BIG DATA: SMART AGRICULTURE

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ABSTRACT

Around 2050, as the world population will be over 9 billion, the food shortage is expected to increase. According to researcher's ultimate solution lies in greater agriculture produce—a process full of vulnerabilities. Investing in ease and refined cultivating & IT tools might not be enough to address the problem of food scarcity. In this scenario big data ventures in. It not only vouches to improve and track harvests, but also has the potential to increase yield production. Modern data-gathering technologies are expected to prove to be transformative, enabling farmers to generate better agricultural produce. The objective of this paper is to highlight on how big data analytics can be used as a tool to reduce food scarcity and its implementation status in India.

Keywords: *big data, agriculture, food scarcity, farmers*

INTRODUCTION

According to experts here, the importance of big data can be gauged from the fact that 90 per cent of digital information worldwide has been created over the last two years, while processing power has increased by 40 per cent between 2010-16. At the same time the cost of storing data has gone down 500 percent (India's challenge is how to use big data for better governance , 2013) Patel et al. (2017).

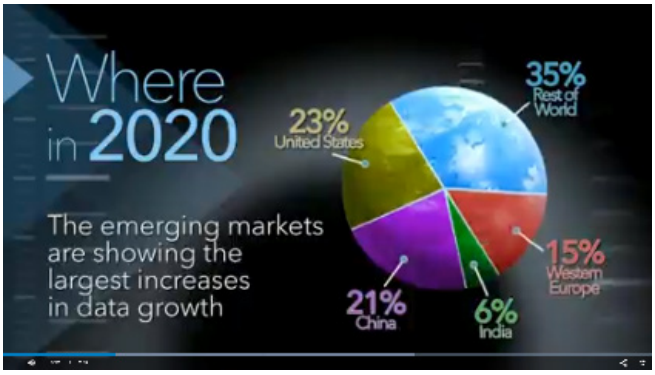
Big data means immense data of a particular domain or pertaining to it; whose proliferation is exponential. Thus, traditional databases cannot provide support for it. As this data can be structured, unstructured and semi-structured its complexity is also high. Big data term is just a decade older. The main traits which appropriately defines big data are :

Volume: From last decade there is proliferation in sources of data and new technologies have been ushered in for its processing and storage.

Velocity / Variability: is the frequency of incoming data that needs to be processed (dummies.com, 2018). The flows can be highly inconsistent with periodic peaks. Daily, seasonal and event-triggered peak data loads can be challenging to manage. Even more so with unstructured data. RFID tags, sensors and smart metering are driving the need to deal with torrents of data at an unprecedented speed and must be dealt with in a timely manner (ntnu.edu).

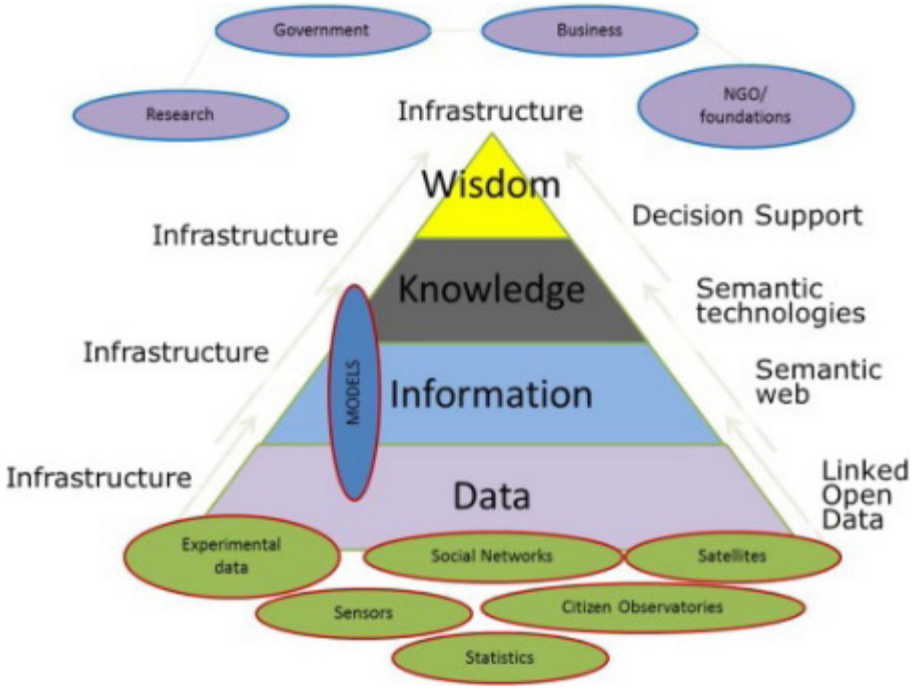
Variety: Data comes in all types of formats – structured (numeric data in traditional databases), unstructured (text documents, email, video, audio, stock ticker data and financial transactions) and semi-structured (sas.com).

Veracity / Value: Veracity refers to the trustworthiness of the data. It focusses on a real objective which is critical to this mashup of the four V's (dummies.com, 2018).



Another attribute as per SAS for Big data is **Complexity** and it deals with data coming from multiple sources, which makes it difficult to link, match, cleanse and transform data across systems. However, it's necessary to connect and correlate relationships, hierarchies and multiple data linkages or your data can quickly spiral out of control (sas.com).

Prior to 2012 the US was the largest single contributor (32%) of global data, India, China and Europe



contributed about 4% 13% and 19% respectively. In 2012, the amout of information stored world wide exceeded about 2.8 Zetabytes. Till today only 0.5% of data is analysed. By 2020, the total amount of data stored is expected to be 50x larger than today and emerging markets like India and China are showing the largest increases in data growth (sas.com).

The importance of big data doesn't revolve around how much data you have, but what you do with it. Data can be from any source which is analyse it to find answers that enable 1) cost reductions, 2) time reductions, 3) new product development and optimized offerings, and 4) smart decision making.

When farming processes are data driven and data enabled via Internet of Things and cloud computing it is called smart farming. This is possible by vast usage of smart machine and sensors in the farm for various processes.

The growing demand for food and shifting food security needs are driving innovation in the resource space. World is now more inter-connected, spawning massive data and exploration of these data can help to drive decision making that can transform the farm source-to-consumer value chain (sas.com). The challenges and opportunities of data is immense in a country like India with 638,000 villages and 130 million farmers speaking around 800 languages with 140 million hectares of cultivable land under 127 agro climatic regions capable of supporting 3,000 different crops and one million varieties. Agri-businesses are subject to numerous regulations and consumer requirements across their supply chain. Of the several touchpoints along the agri-value chain like on farm production, soil health, water requirements, nutrients, pest and its control, energy, traceability and tracking, supply chain management, processing, inspection, transportation, storage, retailers, inventory, access, smart refrigerators, food safety, ripeness, waste, smart services etc. hold critical information that can help businesses make the most of their resources, provide greater transparency in their processes and protect consumers.

Investing in sophisticated farming tools might not be sufficient to address the problem of food scarcity. This is where big data steps in. It not only promises to optimize and track harvests, but also has the potential to increase yield production directly and to ensure that it is avail to needy. Modern data-gathering technologies are expected to prove to be transformative, enabling farmers to generate better agricultural produce. Proliferation of data offers unprecedented opportunities to understand consumer needs and preferences of agro climatic regions and farmers, and to deliver tailored services that can make sense of this data in near real-time.

Big Data and advanced analytics are streamlining food processing value chains by finding the core determinants of process performance, and taking action to continually improve the accuracy, quality and yield of production. Big Data is already being used for optimising production schedules based on supplier, customer, machine availability and cost constraints.

In India, with farm prices of several commodities falling way below their minimum support prices in 2016-

17 and 2017-18 farmers have been under increasing stress. India should look at establishing a systematic mechanism to capture the data that could offer additional value-creating opportunities. In particular, rapid proliferation of mobile technologies in rural populations could let farmers in these areas to improve productivity based on decision made backed by better information grounded on Big Data. It also has the potential to change the agribusiness models including revenue models, as businesses will have the opportunity to offer new products and services thus developing sustainable revenue streams.

With specific crop history data on every field in the country, agriculturalists can now predict their potential harvests better. In fact, farmers and agriculturalists could also benefit from big data to monetize crop yields. By aggregating local pricing in real time and automatically computing transportation costs, farmers can get the best prices for their products without a mediator. What used to take them a couple of hours a day, could now be accomplished in minutes. Thus, smart farming applies not just to the process of farming, but also up to the point where the products are delivered to its end customer.

It can provide agri-business with greater visibility into supplier quality levels, and greater accuracy in predicting supplier performance over time. In India, every year 21 million tons of wheat is lost, primarily due to scare cold-storage centres and refrigerated vehicles, poor transportation facilities and unreliable electricity supply. Big Data has the potential of systematisation of demand forecasting thus reducing such losses. Thus, it can take care of food security also.

BIG DATA: CHALLENGES

Big data requires data which is to be captured from heterogeneous sources. These sources should be interconnected as they may not be in same premises or region. There has been huge leap in internet user and mobile user in 2017. Big data deals with near real-time support and thus for it mobile connectivity is more important. In India, as per report of Internet and Mobile Association of India (IAMAI and KANTRA-IMRB number of mobile internet users is estimated to touch 478 million by June, 2018. Out of this 187 million will be rural users. In order to provide better support to agri-business, connectivity is the most prominent factor which has to be optimum. There is need to develop set of better Decision Support System capable of providing solution in real time. Ultimate goal of farmers is to get better yield and best returns, so the assistance should be cost effective. Integrity and consistency of the information provided should be maintained and this is only possible if there are no ambiguities. Also, care should be taken about redundancy of information from multiple sources of information. All information should be avail from single desk or app and that to in a regional language. Even Decision Support System should be in regional language and easy to understand. A single repository should be created for data generated all over India and its should be openly accessible without compromising individual or group of individual interest. Thus, in this context strengthening of cyber security and storage is required.

CONCLUSION

Big data can play a nifty role in agri-production cycle and provides immense opportunity to increase yield. It also takes care of its optimum and optimistic utilization by controlling supply chain in context to demand. India has got huge capacity of cultivating various crops and Big Data can usher in iota phase of its production in near real time. As percentage of marginal farmers is higher in India, supportive systems of Big Data will be costly for them. An initiative from Indian Government at country level can mitigate farmers' problem and also ensure food security for people.

REFERENCES

Chauhan N. B., Patel, J. B. and Vinaya Kumar, H. M. (2016). Innovative ICT Models for sustainable agricultural development. *National Seminar SEEG-2016*: Lead Paper, pp: 75-80.

dummies.com. (2018, 03 28). Retrieved from .dummies.com: http://www.dummies.com/careers/find-a-job/the-4-vs-of-big-data/

India's challenge is how to use big data for better governance . (2013, Oct 06). (The Economic Times) Retrieved Aug 10, 2018, from //economictimes.indiatimes.com/articleshow/60970320.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

K. P. Patel, D. K. Parmar and R. S. Parmar (2017) Digital enabled vegetable selling. *Guj. J. Ext. Edu.* 28(2):313-317.

ntnu.edu. (n.d.). Retrieved 04 01, 2018, from https://www.ntnu.edu/ie/bigdata/what-is

sas.com. (n.d.). Retrieved 04 01, 2018, from https://www.sas.com/en_us/insights/big-data/what-is-big-data.html

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