The Importance of Big Data in Disaster Relief & Prevention

PUBLISHED BY:

LIVE EARTH

Trusted by Organizations & Agencies Around the World

www.LiveEarth.com

Introduction

Big Data involves a huge amount of information. Studies conducted in 2018 showed that 90% of the world's data had been created during the previous two years, according to a December 18, 2018, Dataconomy post.

Much of this information had to do with disasters, but only a portion of that information was used to facilitate better disaster response. Technology continues to quickly advance while emergency communications continue to fall short of meeting their full potential. We'll examine how Big Data can aid in future disaster crises.

What is Big Data?

Big Data refers to the massive amount of information that is being collected from many sources, analyzed using advanced computer algorithms, and then used to make better decisions.

Sources of information include past event statistics, current satellite images, drones, the Internet of Things, connected medical devices, smart watches, mobile phone apps, social media inputs, information telephoned into 911, and many other sources that are both historical and real-time in nature.

Besides aiding with emergency communication and disaster response, Big Data helps to combat crime, prevent diseases, and conduct biology and environmental research. Computers use it to perform complex physics simulations, connect omics, genomics, business informatics, urban informatics, fintech, internet searches, and other information-processing activities.

Large swaths of raw data points, better referred to as Big Data, encompasses massive amounts of information being collected historically and in real time. Big Data creates challenges for users because volume, variety, and velocity at which data is stored and presented. Additionally, interpretation is a massive hurdle to overcome because most raw data is useless without being able to contextualize the information.

Luckily, there are initiatives out there trying to provide solutions to these problems such as improving data collection and message dissemination to help jump-start a coordinated response to looming disasters.

The Importance of the Three P's

Disaster management is made up of four key elements of prediction, prevention, preparation, response, and recovery. Big Data can help with all four elements.

Computers can use large amounts of prior event information to detect when a current situation is falling into a known pattern. Thus, Big Data can be used to perform user behavior analytics, predictive analytics, and so on to predict the weather, pinpoint flooding, map evacuation routes, and so on...

Various entities use Big Data to predict weather-related events. According to December 18, 2018 Dataconomy blog post, the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), and other agencies used Big Data to predict Hurricane Harvey's landfall in 2017.

The ability to accurately predict future disaster events encourages people to better prepare. As an example, if a powerful hurricane is coming toward a community, informed people in that community can board up windows and leave town. While homeowners can't prevent the hurricane from coming, early warning allows people time to mitigate a hurricane's damage and mitigate the losses suffered to individuals and businesses.

There is also the looming issue of coordinating the recovery process after a disaster has struck your area. This is where it's imperative for insurance companies to work with homeowners, businesses, and organizations to coordinate recovery and help those displaced by the disaster.

For example, one of the first acts of response after a hurricane or tornado is working with local officials to restore power to the area. Through big data analysis, utility companies can discern which areas are most heavily affected by mother nature and invest the most resources to initiate recovery.

Some types of disasters can be prevented altogether if people are forewarned. For instance, if Big Data indicates that the wind in a wildfire area will change directions, placing a ranch in the path of the raging fire, early emergency communication to the rancher would give him time to take action to protect his family, animals, and property. The California/Smoky Mountain wildfires present this type of situation often.

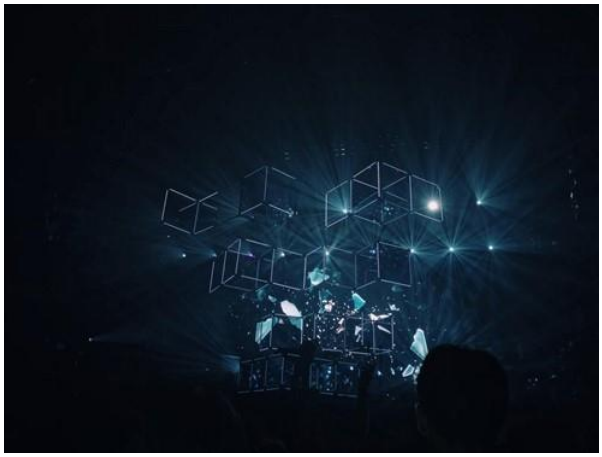
Why Big Data is Important to Disaster Prevention & Relief

Big Data is used to deal with hurricanes, tornados, earthquakes, and many other natural disasters. It was used to help victims of the Nepal earthquake, and it is currently being used to help victims of the COVID-19 pandemic.

As we've mentioned, computers analyze massive amounts of data concerning past disasters and couple it with current information concerning road conditions, flooding, weather conditions, stranded people, victims that come from satellite images, robots, drones, boots-on-the-ground social media information, and from many other sources. After analysis, they offer up the best answers and solutions. They can predict things like where a hurricane will make landfall and facilitate efficient disaster-related activities.

Big Data is used to locate stranded people and to compute the best logistical choices for first responders to reach them. Analyzed information also informs rescuers the best routes to take to get injured victims to hospitals when trees are down, or flood waters cover local roads.

The Federal Emergency Management Agency (FEMA) is part of the Homeland Security arm of the US government. Its job is to prepare states and local governments for disasters and other emergencies. FEMA collects huge amounts of information regarding disasters, hazard mitigation, public assistance, grants and the National Flood Insurance Program (NFIP). FEMA makes its information public and readable through an application programming interface (API).



Not only does the information make FEMA transparent to various entities, but it engages partners who would help to improve outcomes for disaster survivors. Much of what FEMA does is to help disaster victims rebuild their lives. This includes offering them temporary housing and federal grants.

Mass Communication in the United States

Effective communication is needed during any sort of incident, large or small, to properly manage and respond to it. The US media plays a vital role in getting crucial information out to large numbers of US citizens.

Much of the information is presented in article form online or in print by various US agencies. According to TRACIE Healthcare Emergency Preparedness Information Gateway, one government entity that publishes articles about specific national health threats online is the Crisis and Emergency Risk Communication (CERC) branch of the Center for Disease Control and Prevention (CDC).

For instance, to combat the fear and outrage caused by the Ebola outbreak a few years ago, CERC published an article that explained how Ebola was transmitted, the stigma associated with it, and how to best communicate one on one with Ebola victims. The CDC provides training material and does many other things to prepare citizens.

Emergency information is also disseminated by television and radio. Fortunately, says the CERC, journalists are more interested in reporting what has happened (or will happen) and how to stay safe than they are in sensationalizing stories during times of crisis. Information also goes out in various real-time avenues.

What is Social Media Mining?

The recent invention and wide-spread use of both smartphones and social media have enabled the immediate disbursement of information.

Social media mining is the term used for the boots-on-the-ground pictures and first-hand accounts regarding disasters and things shared through social media. These posts give information about things like roadblocks that satellite imagery often cannot decipher. With the many sources of information in hand, first responders can make lifesaving and time-saving decisions.

What is Crisis Mapping?

A natural evolution to crisis mapping came along in 2008 when a non-profit company named Ushahidi created open-source software that was an interactive mapping platform. Users get information from social media, text messages, and emails and then put it on a public online map. This real-time information, coupled with satellite imagery, gives a complete picture of a situation and aids in decision-making.

According to EKU Online, Crisis Mapping was first used to plot where the violent areas were following the Kenyan presidential election. The users plotted the individual bits of information on a Google map so that people would know the places they needed to avoid.

Social media information, satellite imagery, and mapping software can also work together to help rescue disaster victims. Crisis mapping was first done in 2010 during the Haiti earthquake. The U.S. Marine Corps and other first responders quickly located and recovered earthquake victims by studying the information that was entered into the crisis map.

Today, FEMA, the Red Cross, businesses, and other organizations use crisis mapping. The ability to look at situations from both a satellite view and boots-on-the-ground photos and testimonies enables the various entities to make better logistical decisions when seeking to either locate or avoid people or objects in pinpointed areas.

Connecting Displaced People with their Families

Google created “Person Finder” just after the 2010 Haiti earthquake to help people find each other. Even though it was new, this Google feature was updated about 5,300 times. Family members just entered the missing person’s information into the system and the system told them the information that was input about the status of the missing person.

Facebook started its “Safety Check Service.” It asks people whom Facebook knows are close to a disaster zone whether they are okay and for real-time information about the situation. This information is posted on the person’s timeline.

These two features are examples of real-time Big Data that individuals contribute during a time of crisis.

Event Stimulation

Emergency management organizations practice how to handle various disasters. Before Big Data, though, these event simulations didn’t give participants all the possible results because they didn’t have realistic statistics to work with. As a result, testing emergency action plans often happened during an actual disaster and improvements were made incrementally.

Big Data gives a large amount of statistical data from previous disasters. Organizations can see what worked and didn’t work for all sorts of scenarios they themselves may or may not have yet experienced. They can know what works best going into any situation.

How We Can Forecast and Prepare for Future Disasters

Having experienced a pandemic during the modern age, many companies now use more cloud computing, 5G, and machine learning more than ever before. TechRepublic reported that artificial intelligence (AI), 5G, and the Internet of Things (IoT) will top the list of important Big Data technologies in 2021 as companies deal with the aftermath of the COVID-19 pandemic.

COVID-19 has forever changed how some companies will do business in the future. Many companies will choose to let much of their workforce continue to work from home. According to TechRepublic, over one-third of businesses are more concerned about a future cybersecurity disaster because of the growth of IoT. However, 92% of CIOs and CTOs believe their companies are now much better prepared to deal with a data breach or a natural disaster.

Companies that rely heavily on data should have a Big Data disaster recovery strategy in addition to data backups in case an event knocks out the IT infrastructure. That's because backups alone would not be enough to get back up and running.

A comprehensive disaster recovery plan would enable a data-driven company to quickly restore normal operations after disaster strikes. This plan would include both off-site and on-site backups, Big Data recovery playbooks, data transformation tools, and data capture continuity.

For all forms of disaster, an established good relationship with the local media agencies will benefit all. Give your information to all the outlets at the same time and remain available to journalists.

Conclusion

NOAA recently reported that the US suffered 16 separate billion-dollar climate and weather disaster events between January and September of 2020. The 50-billion-dollar loss suffered during this nine-month time frame tied the annual records set in 2011 and 2017, according to the report.

This indicates that weather disasters will continue to increase in frequency in the years to come. That means that many more people will need to be quickly located, rescued, reunited with family members, and possibly helped to rebuild their lives. Pandemics will also come and go, shutting down the economy and putting pressure on hospitals, pharmaceutical companies, and other entities.

There will need to be even more efficient disaster response and real-time emergency communications. The aforementioned Big Data tools will continue to improve and rise to the challenges, as will the forecasting capabilities of NASA and NOAA. Data-driven companies should expect and plan for an IT infrastructure disaster.

Learn More

LIVE EARTH

Live Earth is the world's most advanced real-time geo-temporal data visualization technology. As an open platform, SaaS-based application, with deep roots in the Department of Defense, Live Earth leverages a technology stack that provides real-time situational awareness and an advanced approach to alerting and incident management. The Live Earth platform seamlessly fuses together millions of disparate data sources and presents them on a common operational picture. This enhanced visualization advances business operations globally with increased safety and security, business intelligence, and operational efficiency. Live Earth is trusted by organizations and agencies around the world to make time-critical decisions with real-world impact.