**Data Science Skills required for Industry 5.0 Managers**

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**Abstract:**

This article explores and suggests data science skills required for Industry 5.0 managers. The article is based on desk-based document reviews. Major findings include (a) human should be focused more on analytical and intelligence skills , (b) most of manual job will be taken by the robots and machine (c) judgmental skill will be required for manager's managing several resources (man, machine, robots) (d) for effective decision, manager should focus on the data science skill that helps to compare and contrast on impact of decision (e) Data science skill help to generate knowledge from data.

Managers will not only be managing the human resources but more optimally focused on managing the robots, machines in an organization. Managers need to upskill their career in data science for the information-driven industry. Data-driven decision helps grow an organization transparently and effectively by taking an account of stakeholder interest in business decision. Managers can take effective decision in this globalized economies at multinational companies working with several employment types (permanent, contractual, gig) of workers.

Government agencies and education institutes should promote and apply data science to make values-based decisions in their effective operational work.

**Keywords**: Data Science, Automation, Industry 5.0, Algorithm, Decision

# Introduction

We are progressively moving towards Industry 5.0 where there will be a bigger role of machines collaboratively working with a human. Industry revolution[[1]](#footnote-1) 5.0 emphasizes on humans intelligence having analytical and judgmental skills to inference knowledge and collaboratively control several manpower resources (man, machine, robots) (human, finance, physical, ICT, and time) working at distributed location for optimal efficiency in the industry production (Nahavandi, S. (2019) source???). The machine will be doing several manual and repetitive tasks replacing human labour. The machine will simulate like a human mind that will have the capacity to make a decision on several tasks due to optimized algorithm[[2]](#footnote-2). The backbone for the machine to make a decision will be based on the historical data source and self-learning algorithmic model based on the accuracy of decision performance. Data is generated from several sources through automated and manual tools used by humans and machines.

In the present era of globalization with several business expansion methods like franchising, partnership , there is no limited boundary for any industry domain to grow faster in short duration.

Traditional management system has limitations to interpret information from big data generated from several sources and constraints related to cultural, regional factors. Data science would help managers extract customized information and knowledge related to various cultural and regional factors that would be benefical to roll out specific programs in industry 5.0 targeting customer preferences.

Industry managers would have human capital working from various background and culture in gig based economy and multinational companies. Employee satisfaction is not only limited with pay scale and permanent job in Industry 5.0. Managers would better understand their resources and client with the data science skill that segments human behaviours in professional attitudes and experiences. Data Science skills act as an enabler for managers to better understand the project stakeholders with analytical decision making.

As the organization grows with several stakeholders, the value of data becomes more valuable and data helps take business decisions in data-driven approach. Business analytics helps take organization business decisions based on the historical data and suggest a probability of decision with predictive algorithm. Data science helps to extract descriptive, predictive and prescriptive knowledge base. Descriptive analytic helps managers study with historical data on what had happended in the past. Predictive analytic helps to predicts what is most likely to happen in the future. Prescriptive analytic suggests actions to be taken that affect particular outcomes.An article by Forbes (Press, 2020) states that the amount of data created, captured, copied, and consumed in the world increased from 1.2 trillion gigabytes to 59 trillion gigabytes, an almost 5,000% growth during 2010 to 2020 AD. Around 90% of world data has been generated in the last two years alone (Marr, 2021).

Data science helps to extract knowledge and insights from various forms of structured or unstructured data by using scientific methods, process, algorithms, and the computer system.

Big data referes to the enormous data generated with greater variety, in increasing volumes and with more velocity. While big data are generated from automated tools and Internet of things (IOT)[[3]](#footnote-3) devices, humans will be involved more in optimizing algorithms. Algorithms will be a key factor for doing a task in an automated way having machine self-decision capability. There will be less intervention of humans on any ordered task type. As most of the systematically defined quantitative problems have already been programmed (like accounting, mathematical calculations, etc), computer scientists need to develop algorithms for more of qualitative nature. The human brain is good at approximate calculation whereas today’s computer is designed mainly for exact calculations. A computer programmer will be programming to solve and behave computer-like human beings with more sort of approximate calculations.

The main objective of this article is to explore and sussust data science skills required for Industry 5.0 managers. The overarching methodology for writing this article includes a desk-based document review; analysis; and drawing summary results, conclusions, and recommendations.

# Results and Discussions

As Clive Humby (2006) coined the phrase “Data is the new Oil”. In the current era of the digital world, the value of data is too much rewarding to extract knowledge and information from raw data. For example, in the retail application, we can predict the customer shopping patterns as per season and have sufficient stocks in the store. Data helps to predict consumer psychology in shopping and roll out different offer plans as per the customer category. In the medical sector, the health data can predict the patient health and recommend the specific diet and medicines based on patient history. In the tourism sector, a travel agent can offer various vacation plans as per tourist background information like home country, location and preferred ethnic habits. In the education domain, the student academic record provides information to administration like student’s command on the subject and suggest students pursue a career in interest-based elective subjects. The role of data science is ubiquitous irrespective of industry domains. As the managerial role requires managing several resources in a cost-effective way, their data science knowledge and skills is critical to driving for data-based decision in any organization.

In Industry 5.0, the manager will be interacting cohesively working with machines and humans. There will be more of machine-driven projects. As the manager, s/he should be checking optimal performance and effectiveness of the machine. To equip with analytic skills, managers should be competent enough to analyze the structured and unstructured data. Structured data is more on the standardized format (in table form) in which the report is predefined and information can be extracted easily. Unstructured data does not have any pre-defined format and information needs to be extracted. Unstructured data have data from several data sources and heterogeneous data types, like image, audio, video, text, and so on.

# Conclusion

The role of a data scientist is to derive insightful meaning from unstructured and structured data. The role of the manager is critical to direct the data scientist about what type of knowledge and skills s/he needs to extract from data and make a decision on the business. The future industry needs a manager who is not only SMART but also has knowledge and skills about the data-based decisions and has the capability to interact and direct various resources from the computer command irrespective of location. Industry revolution had started with the manufacturing process of goods and have been changing our lifestyle with the scientific discovery, invention and innovation .

# Some Suggestions for Industry 5.0 Managers

Data science skills (such as descriptive and predictive analytics); would help Industry 5.0 managers to take smart and goal-oriented decision based on the insightful knowledge from the data. Regarding data science, the Government of Nepal (GON) can analyse and roll out different program segments for Provinces in terms of geographical and cultural regions that would eventually contribute to more on values-based goals towards society’s holistic development.

In coming days, the machine would be more smarter and cheaper with innovative solution. Thus, academicians and education institutes should enhance their cirriculum that would help students develop analytical and judgmental skills required to take data-based and transparent decisions.

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1. Industry 1.0:- The first Industrial Revolution had adopted a manufacturing process using water and steam power. Industry 2.0: The second Industrial Revolution started with the electricity invention that had offered capacity for mass production goods. Industry 3.0: The third Industrial Revolution started with computer invention and automation in industrial production. Industry 4.0: The Fourth Industrial Revolution started using smart device tools in industrial production systems having data exchange capability between devices without human intervention. Industry 5.0: The fifth Industrial Revolution is focused on humans collaboratively working with machines for optimal efficiency in the industry production. (CAN BE DELETED SINCE ITS COVERD IN INTRODUCTION). Gig: Gig worker are independent contractor worker. [↑](#footnote-ref-1)
2. Algorithm is the finite steps of solving problem with the computer instructions. Algorithm are converted to program with help of any programming language. [↑](#footnote-ref-2)
3. Internet of Things– IOT refers to the physical devices that are connected to the internet with data collecting and sharing capability. [↑](#footnote-ref-3)