Modern-Day Applications of Data Science
Introduction

Technology has a double-faced arena where it is not only generating opportunities but also creating challenges for modern industries. Various industries have been going through large-scale digital transformation, human expertise is required to understand such a revolution as industries are facing some obstacles to make full-scale deployment of digitalization.

In order to stay innovative and competitive, industries need to be more customer-centric, technically-adaptive, and cost-effective. Though, it is not that simple to touch these matrices when considering that they are still evolving.

“Innovations and agility in businesses are essential driving factors”

While some industries are still operating with traditional business processes, their competitors take the assistance of digital momentum to stay ahead in the curve.

Put into perspective, employing digital assistance in the current and future industrial revolution is inevitable and it is quite challenging, especially when pandemic risks are still high.

To grapple with never-ending challenges such as compliance regulation & traceability, convenience, environmental factors, shortage of skilful workforce, lack of resources, cost of technological/digital transformation of industrial sales and marketing, industrialists are encountering many disruptions in their business due to the COVID-19 outbreak alongside anticipating financial and operational consequences.

To no surprise, this pandemic has impacted industries top to bottom. Following are some key challenges that need to be addressed

- To address disrupted supply chain operations
- To cope with demand that is impacting business goals
- To increase capacity to meet demand
- To improve decision-making processes / practices
- To optimize profit margin

According to President and CEO of Thomas, Tony Uphoff, US manufacturers have embraced the latest technologies to boost productivity and efficiency, many haven’t used them in their sales, marketing, and supply chain management that could support them to sustain in the highly competitive marketplace globally.
Overcoming these challenges or turning these challenges into opportunities, the implications of advanced technologies such as AI/ML works favourably. Each segment of operations necessitates automation to ingest demand fluctuation promptly and effectuate capacity. Industries have immense potential to make a sustainable ecosystem and digitalization comes here to the rescue. It enables industries to operate at their full potential but is strategically challenging.

Let’s explore how these challenges could be transformed into business opportunities and growth in the context of real-time applications.

Strategic Role of Data Science

Undoubtedly, data science and AI are spreading their footprints to revamp business functions today. Presently, Retail and CPG are some of the industries evolving rapidly alongside Banking, Financial Services, and Insurance (BFSI) industries but in the race to be modernized and automated.

Recent statistics convey that;

1. According to the report provided by Nvidia, 83% of enterprises agreed they require AI infrastructure to accomplish future success.

2. In terms with McKinsey, the adoption of digital banking has been increased from 20 to 50% and is expected to grow once the pandemic eases off. It is forecasted that around 45% of customers cut down the bank visiting by the end of the crisis. According to the report, financial service providers have required at least one AI capability, for example
   - The demand for RPA is 36% for organized operational tasks
   - The requirement of the virtual assistants is 32% for effective customer services, and
   - The machine learning techniques are required up to 25% to detect fraud, underwriting, and risk assessment tasks.

3. As per the report of KPMG, 86% of financial business leaders depict the involvement of the government in regulating AI technology. They said 81% of employees of their companies are ready to learn AI adoption as a new skill set.

However, many other industries are more ahead in the game through embracing technology earlier.
COVID-19: Impact and Solutions

Due to the global pandemic, major industries have undergone a significant shift, some are evolving and some industries are experiencing threats from all directions, they are facing significant downward pressure over revenues and profits because coronavirus resulted in lockdown across the globe.

At the same time, this pandemic led to new consumer behaviors. There is a change in ways through which we consume and connect with this world. Severe impact of the pandemic are adding more struggle, for example, disruption in supply and demand of services. The pandemic has originated storms across the industries.

In this aspect, multiple industries were required to make substantial changes, for example, their business processes and operations have gone virtual overnight. People are purchasing groceries online and got delivered to their place instead of shopping in person. They prefer virtual mode of payments instead of cash.

Virtual currency has become a new trend. No one can deny the huge growth in cryptocurrencies. However, these transformations may be long-lasting and highly uncertain without the means of supportive technologies.

Here AI/ML came into the picture, a paradigm shift to drive a huge success, digitalization did its job well. Turning to online platforms, the impact of COVID-19 led to structural changes in consumption and thereby welcomed the digital transformation in the marketplace.

As the pandemic eases, global corporations are embracing new business processes slowly to recover post-COVID-19, various business models such as Direct-to-consumer Model (D2C), and Omnichannel Commerce have become the demand of time.

For example, a change in consumer behavior such as purchasing habits, expectations on fast delivery, anytime anywhere access, smooth navigation, multiple pickups, and delivery options, etc., will form the basis of business strategies and drive top-line success.

Advanced technology such as AI/ML plays a crucial role in consumers’ lives. For this process, data experts can use IoT and emerging 5G technology that can provide an immense flood of data. And, big data analytics tools can be deployed to extract insights on purchasing patterns and product preferences of consumers.

Companies with strong sophisticated data analytics platforms are able to connect with consumers, offering them additional values and services. On the other hand, consumers are enjoying new digital experiences - telemedicine, e-learning, virtual payments, online essential ordering and delivery, buy-online & pick up at the store. As convenience increases, digital adoption will accelerate.

Multiple brands are still facing short-term challenges over health & safety, supply chain disruption, workforce, easy cash flow, fluctuation in consumer demand and marketing, and many more. They can navigate these issues successfully in order to sustain/survive in this crisis, safeguard themselves, maintain financial stability, demand and supply, and overall productivity.

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Retail & CPG Industry: Use Cases

Enlisting below some challenges the industry is currently facing:

- How to enhance customer experience and the factors impacting it?
- How does the customer behave?
- How to optimize cost and augment productivity?
- How to understand whether a business operation works well or not?
- How to add/provide value to customers and improve customer retention?
- How to introduce products and services to increase sales and visibility?
- How to be updated with specific changes in the customer segment and respond promptly?
- How to upsurge efficiency and reduce cost?

Data science plays a significant role in coping up with these barriers by driving favourable outcomes.

Unlocking Growth with Data Analytics and AI

1. Customer Experience/Services

This pandemic makes customers more tech-savvy, they see online/offline stores as identical. They are demanding a digitalized unified experience when purchasing from their selected brands. Brands need to update to which product is high in demand, to recommend similar products based on choice and preference. Put simply, modern consumers see brands, not channels, so an integrated personalized and digital-led process is important to succeed.

For this purpose, predictive analytics is an effective approach to determine:

- Which products are sold together, or seasonally correlated?
- Which product indicates the increasing demand?

Compiling past and current purchasing data extracted from website and store channels can be used by AI/ML algorithms to detect purchasing patterns in the particular geolocation, season, demands, and other similar dimensions to provide optimal inferences specifying inventory decisions.

2. Inventory Management

For retailers, managing products and goods become more challenging with the employment of digital disruptions—optimizing online and offline stores and their channels.

Prefacing personalization, consumers always want digital transparency, for example, in-stock products at nearby stores, online orders alongside in-store pickup, smooth low or no-cost return of items regardless of purchasing mode/means.

Multi-store retailers have always been noted struggling in making balance amidst distribution centres with;

- Regularly expanding demands of huge stock-keeping-unit (SKU) assortment
- Expectations of one-day or two-day delivery, or same-day pickup, instant shipping, and more.
Greater assortment and automated inventory are the requirements of today's time for local marketers, to opt for an optimized inventory is essential.

3. Supply Chain Management

Supply chain management, a backstage model, serving on how consumers receive or purchase the products, the department needs to take advantage of smart supply chain practices to ensure that the right product reaches the customer on time. Retailers and CPG companies are always in an attempt to adopt strategies to maximize profit with huge accuracy in product supply.

More precisely, retailers anticipate demands and handle inventory, the more simply they can reduce wastage, manage expenditures, and invest capital in other activities to make more profit.

Nowadays, companies are increasingly implementing AI and automation to operate with forefront issues and suppliers. For example, chatbots are used to dwindle suppliers' required workforce and to focus on a massive segment of common issues and transactions. Chatbots can communicate with other bots on suppliers' end. Also, automation has reduced labour costs and performs work swiftly.

Following the power of deep learning techniques and advanced analytics, chatbots deliver significant information to retailers regarding any interruptions in the supply chain that they need to resolve immediately.

For example,

- Chatbots can indicate to a supplier about an inevitable accident impacting the supply of products and suggest other modes of supply.
- Since chatbots can operate 24*7, they can perform the task of customer relationship workforce in supply chain management adequately. Chatbots can respond in non-working hours as well, and function among retailers and suppliers in different time zones.

4. Sales and Marketing

Alongside pandemics, the awareness of consumers' privacy, control and regulation has given a different direction to customer behaviour. Big tech corporations have undergone major changes in the way to perform marketing and advertising functions.

Consumers' privacy is always in a controversial topic over decades, and the pandemic has escalated the adoption of digital technologies. Now consumers understand how the data is being used. The government has enforced privacy laws worldwide.

According to these laws, enterprises accumulate data in terms with docile norms to protect consumers' privacy. Privacy laws such as GDPR articulate that the consent of customers is required before using their identity. The evolving landscape of the digital era is following the GDPR norms that are impacting marketing analytics.

For example, Apple has mandated the privacy "nutrition labelling" at its App store and followed consumers' consent to utilize their data for effective marketing.

To deliver a seamless customer experience, companies need to integrate the marketing, technology, cybersecurity, and laws that save them from various risks such as financial risks, compliance risks, and reputational risks.

GDPR offers opportunities to companies
and advertisers to educate their consumers and strengthen their relationship with them for the long run, it also ends browser-based third-party cookies. For example, Google only assigns data within their publishing domain.

Harnessing historical data, AI models can detect which marketing program could generate maximum revenue, ROI. A well-planned program/campaign can anticipate and suggest whether an in-store marketing strategy (for example, buy one get one free, or 40-80% discount) will be effective for a particular product/brand, or not. The program can also specify digital/online marketing that would produce expected results.

Companies sometimes find it difficult to couple forecasting and planning to match best advertising solutions/campaigns, or in accordance with the finest promotional practices. In such circumstances, AI has the capability to introduce data-driven techniques for CPG marketers and retailers.

Empowering its potentiality, AI models can scrutinize the bulk of scenarios containing a little amount of relevant data before delivering appropriate recommendations about which marketing channel will produce maximum outgrowth.

Data science provides CPG companies and retailers the best possible way to employ large-scale operational marketing projects in the most cost-effective manner.

Banking, Finance and Insurance Sector

Banks were among the earlier adopters of IT for secured management and assistance. The expanding size of banks is aimed to provide exceptional customer services alongside operational efficiency. However, the entire industry is struggling to combat with following circumstances:

1. Can technology augment operations, reduce costs and increase customer satisfaction levels?
2. How to automate compliance, anti-money laundering, and fraud detection?
3. Can technology assist in making payment processing faster than earlier without any disruption?
4. What are the effective techniques to make the personalization of customer experiences promptly?
5. AI/ML can be best in cost savings, time-saving, and reduction in expenditure through automation?
6. Can AI transform the customer experience by enabling 24*7 customer interaction steadily?

The face of banking is evolving fast, any segment
of banking be it risk assessment, resourced marketing, customer outreach, cost and revenue management, or product development, everything is supported by data science. Multiple benefits can be accounted for using data science in banks covering sales automation, customer profitability, consumer-specified dashboards, regulatory compliance, forecasting, target marketing, and many more. Some selected areas are mentioned in next section.

1. **Lifetime Value Prediction and Price Optimization**

   In order to compute “good risks,” price optimization and lifetime value prediction-based software are instructed to guide insurance bodies. For example, determining the correct valuation of an insurance product by deploying mortality and morbidity values. Special algorithms use different attributes including previous costs, expenditures, profits, claims, risks to offer solutions such that insurers could tailor particular premiums. Comparing changes in prices with respect to the previous year’s policy, price optimization helps in improving the price sensitivity of customers.

2. **Next Best Offer for Next-Gen Customers**

   Do you know how a bank is able to recommend/sell a product to its potential customer?

   How does a bank convert a customer into a new sell lead?

   For example, depending on the customer information and prior records, a bank offers a Chip Card with a punch line “Your transactions are more secured now” and a customer ended up with the provided service, this is how valuable customers can be transformed into leads. Making the process streamlined using big data analytics helps banks to recognize individual consumers and understand their requirements. In this manner, banks can offer multiple products as “Products for you,” “Offers for you,” “Deals for you,” etc., according to customers’ needs.

3. **Fraud Detection**

   Fraud detection has become a major concern that needs to be taken into consideration because unethical practices result in huge losses and weaken customers’ faith. Employing data science tools and techniques makes it real to identify fraudulent activities, suspicious connections, fishy patterns, and unusual data behaviour with the help of past fraudulent activities, and by applying suitable methods to analyze them.

   For example, predictive data models can examine and detect fraud exercises that generate inferences for the actions not conducted earlier.

4. **Back Office Operational Efficiency**

   AI solutions and data science tools can assist the BFSI industry to improve operational efficiency via anticipating demand depending on prior information, and future events through time-series analytics, for example predicting call centre traffic, improving back-office functions.

   Moreover, these insights allow the industry to make strategic resourcing, advance customer satisfaction level, asset planning & allotment, and so on.
5. **Underwriting and Credit Scoring**

ML algorithms are appropriate sources for underwriting tasks - a very common application in finance and insurance domains.

Banking data incorporates thousands of customer profiles with enormous data entities/attributes, data experts train a model over this data, the model learns and acquires from this.

A well-trained model is able to perform the underwriting and credit scoring tasks the same as a human does in real-time. Such scoring shows the credit worthiness of a person or product and thereby assists banks and insurers to offer credit to the eligible.

6. **Algorithmic Trading**

Real-time analytics makes the biggest impact on this domain as there are trade fluctuations every second. To make real-time beneficiary decisions, financial bodies analyze conventional and non-conventional financial data and make impacts accordingly.

Since this data is available for a shorter period of time, the fastest analyzing methods are demanded to extract inferences. Integrating real-time data and predictive analytics turns out to be effective trading.

Financial institutes require mathematical experts and statisticians to formulate trading algorithms forecasting better market opportunities. Presently, AI offers automated solutions (improving consistently) to make this process faster in delivering accurate outcomes.

Following are some industry-based examples that leverage the proficiency of data science to attain maximum business growth:

**Allstate Insurance**, company has leveraged anti-fraud techniques to reduce fraudulent activities. Using AI and data analytics, the company monitors suspicious claims and keeps eye on upcoming fraud trends.

**Liberty Mutual Insurance**, the company seeks AI support to evaluate documents submitted by consumers using OCR techniques. Leveraging the data available in submitted documents, the company can make effective risk mitigation strategies, enhance time-to-quote, and offer augmented customer services.

MetLife's novel app “The Wall” uses innovative ways to compile massive data into MongoDB. The application uses big data to facilitate communication, understanding, and personalization for each customer as an individual in order to make 360-degree all-encompassing customer-centric services. For example, a customer representative can respond to queries swiftly and efficiently, process claims, recommend new programs/policies while greatly reducing waiting time.
Bottom Line

The era of customer-centric services demands intelligent techniques and automation, smart data analytics inspects all available data and makes informed decisions with AI-power responses, explanations, and recommendations in real-time.

The key to understanding the customers’ expectations and behaviour in an effective manner is to understand feasible changes/fluctuations in the marketplace before they actually occur and act swiftly.

However, there is a lot to conduct as R&D such as identifying highly competitive markets, major financial impacts for a longer time, risks of a customer defaulting, and many more in order to add prominent values to business and to meet customer expectations. In order to provide valuable assistance, data science and AI are definitely supportive tools in this result-oriented voyage.

Potential Opportunities to Improve AI/ML Maturity

- To address several challenges such as data privacy, adoption of ML technologies, adequate requirements of skill/expertise of data experts, etc., corporations across the globe are facing when introducing AI capabilities.
- To explore the most common uses of AI and the value they can bring.
- To accelerate attempts in the journey from research to enterprise-scale deployment of AI models to deliver productivity, scalability, and ROI.
- To reveal how AI-enabled transformations can best recognize new and previously unrealized opportunities in customer operations to evolve.
- To achieve higher profits, personalization at scale, 360-degree omnichannel experience, and fast innovations.

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