Along with its public health implications and economic disruptions, the COVID-19 or coronavirus pandemic is changing the way that people think about all aspects of society. Perhaps one of the most surprising side effects of the outbreak is that it has turned everyone into data scientists. During this crisis, the field of data analytics has moved to the center of the public conversation. People from all walks of life are suddenly reading statistical analyses and epidemiology charts and sharing them on social media as if they were popular music videos or comedy memes.

This pandemic is causing everyday people to become more familiar and conversant with complex statistical concepts and terminology, such as exponential growth curves, doubling rates, and R0 (“R-nought”). The work of data scientists, once obscure, has now stepped into the spotlight – and has the potential to help save millions of lives.

As people all over the world follow the progress of humanity’s shared fight against the coronavirus, a surprising and undeniable result is that we are all becoming data scientists. The world of sports has already helped to popularize the concepts of advanced data analytics and data-driven decision making, changing the way that fans see the game. Football fans have gotten familiar with concepts like “expected goals” and “defensive coverage.” In politics, pollsters have become media stars, and statistical modelling has become a common part of daily conversations, even for casual followers of political news.

In the same way that sports and politics have helped to bring data analytics into the mainstream, the coronavirus crisis is likely to further democratize and promote understanding of data analytics to a global audience. This outbreak has made the way we view things more data driven. Once humanity overcomes this immediate crisis, this additional familiarity with data analytics may well create positive changes for our societies and for the way our organizations work.

Using this simple framework for the Data Analytics Lifecycle, we can see how mass media and social media discussions of the coronavirus are placing data-driven thinking at the center of the public imagination:
• Data collection

One of the biggest news stories every day is how authorities are struggling to conduct enough tests for the virus. We also hear about which cities and states have carried out the largest number of tests, how many positive test results were identified, and what percentage of total tests are positive, which is a way of evaluating the possible spread of the virus. Every country that is currently battling a growing outbreak, such as Germany and the U.S., is trying to analyze the results and learn from the experiences of other countries like China, South Korea, and Italy; people are following other countries’ reporting of case numbers and fatalities. All of these news stories and conversations, whether people realize it or not, are creating a greater awareness of the importance of data collection.

• Data processing

News coverage and public conversations of the pandemic are also reinforcing the importance of collating, validating, and evaluating the collected data. But not all data can be compared side by side. If we really want to learn from the data, we need to have similar standards and governance in place, to make sure we can derive the correct insights from one country’s experiences to inform policies in other countries.

For example, if coronavirus-related deaths are defined in different ways in different places, how can we accurately compare the mortality rate across different countries? This pandemic is teaching people how to think about the importance of making data comparable as a consequence of the issues of different standards, different data governance practices, and different ways of measuring results in different places.

• Data analysis

There are many public health experts around the globe who are either using their existing simulation models that are updated with COVID-19-related data or are deriving insights from mining the data. Different models will give different results based on different assumptions. For example, there was a widely-shared study from Imperial College London which suggested that the pandemic might require an 18-month lockdown; but critics of this study pointed out that its model was perhaps too pessimistic and did not account for some of the latest data that had come out of China and South Korea. This is an excellent example of how complex it can be to do accurate data analysis: the models are only as accurate as the assumptions, and the assumptions often need to change based on new data.

• Dissemination of results

This is perhaps the most important stage of the Data Analytics lifecycle, because this is where the data scientists need to synthesize the results of the analysis into easy-to-understand insights and visuals. The goal is to use the data to tell a powerful visual story that people will quickly understand.

This Epidemic Calculator is a powerful simulation that shows precise insights into how an epidemic can be made more or less severe, based on the point in time when a government starts to act. By adjusting a few variables such as population size, number of hospitalizations, case fatality rate, and the Basic Reproduction Number (R0), people can use this simulation to see how early intervention can dramatically stem the spread of a virus.

This type of interactive visual storytelling shown in the Epidemic Calculator, with easy-to-use slider bars that anyone can access from a web browser, can help governments convey the value of public health measures, such as widespread testing and social distancing.

Johns Hopkins University and Tableau are also offering a free publicly available data resources of visualizations, maps and trackers that are constantly updated with the most recent pandemic data to help people understand the progression and make confident decisions. This is another example of how data science can help epidemics end sooner and save lives.
Finally, the outcomes of the Data Analytics Lifecycle can now be used by government officials and policy makers to make data-driven decisions about the most effective means to combat the pandemic. Better data analytics not only gives us better insights into how many people are sick, it also helps our policy makers make better-informed choices about which strategies are most effective.

For example:

- Is it more effective to close schools, or bars and restaurants?
- How can we demonstrate the effectiveness of shelter-in-place policies?
- How long do social distancing orders need to be in place, and how do we know when it is safe to give the “all clear” signal for normal life to resume?
- What other tactics might also be effective, such as disinfecting public spaces (which has also been done in some Asian countries as part of their fight against the virus)?
- Along with saving lives from this pandemic, the data we are currently generating and collecting can help humanity to become more resilient going forward. We will be able to make better plans on many fronts:
  - How many ICU beds are needed to maintain hospital capacity and prevent shortages under certain scenarios?
  - What is the most cost-effective way to scale up the production and sourcing of necessary medical equipment and PPE (personal protective equipment) for hospital staff?
  - How can we prevent pandemics in the future (based on best practices and lessons learned from how COVID-19 spread)?
  - What are likely to be the most effective means of fighting a pandemic (with data-driven decision making)?

Data Analytics can help policy makers respond to these questions in ways that maximize the effectiveness of the public health response tactics, while minimizing human suffering and reducing social and financial costs. The policy decisions being made with data-driven guidance, especially in times of global crisis, are massively significant: the U.S. economic stimulus package will cost $2 trillion, there are massive costs involved with shutting down the economy, and most importantly, there are millions of lives that can be saved because of an accurate analysis and dissemination of data. Perhaps no other time in human history has data science been so important to so many.

**Data-Driven Mindset: Implications for Companies**

Since the start of the coronavirus crisis, we have all become experts in areas that we might not have known much about previously, from immunology and hygiene, to monetary policy and economic stimulus packages, to the stock market and global supply chains. But the crisis has particularly transformed our mindset of looking at things in a more data-driven way.

Before the pandemic, sometimes there was a certain amount of discomfort or “culture shock” within an organization when shifting to data-driven decision making. But now, billions of people worldwide are suddenly becoming well-versed in the fundamentals of data analytics. This change in mindset will help improve our systems and organizations in ways that we are just beginning to imagine.

For example, companies can use the data generated during this unprecedented economic pause to improve their operations once normal activity resumes. Given the reduced operations of many companies due to the pandemic, we have unique A/B testing conditions that will enable us to understand, for example, which business travel is actually required, what are the impacts of work from home policies, and which business activities generate the most value. There are valuable insights to be discovered in the data of everyday work life.

I truly believe that by changing the way people think about data, this crisis will help us to change the world for the better. We are seeing a real-time, worldwide demonstration of the power of data to save lives, inform policy, shape decisions, and create better outcomes. We are all data scientists now. After this crisis is done, people will be more eager to embrace data-driven decision-making as we shape our collective future.

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