

INNOVATION

Can We Predict The Unpredictable? How Data Analytics Is Driving Smarter Crisis Response



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In an era where the unexpected is becoming the norm, the ability to anticipate and prepare for future events is more critical than ever. The global cost of natural disasters is staggering, reaching an estimated **\$250 billion** in damages in 2023 alone, with climate-related crises like wildfires, floods and storms contributing significantly. In a world where a few days of foresight can save lives and billions of dollars, predictive analytics is emerging as a game changer.

Traditionally used in fields like finance and marketing, predictive analytics is now reshaping the way industries and governments respond to crises. By leveraging historical data, artificial intelligence (AI) and machine learning (ML), predictive models can forecast risks and provide actionable insights in real time. Nowhere is this transformation more evident than in the management of natural disasters like wildfires, where predictive analytics is being used to not only forecast fires but also mitigate their devastating impact.

Predictive Analytics In Wildfire Control

One of the most memorable experiences I had with predictive analytics came during a project aimed at tackling the growing threat of wildfires—a crisis that’s becoming more severe as climate change escalates. Each year, wildfires [destroy millions of acres of forest](#) and cause [billions of dollars](#) in economic damage. The urgency of finding a more effective way to manage these disasters was palpable.

To tackle this, a project was developed to create a predictive model that could forecast wildfire spread. The objective was to improve interactive fire and smoke maps using real-time data, giving public safety officials and residents in high-risk areas the tools to make informed decisions and act quickly.

By combining machine learning algorithms with computer vision techniques, the model achieved impressive accuracy in predicting fire movement. It aggregated data from various sources, including Google, the U.S. Geological Survey (USGS) and the National Interagency Fire Center (NIFC), to generate detailed fire perimeter maps. These maps provided crucial information for predicting how long it would take to control a fire in specific areas, aiding in evacuation planning, resource management and public safety efforts.

Furthermore, the model forecasted smoke dispersion, allowing communities far from the fire’s origin to prepare for air quality issues. The ability to predict both the fire’s path and the spread of hazardous smoke enabled more efficient planning and reduced the overall impact on public health.

Seeing this predictive system in action made me realize the profound impact analytics can have on crisis management. We weren’t just reacting to fires; we were staying ahead of them, using data to anticipate what might happen next.

Data: The Backbone Of Predictive Analytics

The effectiveness of predictive analytics largely depends on the availability and quality of data. In the aforementioned wildfire management project, a significant challenge was aggregating real-time data from various sources and ensuring its accuracy. The team behind the project used a combination of public data feeds and geospatial solutions to compile the necessary information for fire spread predictions.

This points to a critical requirement for successful predictive models: the integration of comprehensive datasets. Inaccurate or incomplete data can lead to flawed predictions, which in crisis situations, could have dire consequences. Therefore, ensuring data integrity and proper validation processes are essential steps in building reliable models.

As technology evolves, the ability to leverage more sophisticated datasets—such as drone footage, satellite imagery and real-time IoT sensor data—will only improve the accuracy and applicability of predictive models in crisis management.

Expanding The Role Of Predictive Analytics In Crisis Management

While wildfire management is a striking example of predictive analytics in action, the technology's potential extends far beyond fire-prone regions.

In flood management, for instance, predictive analytics analyzes historical rainfall, river levels and geographical data to forecast when and where flooding is likely to occur. This enables earlier evacuation orders, more efficient allocation of resources and the reinforcement of critical infrastructure before disaster strikes. In fact, a report from the National Institute of Building Sciences found that every \$1 spent on disaster preparedness [saves \\$6 in recovery costs](#).

The power of predictive analytics isn't limited to natural disasters. In humanitarian efforts, technology can forecast food shortages, population displacement and resource scarcity, ensuring aid is delivered where it's needed most. For example, in 2020, the World Food Programme reported that predictive analytics helped save [millions of dollars and thousands of lives](#) by pre-positioning supplies in vulnerable regions ahead of crises.

Similarly, during the Covid-19 pandemic, predictive analytics played a critical role in tracking the spread of the virus. By analyzing vast datasets, governments and healthcare systems were able to allocate essential resources like hospital beds, ventilators and vaccines more effectively. As public health challenges continue to evolve, the ability to make timely, data-driven decisions will be essential in managing future crises.

The Challenges And Future Of Predictive Analytics

Despite the significant benefits of predictive analytics, challenges remain. One of the most pressing concerns is ensuring that the data used in predictive models is free from bias and represents diverse populations. In crisis management, where decisions directly affect vulnerable groups, it's crucial to maintain fairness and accuracy in predictions.

Another challenge is accessibility. While large organizations and governments have the resources to implement cutting-edge predictive analytics solutions, smaller entities may not. As technology becomes more widespread, creating affordable, scalable solutions for smaller organizations will be essential.

Looking to the future, the potential of predictive analytics in crisis management is immense. As machine learning and AI technologies continue to improve, predictive models will become more accurate, helping decision-makers respond to increasingly complex challenges.

Conclusion

Predictive analytics is revolutionizing the way we manage crises, from natural disasters to public health emergencies. By turning data into actionable insights, predictive models enable governments, businesses and organizations to anticipate challenges and respond proactively.

As we continue to harness the power of data, predictive analytics will play a key role in building a more resilient, informed and prepared future.



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Boris Kontsevoi is a founder and President of [Intetics Inc.](#), a leading global software engineering and digital transformation company. Under his leadership, a group of software engineers developed into a truly global technology company with multiple professional certifications and industry awards, including the Global Outsourcing 100, Software 500, and Global Sourcing Association best of class company.

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