

The Future of Data Science in the Age of COVID-19

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The [measurable turnaround](#) of public confidence in data science since the outbreak of COVID-19 represents an opportunity for data-driven analytics to embed far more deeply in society than was envisaged in the preceding years, with the triumphs and challenges of COVID-facing public sector data science activity setting a new benchmark and level of expectation across the commercial sector as well.

However, although there's reason for optimism that AI-focused data science can thrive in both sectors in the coming years, the evidence for this needs to be carefully evaluated in light of the current global upheaval.

Nearly all the contributing variables for the coming economic and market environment are in flux; not only have the massively skewed spikes and troughs of the COVID era literally forced a re-write of many analytics and AI-driven prediction systems^{1,2}, but they have also cast doubt upon the last few years of trends and predictions related to the industry³.

Let's take a look at the few broad indicators we currently have, and examine how the wider data science sector might need to reconcile the volatile conditions of 2020 and beyond.

Making Sense of the Blown Gradients After COVID

According to McKinsey⁴, the rout of 'face-to-face' society has broken historical analytics models so badly that pre-COVID data may itself have to be considered in a separate historical context, and compensated for in any attempt to maintain a continuum of measurement for year-on-year progression in business cycles.

At the time of writing, post-outbreak data has had less than a year of existence. With no way to know when the post-COVID era will begin (or whether the threat will diminish with the speed of the Millennium Bug or the languorous, decades-long struggle against HIV), it's difficult to understand at what point any long-term analytical context will emerge that isn't specifically related to efforts against the virus.

Even if we were inclined to consider the period since outbreak as a 'hard reset' in analytics and forecasting, not only is post-outbreak data insufficient yet to form a base for prediction, but it's also defined by a number of pivotal factors that are in no way constant, or reliable enough for forecasting further years of combatting the epidemic. These factors include:

- State-led fiscal interventions that give a statistically skewed representation of national and global consumption, productivity and stability⁵.

- Supply chain interruptions, which have had a significant effect on downstream economic logistics management⁶.
- Changes in customer behavior that relate directly to increased short-term and long-term economic insecurity, and which are not in themselves constant or predictable⁷.
- The ambient effect⁸ of the diminution, destruction and/or bankruptcy of multi-billion dollar industries that underpinned the pre-COVID model, such as airlines⁹ and hospitality¹⁰.

There is general agreement however, on one upcoming scenario in which the data science sector will not only play an important role, but need to negotiate in itself.

The Implications of Recession for Data Science

The World Bank estimates¹¹ a 5.2% reduction in the global economy in 2020, characterizing the growing downturn as a portent of the deepest recession since WWII, affecting the largest number of countries since 1870. Others, including the IMF¹², assess the coming decline in terms of a depression¹³, likely to last longer than any comparable economic crises of the last 100 years^{14,15}.

Though the effect of furloughs, lay-offs and terminations has not left the data science sector untouched, with a reported 40% of surveyed companies freezing new data science hires¹⁶, the downward trend is slower, relative to the average in comparable fields.

It should also be considered that sector demand was declining directly prior to the outbreak¹⁷, and that it's now impossible to tell how that short downward trend might have developed.

In any case, outside of public sector health projects either directly or indirectly related to COVID, the data science sector seems destined for a period of reductionism and a focus on essential, proven analytics implementations.

The 2020s to Concentrate on Analytic Methodologies and Technologies

As occurred after the 2008 financial crisis, economically resistant global tech giants are hoovering up¹⁸ the exodus of data scientists from commercial startups unable to weather the storm.

Although these well-funded entities — including Google, Amazon, Microsoft and Apple — are in themselves powerful economic engines for data science and machine learning research, and although all of them are major contributors to open source AI that has multiple applications, their common central interests center on analytics: data gathering, modeling, prediction and deployment, primarily around user intent, and with an emphasis on natural language processing (NLP) and computer vision.

It seems likely that the ongoing monetization of analytics and forecasting systems will represent the central artery keeping more abstract or experimental sub-sectors alive on a provisional basis in the profit-driven context of the private sector, as the global economy struggles to weather the fiscal effects of the pandemic.

Ongoing gains and losses are sector-dependent: according to one industry report¹⁹, the healthcare analytics industry is predictably set to grow at the highest CAGR in the period 2020-21, while the general analytics market is forecast to expand by 15.5% in response to the tectonic cultural changes of 2020.

Data and Analytics as an Engine for Rationalization

Consolidation and rationalization has always been the customary response^{20,21} to shrinking markets or financial catastrophe. Prior to COVID, the trend²² towards automation and data-driven rationalization, spurred by ten years of austerity measures that evolved from sharp need to embedded culture²³, was already prioritizing 'efficient' and structurally narrow commercial business models.

There is no reason to believe that a COVID-driven financial crisis will not initially follow the same pattern for sectors that are vulnerable to the adverse economic effects of Coronavirus.

Effectively this places data-driven machine learning techniques in the role of the time and motion practitioners that developed from Victorian ideals²⁴ to their apotheosis in the 1930s²⁵, and eventually to the corporate hatchet men²⁶ who, ironically, would also ultimately be threatened by AI^{27,28}.

According to one report²⁹, 73% of budgets and projects have been frozen or cut across the global business sector in 2020 to date, while another asserts³⁰ that SMBs are leveraging cloud infrastructure either to augment or initialize new analytics solutions, with a resurgence in analytics investment fueled by the need for efficiency measures and affordable customer support solutions.

Not Our Grandfathers' Recession

There is a strong possibility that the customary recovery environment of a late-stage recession will be different from those of the past; and that the inability to quickly reboot into a pre-COVID economic template will elevate data analytics to a more central and enduring position³¹ in civic and commercial culture, no matter what the outcome of the crisis might be.

If we do not currently need the new roads, train lines and other travel-based infrastructure boosts that kick-started the failing economies of the more-mobile societies of the past^{32,33}, and if we are unable to re-capitalize (as after 2008) by continuing to inflate the cost of real estate in major cities in the face of an urban exodus^{34,35,36} and an emerging long-term telecommuting culture^{37,38}, it seems inevitable that money will follow the customers into virtual space, perhaps for the long term – which signifies a massive acceleration of digital conversion, and the analytics culture that accompanies it.

For business, this external pressure to migrate from analogue transactions to digital paradigms and platforms is merely an acceleration of what was already occurring in the years leading to 2020.

Let's take a look at some of the key areas where data-driven analytics are poised to aid in sector recovery and endurance.

Global and National Supply Chain Logistics

The use of AI to model historical and 'live' logistics data allows distribution companies to simulate thousands of scenarios³⁹, incorporating ad hoc factors such as state and national restrictions that may come into force or be cancelled according to infection levels and local and national policy.

As with many sectors that depend on predictive machine learning systems, the Supply Chain Risk Management (SCRM) industry has had to recover from unexpected variations in demand since the late winter of 2020, and is in some cases merging prediction models for the lifetime of the COVID-19 crisis into traditional logistics forecasting systems⁴⁰.

Managing Remote Productivity

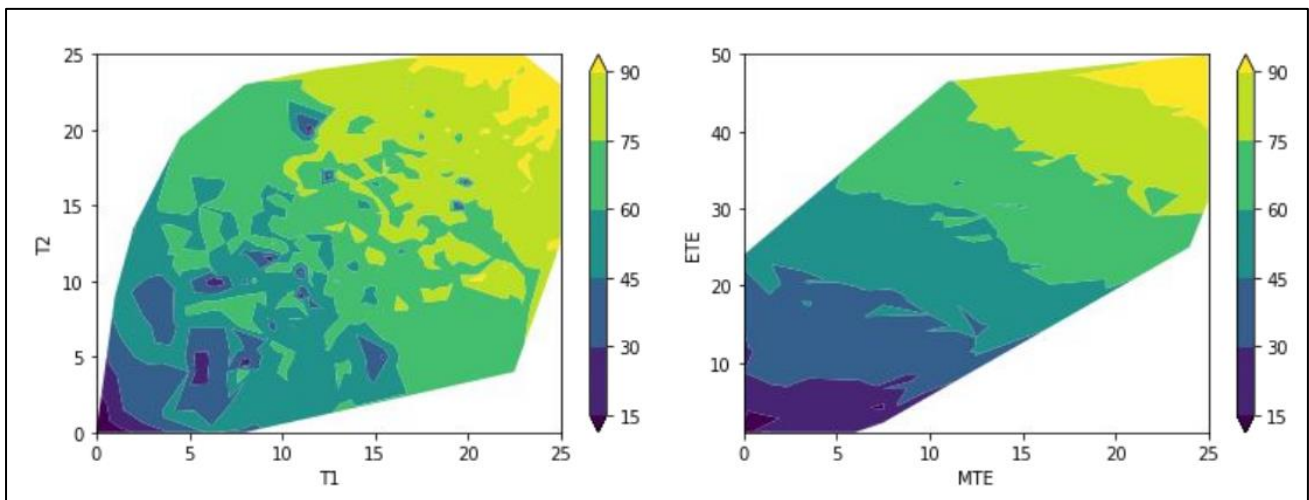
In the United States alone, the Coronavirus crisis is set to force a 733% increase in the number of Americans working full-time from home⁴¹, with many influential companies now committed⁴² to partial or permanent long-term telecommuting, irrespective of societal progress against COVID-19.

Though there are diverse AI-powered solutions to aid remote workers in scheduling, search, and even to improve the quality of teleconferencing⁴³, it seems likely that innovations in AI-based remote monitoring will also bring new data streams that can be utilized for performance monitoring at an individual and team level⁴⁴.

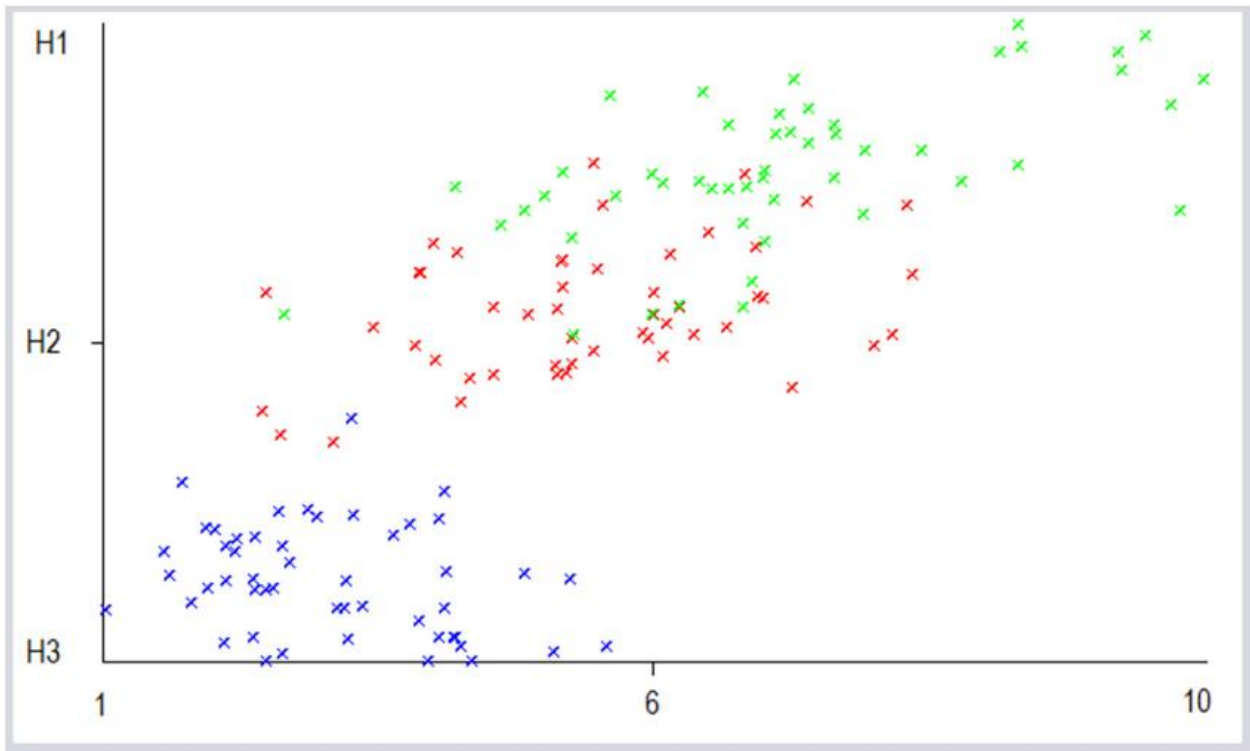
The use of data science and machine learning to evaluate employee performance pre-dates the pandemic^{45,46}. Such systems are centralized, and can be applied to the remote working sphere via company home>intranet VPNs, with only minor latency considerations compared to on-premises work-stations.

One company has experimented⁴⁷ with AI-enabled fitness monitors to assess the level of employee stress during remote working under COVID-19. However, depending on the geographic region and on state, national and local laws, the proliferation of such systems may eventually bring privacy and diverse legal implications⁴⁸ into the public arena, notwithstanding an employee's contractual consent.

Machine learning has been used in a number of evaluative systems for students forced to follow academic courses in ad hoc online environments^{49,50} — a necessary innovation that may eventually feed into more stable and generalized online management systems.



A machine learning project out of India uses gradient-based optimization algorithms to evaluate student performance for courses that have been moved online under COVID-19 restrictions. Source: <https://arxiv.org/pdf/2009.02661.pdf>



An AI-driven academic performance evaluation system in Ecuador, developed in response to COVID-19, analyzes activity development amongst students. Source: https://res.mdpi.com/d_attachment/applsci/applsci-10-05371/article_deploy/applsci-10-05371.pdf

Chatbots

Besides providing curated information on the COVID-19 crisis^{51,52} for overburdened health services, chatbots are proving an essential stopgap^{53,54} for companies whose former investment in intelligent virtual assistants (IVAs) has become urgent under coronavirus restrictions, and for whom negative public perception⁵⁵ of AI-based assistants has been relegated by the scale of the current public health crisis⁵⁶.

Thus it appears that increased public tolerance for chatbot-based interaction in core services such as health may be improving the general reputation and uptake of this sub-sector of AI.

The pre-COVID estimate that chatbot sales would grow to \$112 billion USD by 2023 is now thought⁵⁷ by some to have multiplied significantly. However, the current trend towards economic decline also indicates that lower general economic demand could cancel out this trend, leaving the market with similar prospects to those forecast in the pre-COVID era⁵⁸.

The necessity for increased engagement with chatbots represents an unforeseen opportunity to improve both their performance and reputation: as the volume of IVA transactions increases, analysis of the interactions allows their underlying systems to improve in a manner that could not have been foreseen prior to the pandemic – a further boon to chatbot research and deployment.

Shifting to After-Market Service Emphasis Through AI-Driven Analytics and Logistics Systems

According to Deloitte⁵⁹, the possibility of ongoing disruption to supply chains, together with diminished spending patterns, constitutes a threat to the hardware technology release cycle, including computing components, smartphones, consumer electronics devices and a range of business technologies.

That situation could trigger a short or long-term emphasis on after-market support, where the role of machine learning analytics could transform⁶⁰ from a minor industry advantage to a critical edge in a shriven market often beset by low margins.

The much-criticized tendency of manufacturers to abandon software support for older models in order to perpetuate the buying cycle could even transform from time-limited after-market care to the subscription-based SaaS models that have come to dominate⁶¹ the software market since 2015.

However, as with many COVID-led emergency contingencies, this kind of short-term model revision could make it difficult to eventually return to the more profitable annual hardware churn, if the crisis continues long enough to normalize increased product retention and extended after-market maintenance — with all but the most resilient and consolidated tech manufacturers facing massive losses and an existential threat⁶².

Increased Use of Machine Learning in a Turbulent Real Estate Market

With an emerging shift away from cities⁶³, subsequent turbulence in the rental and real estate market^{64,65}, and the sporadic obstacles in visiting potential acquisitions in person, the use of [AI in real estate](#) seems set to grow.

Prior to COVID-19, machine learning was already engaged in lead generation, mortgage lending risk assessment⁶⁶, budgetary management⁶⁷, property value prediction⁶⁸ and conveyancing⁶⁹. Since the outbreak, diverse platforms and products have arisen that offer interactive virtual viewings, with AI-enabled [augmented reality](#) posited for massive and unforeseen growth in this and other sectors⁷⁰.



This company's 2D and 3D model conversions allow customers to walk through the houses that they have not yet built, and are aided by machine learning⁷¹.

Conclusion

We are still in the midst of massive economic and cultural uncertainty. Notwithstanding that it is already far more severe in scope and reach, if the advent of COVID-19 should prove as short-lived as the SARS outbreak of 2002-2004, companies that re-tool their data science strategies on the assumption of a long-term change in world culture could end up wrong-footed, if not obliterated.

Transversely, those that continue to 'tread water' and freeze budgets on the presumption of a re-normalization within 12-18 months may not be able to catch up to opportunist competitors if the prognosis for the pandemic extends to the long-term, and 'stop-gap' measures continue to evolve on their own terms.

For those sectors not explicitly dependent on a return to pre-COVID levels of social mobilization, the pandemic represents an unparalleled opportunity for [data science consultants](#) to accelerate the growth of AI-driven solutions, in a market where that evolution has, for the foreseeable future, become imperative; and where such solutions will retain their value and viability no matter how the current global situation evolves.

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