big data comes as a blessing which can handle the huge amount of data in any format. For handling the data of the Government sector, it becomes too complex a task when the population of the country is too huge. Here this paper presents the idea and application of Big Data in Government. How government facilities can be increased and data management becomes easy as well as fast.***
Keywords: Big Data, E-Government, Digitalization, Management, Online Services, Enforcing laws, Prediction

I. INTRODUCTION

While talking about Big Data, it becomes necessary to know how much data can be considered as big data. In the year of 1999, the data generated was about 1.5 exabyte of data and at that time 1 gigabyte was considered as big data[1]. But now a day scenario is totally different. In the year of 2006, the data generated was estimated 160 exabyte which was more than 1000% in the year of 1999 and this change occurs in a time span of 7 years only[1]. And in the current time these numbers are too huge. In this era of Zettabyte 1 gigabyte is no more a big data, now big data starting with at least an amount of 1 terabyte. But it is not always about the size of the data, many researchers and experts give different definitions for the big data.

According to some researchers data can be considered as big data if it has V properties. For the big data 7 'V's[2] are defined but 4 of them are considered as most important. Here all the 7 Vs are considered for better and wide understanding.

Figure 1 : 'V's of Big Data

First V is Volume of the data, its concern with the amount of data i.e. how large the data is. The second V is Velocity which concerns the speed at which data is generated. Due to the new sensors and other technologies, data generation increased very dramatically in the last two decades. The third V stands for the Variety; it is for the types of data presented. In big data all types of data are accepted, data might be Structured like SQL or Unstructured like video, mp3 etc. The fourth V is for Veracity; its major concern is about how valid data is? It is about the truthfulness or accuracy of the data. The fifth V stands for the Validity; it means how the data is valid for the application in which it is going to use. It is possible that the same data can be valid for one application but for the other it may be not valid. The sixth V is for the Volatility of data, it is all about time, for how long the data will be in the system/application. The last seventh V represents the Value of the data; this V is different from all other Vs of big data. It shows the valuable output after the competition of the process.

Big data is now needed in every sector because in all the organization and sectors data are generated very rapidly. To handle those data and extract information from those data, big data analytics is required. Some major applications of big data are education, healthcare, IoT, Government, finance, retail, media and entertainment, e-commerce, telecom, travel etc...

In this evolving era of technology, the government is also required to use big data analytics for various purposes. Big data can be the blessing technology for countries like India where huge amounts of data are generated regularly. Big data can serve all the citizens as well as the government in easy, quick and smooth functioning.

II. GOVERNMENT

Government is considered as a group or organization which handles the all work of the entire nation. Different countries have different forms of the government. All the governments are responsible for handling the management of a particular country. In the government sector big data can handle issues like, traffic optimization, cyber security and intelligence, crime prediction and prevention, weather forecasting, drug evaluation, tax compliance etc...

III.BIG DATA ARCHITECTURE FOR THE GOVERNMENT SECTOR

Governments have a huge amount of data so that it is not possible to store all those data at a single place. It is preferable to use the distributed server but it becomes expensive so the simplest solution for that is to use the cloud storage for an easy, cheap and convenient way. The following figure illustrates the architecture of big data in the government sector.

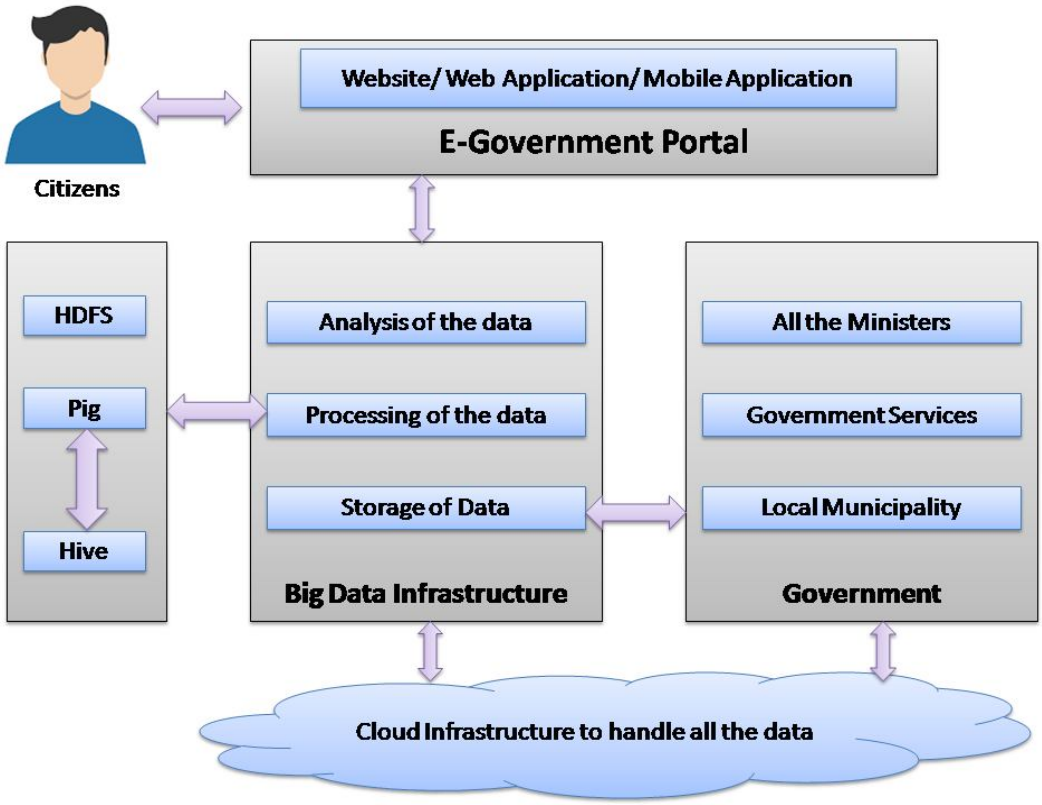


Figure 2: Architecture of E-Government

As shown in the figure all the citizens of the country can access the facilities of e-government from either of the given options i.e, website, web application or mobile application. The first task for the government is to have all the facilities and data online. Though it seems to be expensive, it can save more time and provide easy functioning to the government. After having all the data online, those data can be stored in the cloud infrastructure alternative of the cloud is to have a distributed server, but for some countries it becomes too expensive so cloud can be proven as a better option. As the data stores in the cloud infrastructure then it can be managed by the HDFS and using the facilities of Pig and Hive desire information can be achieved. HDFS makes data available in all situations and it can also manage to create replicas of the same. As all the details are available it becomes easy to perform the analytics on the data. All the handling of the data can be handed over to the authorised body of the government. All the data can't be handled by a single government body if the population of the country is too high. So the simplest solution to this problem is to give access to the local municipality to the citizens. All different municipalities have all the data and access to the data of their regions. This local access can help to take quick action on any situation. As the centralization is also required, the ministers of the state or country can manage those things. Above the local municipalities the higher access provided to the state government and above the state government more authorities will be provided to the central/union government. In some situations like drug evolution can be handled by the central government, weather forecasting can be handled by the state government whereas traffic can be managed by the local municipality. Using the big data technology not only the data can be managed but also prediction can be done.

IV. DIGITAL INFORMATION

All the data of all citizens need to be in the digital form. Starting from the birth to the death all the data and information should be in digital form only.

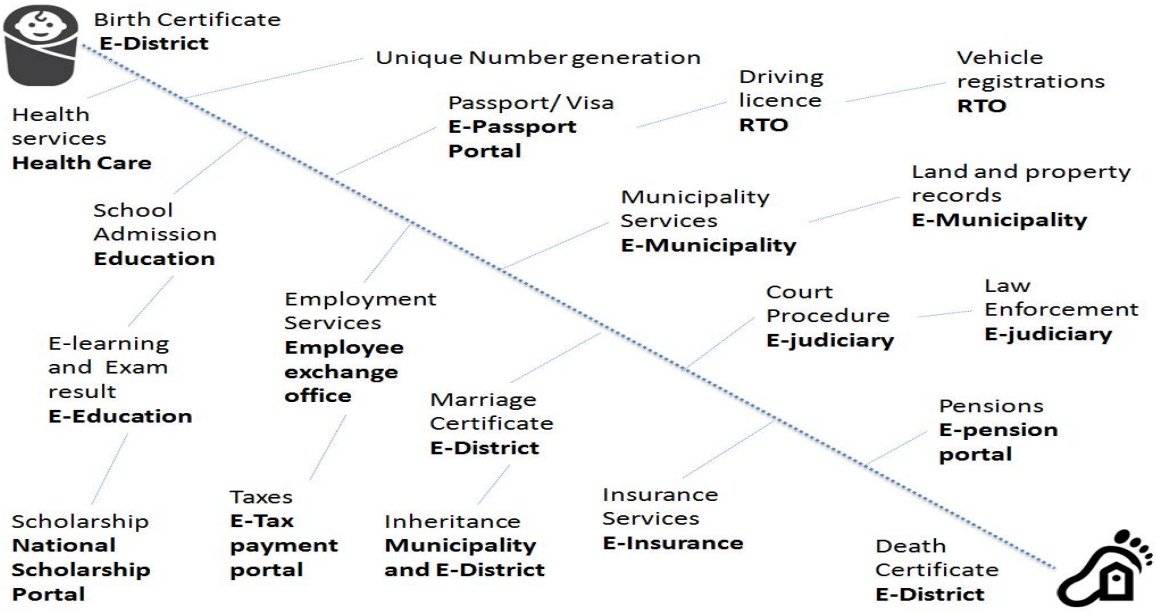


Figure 3: E-Government services to citizens

In any country, data of the citizens is the most important. If a country wants to provide all the information through the digital form then they must provide the facilities of all the portals in digital form. As shown in figure 3, all the majority of the services can be provided in digital form. Then the question arises over here is that, how is the big data going to be helpful in this matter? Answer for this question is simplest. If all the data of all the citizens is online then it is a huge amount of data and to process those data and fetch the meaning full information or to gain knowledge from that data, big data plays a vital role. Here the figure 3 illustrates the whole process starting from birth to death. As and when any baby born within some period of time his/her information has to be stored on a government website. Then the birth certificate should be issued to the new born by the government authorities at district level via e-district services. Then all the information regarding the health also digitalizes to understand and analyse the data of the newborn. Some meaningful information like, how many newborn faces health issues on birth, in which area particular diseases are spreading, child death ratio, parents information and many more analyses can be done using the big data architecture. As all data will be in digital form, big data can help in all the ways.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue IV Apr 2021- Available at www.ijraset.com

From birth certificate to death certificate all things can be managed using big data. An education system, result and e-learning can be done using this method. Government can identify the future job requirements of the people and take some actions accordingly to reduce unemployment rate. Government scholarship schemes can be managed using the same. It becomes easy to predict how much scholarship is required in upcoming time. From this information the government can make a budget. Government should provide e-passport services and it becomes very easy using big data. Any citizen can apply for the passport and all the verification done using the big data. This can increase the speed of these facilities. Like passport vehicle registration can be controlled by digital methods. According to the people's choice and rate of purchasing vehicles, the government can plan a city development so that in future there will be less chance for occurrence of traffic. Marriage certificate, land ownership, inheritance of property and all those things can also be analyzed and disputes can be solved using this technology. Court and judiciary can also be managed by the government. By analysing the old records the government can take actions in future for better administrations. Pension and insurance data also be analysed for the future references and actions. If all the data managed by the government properly then much workload can be reduced. Some of the usage is described below.

V. CRIME PREDICTION AND INVESTIGATION

In a populated country like India and China, crime prediction and investigation becomes a major issue. All the citizens' data should be available to the police officials. If police have data of all the persons of the area then it becomes easy to solve the issue by matching the biometrics of the criminals. Here a model of big data is presented which can help the police to solve the case as well as to predict the crime.

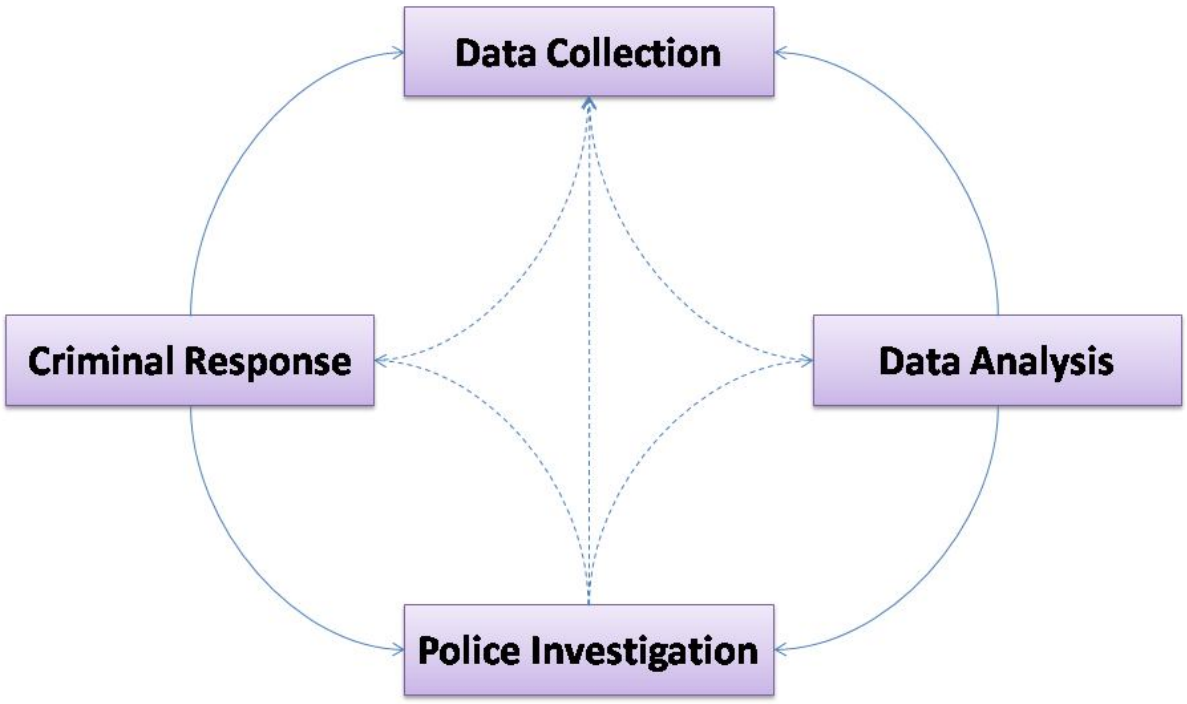


Figure 4: Crime prediction and investigation

As shown in the figure 4, police can predicate as well as investigate the crime using the big data. At the first place all the data about the crime performed till date needs to be stored in digital form. Then all the records can be analysed and prediction of crime will be likely to be happening in near future. For example, every time a mega festival time thief and robbery is committed in some particular area, then the system can predict that this kind of act is going to happen in some period of time so that police can prepare likewise. This data also helps the police to identify the suspects. Police can take help of biometric of the criminal and if the same criminal perform/committed crime for a second time then for the police it becomes easy to catch the criminal. Criminal response also needs to be stored into the system so that any new crime prediction can be done using the pattern identification in the data. In this manner it becomes easy and more convenient to identify suspects and proper utilization of resources can be possible. Using the big data, it is possible to decrease crime rate by enforcing more convenient/strict laws in particular areas.

VI. E-BANKING AND FINANCE

In banking and finance, the government can take advantage of the big data. All the banks are under a central bank of the country, so the central bank can take details of the income, tax payable, investment and all other details of every individual citizen of the country. From these huge data, prediction about the future investment or any fraud likely to happen can be determined. By providing all the banking facilities online tax calculation as well as other important information easily available to the government. Government can also regulate the cash flow in the country. As far as the finance part is concerned, security becomes a major barrier. For some countries this might not be possible due to the lack of education and awareness of the technology.

VII. TRAFFIC MANAGEMENT

Traffic is now becoming one of the major issues in many parts of the world. Big data can also help in solving this issue as well. At the local level of the government traffic information can be gathered. In mega cities sensors and location facilities also are used to gather information of the traffic occurrence. In the area where usually traffic occurs, using big data technology and information gathered it becomes possible to find that place and possible solutions for that as well.

VIII. WEATHER FORECASTING

Weather plays a vital role in the development of any country. To identify the weather condition a huge amount of data needs to be analysed. It can also be done with the help of super computers but it is too expensive so that many countries can't tolerate its expenses. With the help of big data, all the data can easily analyse the system and weather situations can be determined by the metrology department. Moreover it is also possible to collect data from various sensors fitted in specific locations for higher accuracy.

IX. E-TAX FACILITY

Government can start this e-tax facility so that every citizen can pay the tax easily and it becomes easier for the government to identify the tax details. By applying a process on this huge data the government can predict the tax for the future and likewise the government can create a budget for the country. Moreover as all the things on digital form, using the big data methodology and programming it becomes possible to identify the people who are not paying full tax. By applying proper methodology a clear cash flow can be generated.

X. DRUG EVOLUTION AND HEALTH CARE

Health is the real wealth. For any country, healthy citizens are the major resources for development. Big data can help the county in development and production of any drug. The most recent example is vaccination against covid-19 virus. Big data helps to develop the vaccine as well as it can be used in vaccines drives running by various countries. It is possible to use this technology to determine the effect of vaccines on the people, so that it can be useful in future. Tracking and tracing of the patient can be done by this new big data technology. In addition to this health care can be managed. It becomes easy to identify the attack of particular diseases at some place in some period of time so that the government can utilize resources properly and it can save the lives of people. For example, in some regions of India during monsoon malaria disease is likely to spread. So if all data can be analysed using big data technology then a pattern of any disease can be identified and the government can take percussive action for that. Moreover drugs stock is also managed by this kind of portal. How much production is there for particular medicine, how much required every year. From this kind of information the government can make decisions like, need to import any drug or it is convenient to export a particular drug. Government can also look for the incising production in the country.

Apart from the above mentioned area, Big data can help in analysing the diseases and making medicines for that. At the present time all new drug which are developed is tested on the animals. It should not be done. So here big data can save the ecosystem by providing the same thing. If all the information about the human body is transferred in digital form then it might be possible to test any drug in the computer system rather than putting the animal's life in danger.

XI. CYBER SECURITY

For any country cyber security is a major issue. If all the data is available on line then protection of that data must be required. In this matter big data can help to manage this security. By analysing the data of access big data can provide security to important data. In managing the access of the website to the users can be controlled using big data technology. Taking an example of any country where pornography is prohibited though citizen can access that site through different loopholes in the system. Using big data technology, the government can regulate these things. By accessing, storing and analysing locations data the cyber crime can be controlled by the government.

XII. DISASTER MANAGEMENT

Disaster can be either natural by human mistake, it harms the local people of the area. Government can have the record of all the plants which mightily cause the disaster, by using the big data technology the government can regulate all those things. It becomes possible to keep track of all these risky plants and disasters can be avoided. While talking about natural disasters it is not possible to avoid it but management can be done in such a manner so that it causes minimum damage. By using various kinds of sensors and its data, it becomes possible to predicate a disaster before it happens. Not all but some disaster can be predicted and action can be taken accordingly so that minimum loss should be there. Even if disaster causes damage, recovery can be managed with the use of technology.

XIII. 3-D MODEL CREATION

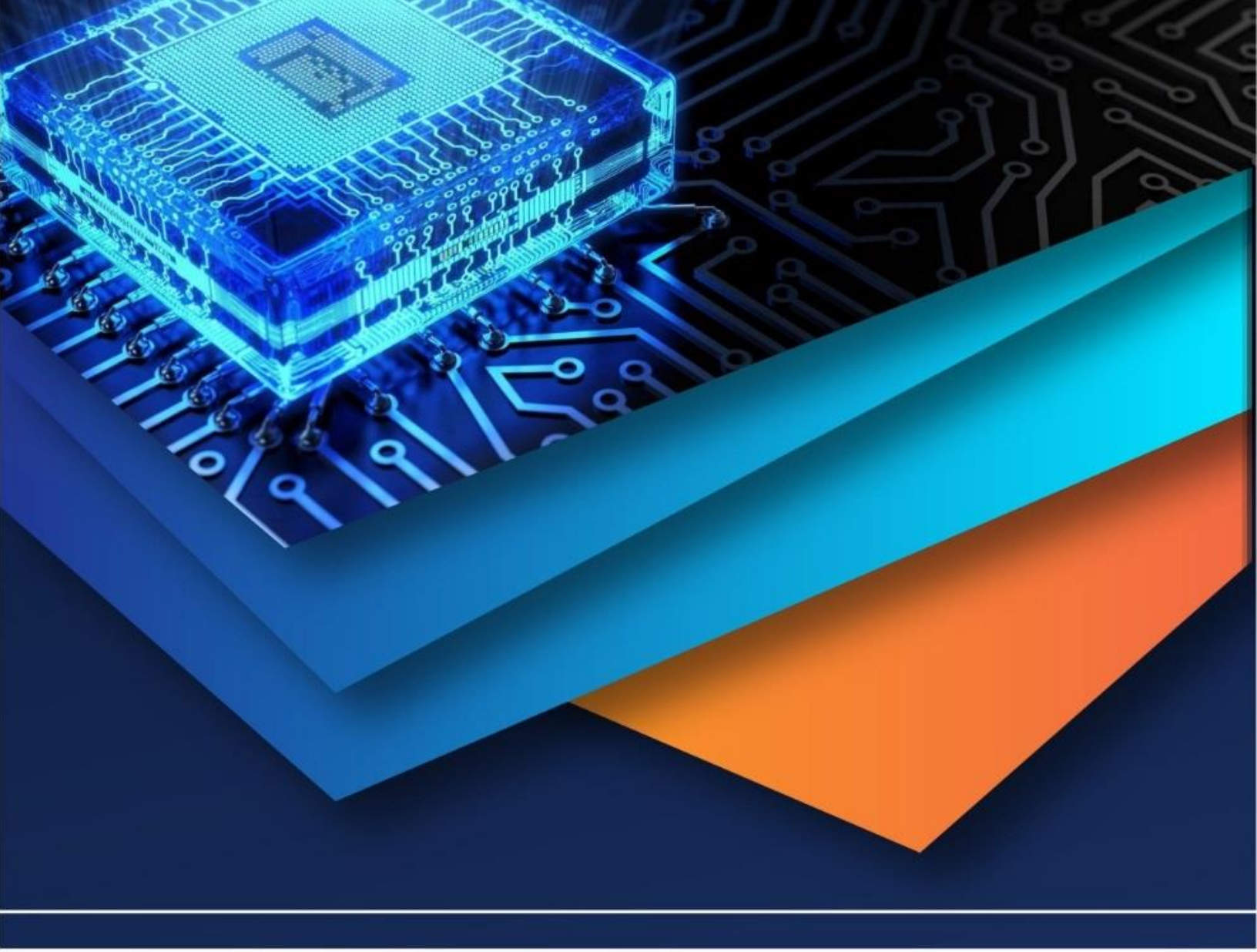
Government should create a 3-D model of every city. For creating those models the government should use the method known as satellite photogrammetry which can help to create a 3-D model of the city. This model can help in disaster management. Using the big data, it is possible to predict the effect of flood or tsunami in the city and percussive action can be taken by the government. This model can also help to develop various cities in beneficial manner and in proper architecture which minimize the harm to nature.

XIV. CONCLUSIONS

Big data can be proven a blessing of technology to the government. It can save time as well as help the government to predict the future risk. This new way of government can enhance the life of the citizens to the new level. With the digitalization and analysing the data using big data methodology, an important data gets when it is required. Big data can also help to combine all the sectors with the government sector to create such an environment where all details can be achieved on time and prediction of any situation can be done before occurrence of the problem. This new government can serve the citizens of the country.

REFERENCES

[1] https://towardsdatascience.com/how-big-is-big-data-3fb14d5351ba#:~:text=The%20term%20Big%20Data%20refers,gigabyte%20was%20considered%20big%20data.
[2] Seven V's of Big Data Understanding Big Data to extract Value, M. Ali-ud-din Khan, Muhammad Fahim Uddin, Navarun Gupta
[3] Big Data in Governance in India: Case Studies, Elonnai Hickok, Sumandro Chattapadhyay, Sunil Abraham
[4] Big Data Analytics in Government: Improving Decision Making for R&D Investment in Korean SMEs, Eun Sun Kim, Yunjeong Choi and Jeongeun Byun.
[5] National Crime Records Bureau. "About Crime and Criminal Tracking Network & Systems - CCTNS." available at http://ncrb.gov.in/cctns.htm
[6] Paul Makin, Steve Pannifer, Carly Nyst, Edgar Whitley, Digital Identity: Issue Analysis.
[7] Thomas Davenport, Big Data at Work: Dispelling the Myths, Uncovering the opportunities, Harvard Business Review Press, Boston, 2014.
[8] Big Data application by Edureka, available at https://www.youtube.com/watch?v=skJPPYbG3BQ&t=1146s.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY