Big Data Solutions for Natural Sustainability

Sustainability is a big focus for organizations worldwide. This article describes how Big Data can be useful to address the key challenges of Natural Sustainability. Big Data solutions combined with the increased collaboration across governments, social organizations and corporations will help solve some of the biggest challenges of the mankind.

The world population is estimated to reach 9 billion by 2050 and is expected to put a tremendous pressure on the resources like food, water, air and travel. Global warming is likely to increase the earth temperature by another 2-3 degree Celsius by 2050 which is sufficient to upset the natural balance. Each of us experience every day the inklings of what is to come in future in forms of untimely blizzard, rash summers, no rainfalls, cloud bursting and much more. It is no surprise that the world over Natural Sustainability has been a major focus for governments, social groups and corporations. Organizations have been trying to address the Sustainability challenge using a variety of simulation techniques and using the data from weather history, industrial output, macro-economic and population distribution. Besides the uncertainty in the simulation, the unavailability of the data and the lack of technology which can work with scattered and the variety of data in a reasonable time have emerged as the main challenges.

Big Data is highly relevant to Sustainability issues. Most of the Sustainability related issues are related to predictive modeling or resource optimization which can be handled by Big Data techniques provided the data is available.

Many of us have already heard about Big Data, a significant development in the IT arena. Big Data refers to the set of technologies which enable collection, storage and processing of massively large datasets from all possible sources and at such a fast pace that it is impossible to manage them with the existing systems. We believe Big Data is a key solution towards Sustainability. We use 'Green Big Data' to refer the application of Big Data technologies to solve Sustainability challenges such as water crisis, urban planning, agricultural output, global warming, cyclone damage, volcano eruption, earthquakes and cloud bursts.

From Analytics stand point, there are two broad categories of Sustainability problems. First category belongs to predictive modeling which is used to predict the occurrence of events like earthquakes, volcanoes, cloud bursts and cyclones. Early and accurate prediction of such events can lead to timely mitigation planning and savings of trillions of dollars and thousands of human lives. Government agencies and many social organizations are already working on this challenge using powerful and expensive computers but the accuracy and timeliness has been a problem. Most of the times, it is either because they don't have the technology to process the vast unstructured data or because the processing is very slow resulting into an untimely response and a huge loss. Imagine if the Indian Tsunami of 2004 could have been predicted a few weeks before it actually unleashed a havoc and killed 250,000 people who were completely unprepared to face the situation. Imagine if the 2010 Iceland Volcano eruption and subsequent flight disruption could have been predicted in

advance. Recent cloud bursting in Himalayas claimed 50,000 lives and billions of dollars in losses. All these events could have been predicted using real-time satellite imagery combined with massively large historical environmental structured and unstructured data. Timely prediction of such events can help in preparation and minimize the loss of human lives and resources.

Second category of Sustainability challenges such as urban planning, water crisis mitigation and reduced agricultural productivity belong to optimization and reporting. World over and especially in developing countries of Asia and Africa, people face severe water problems. Either they don't have a clue of impeding problem or they don't know how to tackle them. Imagine the benefits of optimization of water usage, recycling, and water reuse in a city like Dubai. Population growth will lead to development of new cities and pressure on existing cities to demand optimization of the use of resources. Big Data can play a significant role in urban planning. City like New York and Tokyo can improve its power distribution network and significantly reduce losses from infrastructure and maintenance problems. Traffic congestion is another problem seen in cities world over which can be reduced using the Big Data optimization.

Increase in the food production without soil exhaustion and contamination of soil and water and at the same time increasing the profit is a big challenge. Big Data can help integrate information of soil history, nearby industries, crop productivity, time to market, soil and water contamination and type and volume of fertilizers and analyze all at the same time resulting into solutions for improved productivity, minimal environmental damage and better returns on crop yields. By certain estimates, 20% of the crop is damaged from the time of harvest to the time it reaches store houses. Providing a sustainable and profitable agriculture would fulfill the fundamental need of increased population in years to come.

Big Data has a role to play in increasing the agricultural productivity. Proper planning could lead to reduced wastage and increased output and without damaging the environmental resources

Big Data can be used to measure the impact of global warming and increased fishing on aquatic ecosystem and suggest remedial measures such as preferred fishing regions, sea routes and waste disposal. Power dissipation in electrical distribution networks is another big challenge specially for developing nations. Big Data can be very useful to plan the power production and distribution networks and identify regions which can use renewable sources of energy like solar and wind.

The point is not that 'Big Data' is a panacea and has solutions to all the Natural Sustainability problems but the point is that 'Big Data' provides a powerful technology which could prove immensely useful to solve some of the biggest problems of the Natural Sustainability. The need is to give a serious consideration to Big Data.

DataMente provides consulting services related to the use of Big Data in solving Natural Sustainability challenges. For more details contact info@datamente.co