

STUDENTS' ECONOMIC FORUM A monthly publication from South Indian Bank

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The "Students' Economic Forum" is designed to kindle interest in the minds of younger generation. We highlight one theme in every monthly publication. Topic of discussion for this month is "Data Science".

What is Data Science?

Data science is a multidisciplinary actionable approach to extracting insights from the large and ever-increasing volumes of data collected and created by today's organizations. Data science encompasses data analysis preparing for and processing, performing advanced data analysis, and presenting the results to reveal patterns and enable stakeholders to draw informed conclusions.

Data preparation can involve cleansing, aggregating, and manipulating it to be ready for specific types of processing. Analysis requires the development and use of algorithms, analytics and AI models. It's driven by software that combs through data to find patterns within to transform these patterns into predictions that support business decision-making. The accuracy of these predictions must be validated through scientifically designed tests and experiments. And the results should be shared through the skillful use of data visualization tools that make it possible for anyone to see the patterns and understand trends.

The Data Science Lifecycle



Capture: This is the gathering of raw

structured and unstructured data from all relevant sources

Prepare and maintain: This involves putting the raw data into a consistent format for analytics or machine learning or deep learning models.

Preprocess or process: Here, data scientists examine biases, patterns, ranges, and distributions of values within the data to determine the data's suitability for use.

Analyze: This is where the discovery happens—where data scientists perform statistical analysis, predictive analytics, regression, machine learning and deep learning algorithms, and more to extract insights from the prepared data.

Communicate: Finally, the insights are presented as reports, charts, and other data visualizations that make the insights—and their impact on the business—easier for decision-makers to understand.

Data Science Tools

Data scientists must be able to build and run code in order to create models. The most popular programming languages among data scientists are open source tools that include or support pre-built statistical, machine learning and graphics capabilities. These languages include:

R: An open source programming language and environment for developing statistical computing and graphics, R is the most popular programming language among data scientists. R provides a broad variety of libraries and tools for cleansing and prepping data, creating visualizations, and training and evaluating machine learning and deep learning algorithms. It's also widely used among data science

scholars and researchers.

Python: Python is a general-purpose, object-oriented, high-level programming emphasizes language that code readability through its distinctive generous use of white space. Several Python libraries support data science tasks, including NumPy for handling large dimensional arrays, Pandas for data manipulation and analysis. and Matplotlib for building data visualizations. Data scientists need to be proficient in the use of big data processing platforms. such as Apache Spark and Apache Hadoop. They also need to be skilled with a wide range of data visualization tools, including the simple graphics tools included with business presentation and spreadsheet applications, built-for-purpose commercial visualization tools like Tableau and Microsoft PowerBI, and open source tools like D3.js (a JavaScript library for creating interactive data visualizations) and RAWGraphs.

Importance of Data Science in Business

There are various reasons why Data Science is important in business. Data Science enables enterprises to measure, track, and record performance metrics for facilitating enterprise-wide enhanced decision making. Companies can analyze trends to make critical decisions to engage customers enhance better. company performance, and increase profitability. Data Science models use existing data and can simulate several actions. Thus, companies can devise the path to reap the best business outcomes. Data Science helps organizations identify and refine target audiences by combining existing data with other data points for developing useful insights. Data Science also helps recruiters by combining data points to identify candidates that best fit their company needs.

Data Science Use Cases

There's no limit to the number or kind of enterprises that could potentially benefit from the opportunities data science is creating. Nearly any business process can be made more efficient through data-driven optimization, and nearly every type of customer experience can be improved with better targeting and personalization. According to one study, the global Data Science market is expected to grow to \$115 billion by 2023. Here are a few representative use cases for Data Science and AI:

In the **healthcare industry**, physicians use Data Science to analyze data from wearable trackers to ensure their patients' well-being and make vital decisions. Data Science also enables hospital managers to reduce waiting time and enhance care.

Retailers use Data Science to enhance customer experience and retention.

Data Science is widely used in the banking and finance sectors for fraud detection and personalized financial advice.

Transportation providers use Data Science to enhance the transportation journeys of their customers. For instance, Transport for London maps customer journeys offering personalized transportation details, and manages unexpected circumstances using statistical data.

Construction companies use Data Science for better decision making by tracking activities, including average time for completing tasks, materials-based expenses, and more.

Data Science enables trapping and analyzing massive data from **manufacturing** processes, which has gone untapped so far.

With Data Science, one can analyze massive graphical data, temporal data, and **geospatial data** to draw insights. It also helps in seismic interpretation and reservoir characterization.

Data Science facilitates firms to leverage social media content to obtain real-time media content usage patterns. This enables the firms to create target audience-specific content, measure content performance, and recommend on-demand content.

Data Science helps study **utility consumption** in the energy and utility

domain. This study allows for better control of utility use and enhanced consumer feedback.

Data Science applications in the **public service field** include health-related research, financial market analysis, fraud detection, energy exploration, environmental protection, and more.

An international **bank** created a mobile app offering on-the-spot decisions to loan applicants using machine learning-powered credit risk models and a hybrid cloud computing architecture that is both powerful and secure.

An **electronics firm** is developing ultra-powerful 3D-printed sensors that will guide tomorrow's driverless vehicles. The solution relies on data science and analytics tools to enhance its real-time object detection capabilities.

A **robotic process automation** (RPA) solution provider developed a cognitive business process mining solution that reduces incident handling times between 15% and 95% for its client companies. The solution is trained to understand the content and sentiment of customer emails, directing service teams to prioritize those that are most relevant and urgent.

A **digital media technology** company created an audience analytics platform that enables its clients to see what's engaging TV audiences as they're offered a growing range of digital channels. The solution employs deep analytics and machine learning to gather real-time insights into viewer behavior.

An urban **police department** created statistical incident analysis tools to help officers understand when and where to deploy resources in order to prevent crime. The data-driven solution creates reports and dashboards to augment situational awareness for field officers.

A smart **healthcare** company developed a solution enabling seniors to live independently for longer. Combining sensors, machine learning, analytics, and cloud-based processing, the system monitors for unusual behavior and alerts relatives and caregivers, while conforming to the strict security standards that are mandatory in the healthcare industry.

What Is Data Analytics?

Data analytics refers to the process and practice of analyzing data to answer questions, extract insights, and identify trends. This is done using an array of tools, techniques, and frameworks that vary depending on the type of analysis being conducted.The four major types of analytics include:

Descriptive analytics, which looks at data to examine, understand, and describe something that's already happened.

Diagnostic analytics, which goes deeper than descriptive analytics by seeking to understand the why behind what happened.

Predictive analytics, which relies on historical data, past trends, and assumptions to answer questions about what will happen in the future.

Prescriptive analytics, which aims to identify specific actions that an individual or organization should take to reach future targets or goals.

Applying data analytics tools and methodologies in a business setting is typically referred to as business analytics. The main goal of business analytics is to extract meaningful insights from data that an organization can use to inform its strategy and, ultimately, reach its objectives.Business analytics can be leveraged in a variety of ways. Here are a few examples to consider:

Budgeting and forecasting: By assessing a company's historical revenue, sales, and costs data alongside its goals for future growth, an analyst can identify the budget and investments required to make those goals a reality.

Risk management: By understanding the likelihood of certain business risks occurring—and their associated costs—an analyst can make cost-effective recommendations to help mitigate them.

Marketing and sales: By understanding key metrics, such as lead-to-customer

conversion rate, a marketing analyst can identify the number of leads their efforts must generate to fill the sales pipeline.

Product development (or research and development): By understanding how customers have reacted to product features in the past, an analyst can help guide product development, design, and user experience in the future.

Data Science vs. Data Analytics: Two sides of the same coin

While many people use the terms interchangeably, data science and data analytics are unique fields, with the major difference being its scope. Data science is an umbrella term for a group of fields that are used to mine large datasets. Data analytics software is a more focused version of this and can even be considered part of the larger



process. Analytics is devoted to realizing actionable insights that can be applied immediately based on existing queries.

While Data Science focuses on finding meaningful correlations between large datasets, Data Analytics is designed to uncover the specifics of extracted insights. In other words, Data Analytics is a branch of Data Science that focuses on more specific answers to the questions that Data Science brings forth. Another significant difference between the two fields is a question of exploration. Data Science seeks to discover new and unique questions that can drive business innovation. In contrast, Data Analysis aims to find solutions to these questions and determine how they can be implemented within an organization to foster data-driven innovation.

The total amount of data created, captured, copied, and consumed globally is forecast to increase rapidly. Over the next few years up to 2025, global data creation is projected to grow to more than 180 zettabytes. In 2020-21, the amount of data created and replicated reached a new high. The growth was higher than previously expected caused by the increased demand due to the COVID-19 pandemic, as more people worked and learned from home and used home entertainment options more often.

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