

The Pakistan accountant

Magazine of The Institute of Chartered Accountants of Pakistan



DATA ANALYTICS

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Chartered Accountants
of Pakistan

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DATA ANALYTICS

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President's Page

The culture of an organization is strongly linked with the orientation of its Top management including the Directors and especially the CEO. There is little doubt that a CEO's own reliance on Data Analytics or lack thereof sends a powerful message to the rest of the organization through the decision outcomes.

Business Focus or Strategic Goals may prove persuasive when these are based on Data and Analytics, otherwise, a serious threat arises from competitors who are more Data-driven. The Digital Assurance & Accounting Board of ICAP has earned a reputation for advancing the Data Analytics skills of Professionals working in Government and Corporate organizations. The programs offered by it, truly make a difference, by equipping the decision makers with Data Analytics Tools, for making business decisions.

I strongly believe that Data Analytics has become essential to every organization for strategic decision-making as it allows them to effectively manage the Data gathered from various stakeholders and thus becoming Sustainable Business Organizations. I hope this issue of The Pakistan Accountant will help readers to learn more about the importance of Data Analytics and its necessity in today's Competitive Environment.



Mr. Ashfaq Yousuf Tola, FCA
President, ICAP

Editor-in-Chief's Page

Businesses across the World are expanding significantly by effective use of Data, Analytics & Artificial Intelligence. The absence of an organizational culture, however, is a significant barrier that prevents companies from realizing the full potential of data analytics and the superior decision-making that can result from it. A data-driven culture may be established to accrue its competitive benefits. Companies need strong data cultures, in this Digital Era where important decisions are informed by Data Analytics and Executives must act on analytically derived insights rather than intuition or past experience.

E-Commerce or Digital platforms have strong Digital cultures that are driven by Data and Statistics, but many traditional companies are still struggling to handle big data effectively and produce meaningful outcomes.

This edition of "The Pakistan Accountant publication" summarizes the Importance of Data Analytics and its true potential. We are pleased to incorporate informative article contributions from our esteemed Members and industry experts' perspectives.

We are delighted to include valuable article contributions from our respected Members and insightful thoughts of Industry professionals.

I hope it captivates readers and give them an enjoyable reading experience.



Mr. Saifullah, FCA
Chairman - Marcom Committee &
Editor-in-Chief



Data Analytics - Ethical & Legal Concerns

Dr. Ahsan Laliwala, FCA

Data mostly contains facts, figures, pictures, events and features. It is information that can exist in textual, numerical, audio, or video formats. Data is existing from the earliest point of time when it could be very limited in size and easily remembered by a Human memory. Its true potential is realized when a large Dataset is compiled and analyzed to drive results. The term 'Big Data' was coined to describe Datasets that were too large to be processed with the help of conventional tools. The six features of Big Data popularly known as "Six Vs" are Volume, Velocity, Variety, Value, Veracity and Variability.

The Data collection, scope of collection & features of Data to be collected only gets sense from the objective which is

“The term ‘Big Data’ was coined to describe Datasets that were too large to be processed with the help of conventional tools. Six features of Big Data popularly known as “Six Vs” are Volume, Velocity, Variety, Value, Veracity & Variability.”

“ A slight mistake or Data leakage can cause an enormous hit on goodwill as well as loss of business and regulatory penalties together with payment if any for ransomware. ”

desired to be achieved, and hence a particular Data or its feature may be useful for one person or organization but not for others. Data is only useful when information can be derived from it otherwise it's merely a collection of dispersed facts and figures. The current expectations of features of good Data collection are minimum cost, minimum time, and maximum use. Keeping this expectation in mind, presently Data is wealth useful in all facets of life, especially for Commercial, Medical & Scientific purposes.

However, with the refined means of Data acquisition and power of Data to create an imbalance in the commercial world, society, and effect on Human rights specifically as consumers, the need to have Ethics, Laws & Regulations was felt and still growing. Similar to the unlimited geographical boundaries of the internet providing limitless opportunities for Data acquisition, Laws & Regulations as promulgated by different countries in the world have extraterritorial effects which sometimes cause conflict of Laws. These Laws & Regulations govern the whole lifecycle of Data starting from acquisition/collection, compilation, and going up to its storage, sharing & transference, analysis, and ultimate use.

The Ethical & Legal constraints that are faced at each stage of the Data life cycle are enormous and each one deserves to be compiled in separate chapters, but for a very brief overview some of these are discussed below:

Collection, Acquisition & Compilation of Data

The primary Legal concern in relation to collection and acquisition of Data is the consent and privacy of Data which directly associates with universally recognized Human Rights. These concerns are primarily important in relation to automatic acquisitions and processing of Data by the websites. To address these concerns organizations are required to specify on their website what information is collected including cookies policies and how they ensure compliance of Law in relation of privacy and Data transfer within the group companies and with third parties.

More specifically in relation to cookies, website classifies it into two (02) groups namely, Optional & Functional cookies. The later one necessary for optimal operation of website and

cannot be configured as relates to the key functions including the language used, display resolution, account access, etc. Whereas, optional cookies are subject to the consent of visitors of the website usually consented by website visitors without considering the details, and are classified into three (03) types, namely

- Analytical & Performance Cookies used to measure and analyze website audience including visitor volume, pages viewed and average browsing time are primarily relating to the improvement of website performance.
- Personalisation Cookies to provide online (or in-store) recommendations of Products, Services & Content based on expectations and preferences to enrich personalized experience.
- Advertising and Social Media cookies used for advertisements displayed on third-party websites, including Social Media tailored to visitor's preferences usually used to measure the effectiveness of advertising campaigns.

Storage of Data

This stage of Data lifecycle is critical from point of exposure to Cyber risk. The cost to be incurred by owner of the Data primarily dependent upon the Volume & Sensitivity of Data, Business sector, Governance and Legal requirements. A slight mistake or Data leakage can cause an enormous hit on goodwill as well as loss of business and regulatory penalties together with payment if any for ransomware. The qualities expected at this stage are minimum cost with maximum storage capacity, maximum security, always updated, retrieve ability, and capability to use for different analytics. Moreover, the Laws breaching reports are important to be recalled. In order to avoid the huge cost of Data storage, companies may adopt Cloud storage but it also has a number of Risks and Legal compliances associated with it.

Sharing & Transference

In relation to sharing, the Data owner needs to consider number of factors like nature of Data (personal or sensitive Data), Legal permission to share Data, the real owner of Data and its permission, and Laws & Regulations associated with the transference of Data. On the Ethical side, the factors like cultural consideration, impact on people and communities, environmental concerns, and possible National Security issues needs to be considered. Moreover, the intellectual property rights on Data (if any) and its structure together with monopoly & essential permitted use are also part of Legal debate.

Data Analytics

Acceptably this stage of Data lifecycle is the ultimate goal of whole exercise. Data Science, Data Analysis, Machine Learning (ML) & Artificial Intelligence (AI) are the terms generally used interchangeably in Data analytics, but are different concepts though interrelated, specifically considering the quantum of Data and concurrent steps in the process. Data analytics is a field that studies how to collect,

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process, and interpret Data whereas Data science studies Data and extract the meaningful information from it.

In Machine Learning (ML) Data scientists create the algorithms that make machine to learn from Data & Patterns in it, make decisions and improve itself through experience. Artificial intelligence (AI) and Machine Learning are also used interchangeably, but ML is only a subset of the broader category of AI. Artificial intelligence refers to the general ability of Computers to mimic Human thought and perform tasks in real-world environments i.e. capable of behaving in ways that both mimic and go beyond human capabilities. AI-enabled programs can analyze and contextualize Data to provide information or automatically trigger actions without Human interference. Artificial intelligence systems used tools like Machine Learning, Deep Learning, Neural Networks, Computer vision and natural language processing

However, in order to get the correct results both the Data as well as expertise of person analyzing it are important and must be free from all biases. Bias refers to the tendency of Machine Learning an artificial intelligence system to produce skewed results that are systematically prejudiced against individuals or groups based on factors that should have no bearing on outcomes. Bias can be caused by unrepresentative, limited, or incomplete data sets.

In Machine Learning and other artificial intelligence subsets, algorithms often operate in ways that even the developers don't understand. The designers of the AI "Trained" it with a vast amount of Consumer Data, but at the end of the day, it may be that no one knows exactly how the AI made the decision it did.

Hence, it should be appreciated that data selected to train AI could eventually be under intense scrutiny in court during a discrimination case. More Laws are being proposed in this field, such as Algorithmic Accountability Act of 2019 in US, that requires documentation into the logic guiding how AI systems make decisions. Another example is EU law i.e. European Union's General Data Protection Regulation (GDPR), under which a business using personal Data for automated processing must be able to explain how the system makes decisions. Additionally, GDPR also grants an individual a "right of human intervention" whereby an individual may ask for a human to review the AI's decision to determine whether or not the system can make a mistake. This right of human intervention and the right of explain-ability places Legal obligation on the business to understand what happened, and then make a reasoned judgment.



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Data Analytics A Voyage from Droplets to Rainbows

Mr. Khizar Hayat, FCA

The processed form of smashed and scattered Data clusters into meaningful, defined designs, scooping of relevance & decisive information may be called as Data analytics metrics & evaluation.

Data, Information & Analytics templates & outcomes are encircling the analysis fleet. Limiting factors and leading edge may lie with the analytical team exercising inferences, roles, course of actions, plans definitions & anticipations from Data thrills, information trails or glossy paperwork, Data scenarios, and presentations.

Skills set horizons might be either inappropriate mix or be a function of opera-spectrum in accordance with regulatory affairs.

“ Data, Information & Analytics templates & outcomes are encircling the analysis fleet. Limiting factors and leading edge may lie with the analytical team exercising inferences, roles, course of actions, plans definitions & anticipations from Data thrills, information trails or glossy paperwork, Data scenarios, and presentations. ”

Tambula Veins & Outcomes

Extent and time to complete and avert on any sequenced information are largely depended on composition & access built into underlying Demographic contents & Pictorials, Billboard ingredients, Layouts, and Benchmarks. The more concentrated information access, the more is the probability of optimal & glowing outcomes.

Axis for Demographics layouts of selected Analytical Data is of the highest value.

Analytical information may be a mix of multiple layers and aided patterns and subject to excessive sweating as well as the emergent stimulus. Traits like litmus turning would be of great significance for analyzers and data scanners.

Litmus Traits of analyzers are the life & blood of enterprises.

Trails and Frills may be associated with all Typescripts or Transcripts whether they are meant for any hierarchical utilization. The dire needs of Regulators & Capital Markets would also make analysis Stories & Intervals more value-added and reaping.

Trails and Frills would be of vital utility for subsequent reference and for keeping Data demographics alive.

Analytical skills would be correlated with the sophistication of Data modes, processes, systems run, applications availability and aging as well as Data concurrency.

Age Application & Modes would be the supplement for continuity and sequential flows of information. Data and processes are basically parts & parcels of any growing, successful, or going concerns & public projects. Scope limitations may be termed in different ways:

- Clashing of considerations.
- Dominance prevalence.
- Bargain constraints.
- Culture attributions.

Every

Subjective, Time-constraint information, Bird eyes reviews, and highly skilled insights might be under the scope of analytical Taps and incidental or judgmental mapping Worms.

Analytical views are always prone to aversions like:

- Role stereotypes.
- Samples non-selection.
- Schemes designs and arrangements.
- Exceptions.
- Tolerance levels.
- Team traits and taming.
- Porous and deviations in processes.
- Environmental affluences.
- Marketplace impacts.

To keep float or sailing, systems have marginally kept alive with the placing of intervening, breathing dashes and

“ Extent and time to complete and avert on any sequenced information are largely depended on composition & access built into underlying Demographic contents & Pictorials, Billboard ingredients, Layouts, and Benchmarks. ”

slashes for intermeshed results and orientations. This dimensional phenomena in analytical analog would supplement lasting operations and facilities.

Dashes & Slashes is the glossy outcome and meaning for existence.

Data Puzzle to Unveil

Behavioral patterns associated with the relevant process holder towards information, analytical reviews & modes of results of drawn might be ranging from positive, negative, neutral, and exaggerating.

Throughputs thereof resultantly might be spontaneous, just & fair enough.

Data analysis might be a subject of variants like data association traits, data routes & exceptions, surpassing of all modalities, ethical dimensions, reciprocal arrangements or off sets, generic systems bottlenecks & cultivated decision making, and predefined outcomes.

Trafficking & Routings of information centers are predetermined and submissive to decision holders.

Viscosity and depth of relevance as well as the sequential magnitude of analytical and refined information would be a function of hierarchical addresses and cross-netting among stakes.

Latitudes & Altitudes of Data processes and allied analytical skills would be reciprocated in form of soother swallowing of monetary and fiscal charms and marshmallows.

Analytical tools and aiding processes are more concentrated in the forms of ever-changing topologies, built-in features, and soft expertise.

From conventional to the latest versions of capabilities are of vital utility subject to digital sophistication and pace.

“ Age Application & Modes would be the supplement for continuity and sequential flows of information. Data and processes are basically parts & parcels of any growing, successful, or going concerns & public projects. ”

Arena of digital Science and rapid Updates therein had been revolutionizing both end-users and data players. True sensitivities and underlying leaches or cognitive data patterns would be of significant attributions for routine to exceptional information evaluation and optimal course of planning.

The role of the Data analyst is more blessed on way forward or routings from basic data Scratch to Digest of complex outlooks and information vending.

Outcomes, foreseen transcripts, and decisions modeling miniating from analytical and grinding views or data extraction might be ranging from optimistic, pessimistic, neutral, superfluous, or endowing.

The essence lies in data conversion is the extent of successful conversions of different forms of business data sources into meaningful and supplemental information and lucrative outcomes for stakeholders.

The main task is to unleash traits and Probabilities of the data world & exercise due Transformation of information and analog signals into current tech digital patterns to grasp growth prospects.

Data drills and formations are indicative of mixed proportions of both planned and sergeant entrepreneurship outcomes and probabilities.

Edges and comparative aids fall with the Efficacies of planners, resultants surely are either stabilizers or somewhat geared returns.

Greater the terminal velocity built-in analytical processes and flexibility in Data management, more coherent corporate excellence or upsurge and objective patterns emerge over spans.

Reinforcement of spontaneous disposal of data into information might lead to enterprise Success being supplemented by factors of production inculcated with the

Terminal velocity of each endowment. The biggest challenge for corporate excellence might be directional aims and broader aided access to afflux data stratum and extraction of vetted & refined meaningful strains of governance.

Control and reliance are key drivers and determinants for representative slots of information wraps and envelopes for analytical and judgmental mapping and scenario modeling. Ease & Taming are two testing traits for analytical span.

Sourcing of data would evolve around fulfilling and redressing of basic to strategic information needs as well as exception routings & alternatives phasing.

Indicators and historical layouts for business or economic or investment drives are being serving from basic to moderate levels of information spooling and velocity.

Extraction and analytical impulsive information would be a function of –win-win scenarios for any bargain consideration in any economic or investment motives keeping in view mutually exclusive events and ultimate options gains.

The whole limits would be governed by the generation of Business or Economic value from choices and evaluation of technical, and non–technical elasticities and benefits or potentials.

The biggest phenomenal attributes are affixing of connotational characters and conventional consistency reviews and views over extended intervals. Although information patterns are embedded with similarities and consistency but at same time end-users are also embarked with internal and external bars and are meant to exercise rigorous stational information utility and subjective Data management. One may define as conventional Data efficacy being function of Information or content legacy.

Data forms and Shape are taken acceleration in recent years.

Technological innovations both in terms of systems, equipment, networks, connectivity, artificial intelligence, e-commerce gadgets, and gizmos had accelerated the pace of instantaneous availability and disposal of data tasks and allied analytical chemistry.

Intra connectivity among different supply chain associations and trade swaps had also embarked with quicker decision modeling and resource sizing and deployment.

Multiple data states from conventional paperwork to current analogy form had made inbuilt ease, rapidness, and sophistication in analytical reviews and alternatives vetting.

Metaphors & Stacks

Metaphoric and stacking of data and then information is synchronizing pulse for meaningful analysis and design of data sampling distribution & selection and realistic models for conclusions and foreseeable planning.

“ The main task is to unleash traits and Probabilities of the data world & exercise due Transformation of information and analog signals into current tech digital patterns to grasp growth prospects. ”

Data or process owners as well as information drivers or centers would be enabling analytical chemistry to the extent of needed processes facilitation and long-term

Accommodations & prospects. Boundaries for corporate or systems or governance ramifications are settled in basic opera, environmental attributes, processes holdings, and drivers. Analytical exercises or tasks are well aware of boundaries and axis of patterns settled down for data metaphors and ownership.

Ethical panorama is very much relevant and a test case for developing governance models and economies. It is a function of either deeper louder supremacy, learning dominance or broader scaling views, chasing significance, or meeting or compensating systematic trades off rather than the circumstantial balance of corporate domains.

Ethical standards are equally good and need reinforcement as well - guarding at charge with governance levels to keep lucid governance benchmarks and growth reflux.

Enriched Data Druthers & Fritter

Data symmetry is of course variants magnitude and may have profound bearings on judgements and plans definition science. Enrichment altitude would be complemented with hard-worms, soft-worms, firm-wares, and environmental worms and resultants would be direct heaping of data druthers and fritter for the data science environment.

Preemptive & Collusive Models

To follow the suit like developed states, a major analytical milestone would be placing of excessive reliance on pre-emptive frameworks and baseline governance patterns. Conventional static and bureaucratic information disposal systems might have largely snapshotted into mere information dissemination and afterward lines-biting.

Carrot & Stick in 7 Basket

To be more pragmatic, conventional analytical versions would be cognizant of the fact that the placement of the carrots and sticks in the basket might be inverted into

mutually inclusive governance paradigm. Learning models for data analyzers from business resource management (ERP) institutions like Ora or Oracle University might be paving pathways for future analytical scaling.

A paradigm of various data management process personnel roles might be subject to the type of specific learning curves necessitating for the respective domain. Embark furthermore, for any work applications, data analyst is of predominant weight. However, if any systems development applications are underway, Data scientist would be of significant value for knowledge deliverance and application developmental works.

Western mapping of multiple Data skills holders is enabling & smoothing analytical field had been cited. In a data game, key drivers and process enablers would range from data engineer, data architect, data scientist, business analyst to data analyst.

The importance of extraction of relevant impacts and allied universal facts & alarming ethos can be very precisely depicted by UN – data value teams. The main concern is encompassing downward trends in growth rates, lowering of real incomes, fiscal & social erosions and climate challenges abreast.

In Pakistan, currently, shift has also been done towards an “Open Data Policy” at the state level to seek processes and departmental excellence and road for long-termplanning.

Products launching in an automated environment is a multidimensional and teething task subject to defining:

- User interface.
- User Experience.
- Product Design.

Processes would be optimal depending on the ease-of-use of the product and the economic fit of the product.

The overwhelming emphasis on Data extraction and choices is imperative mainly because successful deliverance of governance and marketing plan would be driven by supreme SWOT analysis. Minimal reflections and deflections of resources as well as governance analytical chemistry would be needed to be further aided by concerned quarters for achieving goals like balancing, modernization, research & development.



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How does Data Analytics Work and How it Benefits the Businesses?

Mr. Syed Imtiaz Abbas Hussain, FCA

To understand the utility, importance, and benefits of Big Data, one needs to know "What Data Analytics is?"

Data Analytics is the process of examining Data Sets in order to find trends and draw conclusions about the information it contains. Data Analytics is done with the aid of specialized Systems and Software.

Nowadays, our Society runs on Data as we generate more than 2.5 quintillion Bytes of Data each day. The Global Big Data and Business Analytics Market has been expanding over the last several years, jumping from \$122 Billion in Global Revenue in 2015 to \$189 Billion in 2019 and driving towards a projected \$274 Billion for 2022.

Data Analytics is similar in nature to Business Analytics for approaches to analyzing Data. The difference is that the latter

is oriented to Business uses, while Data Analytics has a broader focus.

Depending on the particular Application, the Data may consist of either Historical Records or New Information that has been processed for Real-time Analytics. In addition, it can come from a mix of internal systems and external Data sources.

Data Analytics can also be separated into Quantitative Data analysis & Qualitative Data analysis. The former involves the analysis of Numerical Data with Quantifiable variables. These variables can be compared or measured Statistically. The Qualitative approach is more interpretive as it focuses on understanding the content of non-numerical Data like Text, Images, Audio & Video, as well as common Phrases, Themes, and Points of view.

In the past, Data queries and reports typically were created for end users by BI developers who worked in IT. Now, more organizations use self-service BI tools that let executives, Business Analysts, and Operational workers run their own ad-hoc queries and build reports themselves.

Data is like the blood of Business analytics or the fuel of Business. Companies, rather big or small, run on Data generated and collected from their operations and external sources.

To get the greatest insight from your Data, one must be familiarized with the following five types of Data Analytics (Descriptive, Diagnostic, Predictive, Prescriptive, and Cognitive Analytics), which can be used individually or closely with others to maximally benefit from the company's Data.

- 1. Descriptive Analytics:** is the simplest type of analytics and the foundation, the other types are built on. It allows you to pull trends from Raw Data and briefly describe what happened or is currently happening. It answers the question, "What happened?". Data visualization is natural fit for communicating Descriptive Analysis because Charts, Graphs and Maps can show trends in Data as well as ups-downs in a clear, easy and understandable way.
- 2. Diagnostic Analytics:** addresses the next logical question, "Why did this happen?" It is useful for getting at the root of an organizational issue.
- 3. Predictive Analytics:** is used to make predictions about future trends or events and answers the question, "What might happen in the future?". By analyzing Historical Data in tandem with Industry trends, one can make informed predictions about what the future could hold for the Company. Making data-based predictions can help organizations to formulate strategies based on likely scenarios.
- 4. Prescriptive Analytics:** answers the question, "What should we do next?". It takes into account all possible factors in a scenario and suggests actionable takeaways. This type of analytics is especially useful when making Data involved decisions.
- 5. Cognitive Analytics:** applies human-like intelligence to certain tasks, and brings together a number of intelligent technologies, including Semantics, Artificial Intelligence Algorithms, Deep Learning and Machine Learning.

How does Data Analytics work?

Data Analytics applications involve, more than just analyzing data, particularly on advanced analytics projects.

- 1. Define Questions & Goals:** The analytics process starts

with obtaining Business problems, questions, or goal in a statement so that relevant Data may be collected and processed to get the desired results.

- 2. Collect Data:** Quick relevant Data to collect. Data scientists identify the information they need for a particular analytics application and then work on their own or with Data engineers and the IT staff to assemble it for use. Data from different source systems may need to be combined via Data integration routines, transformed into a common format, and loaded into an analytics system, such as a Hadoop cluster, NoSQL Database or Data warehouse. In other cases, the collection process may consist of pulling a relevant subset out of a stream of data that flows into, for example, Hadoop. The Data is then moved to a separate partition in the system so it can be analyzed without affecting the overall Data set.
- 3. Data Cleaning:** Once the Data that's needed is in place, the next step is to find and fix Data quality problems that could affect the accuracy of analytics applications because it is necessary to ensure Data integrity through a dynamic monitoring and verification process, which includes running Data profiling and Data cleansing tasks to ensure the information in a Data set is consistent and that errors and duplicate entries are eliminated. Additional Data preparation work is done to manipulate and organize the Data for the planned analytics use. Data governance policies are then applied to ensure that the Data follows corporate standards and is being used properly.
- 4. Data Analysis:** A Data Scientist builds an Analytical Model, using predictive modeling tools or other analytics software and programming languages such as Python, Scala, R, and SQL. Typically, the model initially runs against a partial Data set to test its accuracy and then revised and tested again as needed. This process is known as "training" the model until it started to function as intended.
- 5. Data Results:** Communicate the results generated by analytical models in effective and meaningful designed reports with key actionable recommendations to Business executives and other end users. The Data is presented on real-time interactive dashboards consisting of advanced visual tools to make the analysis more insightful and decision-making more relevant, well-informed, and efficient.

How Data Analytics Benefits Businesses & others?

Technologies and techniques are widely used in commercial industries enabling organizations to take better-informed decisions. The organizations that use Business analytics not only can survive but often grow and flourish in this type of condition."

Data Analytics is the process of examining Data Sets in order to find trends and draw conclusions about the information it contains. Data Analytics is done with the aid of specialized Systems & Software.

Data Analytics initiatives can help Businesses in boosting Business performance in a number of ways listed below:

- 01 Increase in Revenue.
- 02 Decrease in Cost, Wastages, and Leakages.
- 03 Improve Operational Efficiency and Productivity.
- 04 To optimize Marketing campaigns with improved customer acquisition & retention through improved customer experiences.
- 05 To respond quickly to emerging market trends and gain a competitive edge over rivals.
- 06 Faster decision-making.
- 07 Increase Business agility.
- 08 Better Financial performance.
- 09 Identification and Creation of new Product and Service Revenue.
- 10 to improve key performance metrics by reducing risk, optimizing operations, and increasing efficiency, and setting strategies that ultimately confer a competitive advantage.
- 11 To manage budget through variances and corrective actions etc.
- 12 In marketing and pricing strategies. For example, a life assurance / Takaful company is likely to take into account potential health and life variables such as Age, Gender, Location, Health, Occupation, Family history, and Income while devising Life insurance / Takaful policies.
- 13 Targeting online advertisements, analyzing customer behavior to determine buying patterns.
- 14 Flagging potentially fraudulent Financial Transactions.
- 15 Identifying Patients at risk of particular medical conditions.
- 16 Detecting impending parts failures in industrial equipment beforehand.

Conclusively, any Business professional needs foundational knowledge of Data Analytics to make proactive and calculated decisions. Accessing Data is more convenient than ever but even if a decision is made without considering the Data, one may lose the foremost opportunities or red flags that Data communicates. Professionals who can benefit from Data Analytics skills include:

- Marketers, who utilize customer data, industry trends, and performance data from past campaigns to plan marketing strategies
- Product managers, who analyze the market, industry, and user Data to improve their companies' products
- Finance professionals, who use historical performance Data and industry trends to forecast their companies' financial performance
- Human resources and diversity, equity, and inclusion professionals, who gain insights into employees' opinions, motivations, and behaviors and pair it with industry trend Data to make meaningful changes within their organizations

Scientists and researchers also use analytics tools to verify or disprove scientific models, theories, and hypotheses. Weather

forecasting is one of the best-known uses of Data Analytics. Data Analytics is also used to forecast elections, predict the spread of diseases, and model the effects of climate change. Data Analytics initiatives give support to a wide variety of Business functions in addition to the Marketing,

Manufacturing, and Healthcare industries. For example:

- a. Banks and credit card companies analyze withdrawal and spending patterns to prevent fraud and identity theft.
- b. E-commerce companies and Marketing services providers use clickstream analysis to identify website visitors who are likely to buy a particular product or service based on navigation and page-viewing patterns.
- c. Healthcare organizations determine the patient's Data to evaluate the pattern of treatments for Cancer and other diseases.
- d. Mobile network operators examine customer Data to forecast churn which enables them to take steps to prevent customers from defecting to rival vendors.
- e. To boost Customer Relationship Management efforts, companies engage in CRM analytics to segment the customers for Marketing campaigns and equip call center workers with up-to-date information about callers.

Observations

The massive amount of Data Businesses accumulate from their customers, Business operations, suppliers, employee performance, and so on is not useful unless it's acted on. What changes the outcome of Business today is how we understand and act upon our Data.

That understanding requires analytics.

Moreover, if the Data is inaccurate, outdated, or used by wrong tools then Data Analytics outcomes will be negatively impacted. As explained above Data Analytics covers and restricts to only Historical and Real-time Data and information and does not cover future Data and information which may be useful for Designing, Budgeting, and Management Accounting issues.

Data Analytics on many applications requires a high level of expertise which includes Data Scientists, Statisticians, Data analysts, Data engineers, BI Developers Business analysts, etc. A wide range of tools used may cause Data Analytics an expensive affair but the benefits, especially medium and large-sized organizations get from Data Analytics, are much more than its cost. Small and medium-sized organizations may get benefits from Data Analytics through outsourcing service providers at much lower expenses.

Data Analytics is the best and utility-based gift from Hi-Tech to organizations who want to go-grow-glow.



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Data Analytics The Future

Mr. Asad Ullah, ACA

Power of Data & Analytics

Diagrams are of great utility for illustrating certain questions of vital statistics by conveying ideas of the subject through an eye that cannot be so readily grasped when contained in figures. Florence Nightingale is a founder of modern nursing who used data analytics to primarily revolutionize and transform healthcare by identifying sanitation and hygiene as significantly important to health outcomes. This changed healthcare practice forever.

Yesterday, even as we built our societies and explored our world, we struggled to interpret all the information available to us. Today there are more of us than ever before. Each generates information about who we are and what we need. Living in a more connected world. We have ever more effective ways to harness this information, understand it and use it. It gives us invaluable insight into our businesses, our people, and our risks.

“Yesterday, even as we built our societies and explored our world, we struggled to interpret all the information available to us. Today there are more of us than ever before. Each generates information about who we are and what we need. Living in a more connected world.”

“The first part of taking a data-enabled approach to solving important problems is collecting and consolidating the relevant data, along with cleansing it to be fit for further exploration. The data is available in two forms unstructured and structured.”

Dave Reinsel, Senior Vice President of IDC's Global DataSphere, quoted in March 2021, "The amount of digital data created over the next five years will be greater than twice the amount of data created since the advent of digital storage."

Are we ready for Today? Are we ready for Tomorrow?

Data Analytics

We all heard the two buzzwords. But what do they really mean? Let's start with definitions. Data refers to the volumes and types of information that can be collected and processed using increasingly high-tech systems. Analytics is the use of maths and statistics including qualitative and quantitative techniques and processes used to provide insights essentially making it easier to see the patterns and identify connections in order to make better decisions.

Data Collection

The first part of taking a data-enabled approach to solving important problems is collecting and consolidating the relevant data, along with cleansing it to be fit for further exploration. The data is available in two forms unstructured and structured. Though all data has to be put into structured formats to be analysed.

Unstructured data has no predefined format, making it much more difficult to collect, process, and analyse. Examples of unstructured data include books, videos, and social media posts. One of the most common types of unstructured data is text. Unstructured text is generated and collected in a wide range of forms, including Word documents, email messages, presentations, survey responses, transcripts, and posts from blogs and social media sites. Structured data is highly organized and formatted in a way that makes it easily searchable. Some examples of structured data are Microsoft Excel or Google Sheets that organize data in columns and rows, as well as spreadsheets and databases.

It is important to consider whether the collected data is accurate, valid, and complete. Technology and tools can help to assess this, and then clean the data before it is explored further.

Data Exploration

Data is explored to identify patterns. A range of analytical tools can be leveraged to uncover insight, depending on the desired outcome.

- **Descriptive analytics:** It is the process to describe, summarise and analyse historical data to comprehend the variances. It gives insight into what actually happened. It provides a complete sight of trends to build a future approach. The positives and negatives can be identified. Dashboards, scorecards, and alerts are examples.

- **Diagnostic analytics:** It identifies causes of trends or outcomes and correlations between variables. It offers the answer to why an event happened.
- **Predictive analytics:** This predicts future outcomes based on past trends and historical data. It helps to classify risks and opportunities.
- **Prescriptive analytics:** It recommends the 'right' or optimal course of actions or decisions - what should be done. It recommends the succeeding steps to be taken in making any strategy.
- **Autonomous analytics:** It analyses the data automatically and continuously to identify potential risks and opportunities. It is a modern solution to use machines as data is becoming more complex.

Data Visualisation

"If you can't explain it simply, you don't understand it well enough".
(Albert Einstein)

Data is only as good as the user's ability to understand and communicate it. Data visualization is the conversion of raw data into a format that is more comprehensible and user-friendly than displaying it in tabular form. Best practices for visualizations include ensuring that the visualization reflects responses to the question/problem being solved, minimizing the data to ink ratio, displaying the data honestly, and applying good design principles to allow the user to understand the message. Technology to support visualizations is evolving all the time such as Power BI and Tableau amongst others.

Data Analysis Application

The real power of data-led insight coupled with expertise and experience is applying these in order to add value to every part of the value chain and to every area of decision-making. Typically, insight from analytics helps in a number of ways:

“Data refers to the volumes and types of information that can be collected and processed using increasingly high-tech systems. Analytics is the use of maths and statistics including qualitative and quantitative techniques and processes used to provide insights essentially making it easier to see the patterns and identify connections in order to make better decisions.”

- Stronger Risk Management
- Greater Operational Efficiency
- Enhanced Product /Service offerings
- Increased Margins
- New Growth Opportunities

Data Analytics in Organizations

Rob Casper, Chief Data Officer - JP Morgan Chase says “The best advice I have for senior leaders trying to develop and implement a data culture is to stay very true to the business problem: What is it and how can you solve it? If

you simply rely on having huge quantities of data in a data lake, you’re kidding yourself. Volume is not a viable data strategy. The most important objective is to find those business problems and then dedicate your data-management efforts toward them. Solving business problems must be a part of your Data strategy.”

What capabilities does an organization need to succeed? One approach is the Delta Model.

DATA that is clean, accessible, and unique to the organization. An enterprise-wide focus with key data systems and analytics resources available to the whole organization and not just isolated teams. Leaders at all levels that promote a data-analytics-driven culture. TARGETS for key business areas that can benefit from this approach and talented ANALYSTS to execute a strategy in a complex and dynamic business environment. All these ingredients will aid an organization to embed successful data analytics culture.

Data Privacy

It is significantly essential to create new policies to protect the personal data that is collected over time. With confidentiality increasingly in jeopardy, data privacy is becoming more about controlling how data is used, while cybersecurity is focusing more on preventing data manipulation and destruction that could undermine trusted systems.

“The most important objective is to find those business problems and then dedicate your data-management efforts toward them. Solving business problems must be a part of your Data strategy.”

The data collected with meaningful consent is permitted to act upon. Organizations need to consistently cultivate trust, explaining in common-sense terms how data is being used and what is the purpose. The personal data once collected is to be stored securely and can be used by authorized persons. The objective is to analyze the data as it is done the data should be destroyed within a specified period.

Synopsis

Data and Analytics are more than buzzwords and are vital to improving decision-making to ensure that an organization is a step ahead of its competitors. There are different steps in the process from Data collection, exploration, and visualization to its analysis which can be rooted in the organization’s culture along with the formulation of Data privacy policies through the direct involvement of its top leadership.



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Big Data Analytics for Business

Mr. Adnan Mehmood, ACA

In today's Digital Economy, where Data storage and analysis are in great demand IT Departments are facing problems in Safeguarding and Evaluating this Data. It's a necessity for businesses to Collect and Store the available Data. This structured & unstructured Database is driven by Big Data comprising Documents, Photographs, Audio, Videos, Social Media Content etc. Big Data Analytics is also important for Business Development Prospects and Customer Retention. An analysis of Hadoop and MapReduce shows how a company's economic worth and competitive edge can be improved through the use of Big Data analytics.

Big Data: A New Perspective

Data of Non-traditional Database is referred to as "Big Data." For Big Data, value may be reaped by utilizing tools like

In today's Digital Economy, where Data storage and analysis are in great demand IT Departments are facing problems in Safeguarding and Evaluating this Data. It's a necessity for businesses to Collect and Store the available Data.

Hadoop, HDFS, NoSQL, MapReduce, MongoDB, Cassandra, PIG, HIVE, and HBASE. There are unlimited sources for Big Data.

Traditional relational Data is being supplemented by an increasing amount of unstructured Data. Data generated by machines grows rapidly and encompasses a wide range of content. From Corporations to Governments, all kinds of organizations produce massive amounts of Data. These giant Data sets have shifted the focus of Businesses around the world to gain meaningful insights and competitive advantages. It's tough to extract useful information from these Data sources. The potential of Big Data to improve Company Performance & Market Share necessitates the use of analytics. Recently, growth observed in Big Data's tools, volume, pace, and variety. These technologies rely heavily on open-source Software. Hadoop combines open-source Software and Commodity Hardware. There are tools for analyzing and distributing the Data that is received. Most IT teams will have to learn new skills to work with both internal and external Data sources as a result of the advent of these technologies. The use of Technology is essential, but not sufficient, for a successful Big Data Strategy.

Big Data & Analytics

High-Speed Data Collection, Storage, and Analysis are key components of Big Data. Emails, Mobile device outputs, and Sensor-generated Data are no longer limited to structured Database entries. Big Data and Analytics is a new and evolving idea, hence there is no single definition. Numerous and sometimes conflicting definitions have been offered by Stakeholders. One of the early definitions of Big Data was presented by Gartner in a report published in 2001. Gartner defines Big Data as a combination of Volume, Velocity, and Diversity. Unstructured Data, such as Phone records, Mobile Banking transactions, Blogs, Posts, Tweets, Web-Searches, and Images can be processed using Big Data Analytics to uncover trends and patterns in Datasets. Big Data also includes Technology. For Big Data evaluation, unique Technology is required. New approaches to frontier problems can be found through the use of Big Data. Businesses face a wide range of issues and even when they have access to a wealth of information, they struggle to use it effectively in their decision-making. Predictive Analytics uses Data from the past to predict future consumer behavior and trends. It uses historical Data to make predictions about the future. Trends are discovered using Statistical Models and Machine Learning techniques in this study. It is a

Traditional relational Data is being supplemented by an increasing amount of unstructured Data. Data generated by machines grows rapidly and encompasses a wide range of content. From Corporations to Governments, all kinds of organizations produce massive amounts of Data.

Machine Learning based Data analysis and Prediction Technique called Predictive Analysis (PA).

Predictive Analysis & Preference Matching in E-Commerce

The application of Predictive Analysis in E-Commerce can be utilized for Product Recommendation, Price Control, and Predictive Search. E-Commerce websites offer a wide range of Goods & Services for sale. Customers may have a difficult time sifting through thousands of items available online. An E-Commerce site or app can quickly identify/predict products that match a customer's preference with the help of a recommender system. Collaborative Users' preferences are stored in a Database when they utilize filtering. New visitors to the E-Commerce site are matched with the preferences Database to locate a preference matching class upon arrival that these products have been suggested by similar customers. Another E-Commerce innovation is Clustering. Users with similar preferences are identified by using the Clustering Algorithm.

Flume Agents: A Reliable Distributed System for Data Gathering

Data can be collected, aggregated, and sent using Flume, a reliable distributed system. Flume is a Java Virtual Machine-based agent that may be deployed in many ways (JVM). Agents are made up of various components, such as Inputs, Outputs, and Pathways. When using Flume agents, information can be ingested from a variety of sources. A sink, typically Hadoop, receives Data from Flume agents and then communicates events to sinks via channels.

Sqoop: A Database Integration Framework for Data Exchange

Hadoop and relational Databases may exchange Data with the help of Sqoop. Exporting Data from HDFS after a MapReduce transformation using Sqoop is also possible. HBase and Hive can be imported using Sqoop. The Database structure is described by the RDBMS, which Sqoop connects to via its JDBC connection. Import and export are parallelized and fault-tolerant with MapReduce.

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Data is imported into HDFS in a row-by-row fashion via Sqoop. Multiple HDFS files are created by parallel import.

Zookeeper: An Open-Source Distributed Coordination Server

Open-Source Zookeeper is a server that provides reliable distributed coordination. A naming registry and a distributed configuration synchronization system are included. Distributed configuration Data is stored and updated by Zookeeper.

MapReduce: A Map Function for Big Data & Retrieval

2004 saw the introduction of MapReduce by Google. A map function that transforms Source Data into Statistics and a reduction function that combines all of the Statistics into one response are the two pieces of MapReduce

Splunk: A Simple & Fast Data Search Engine

Machine Data can be searched, analyzed and reported by using Splunk. It is possible to use Splunk to manage Applications, Security, Compliance, IT operations, and Business analytics all at once. Unstructured Data may be indexed and stored quickly using Splunk's engine.

Spark: Apache Big Data Processing Framework

Apache Big Data Processing Framework Spark is fast and simple to use. Hadoop as a Big Data Processing Technology has been available for Ten years and is the solution of choice for processing enormous Data collections. Spark reduces the cost of Data shuffles in MapReduce. Because of the in-memory Data storage and near Real-time processing, this Big Data solution performs better than the competition. Amazon uses Predictive Analytics and Big Data to anticipate when a customer will buy a product and then pre-ship it to a depot near the final destination

A New Way to Make a Big Change

The pace of Technological changes is very rapid and Organizations relying on Data for critical decisions and must find a solution to analyze more Data with fewer resources. Companies having optimum resources can transform their company with Big Data. Insights and Solutions to Business issues can be gleaned from large amounts of Data. A company's bottom line is likely to improve if it investigates Big Data and takes decisions based on its learnings. There are many new Business opportunities to be discovered by Big Data analysis, not just cost savings or efficiency advantages. Decisions backed by the Data are mostly predictable and offer low-risk outcomes.



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Data Analytics WHY?

Mr. Muhammad Asad Ali, ACA

Data is the Oil of the digital era, core Intellectual property, and the prime currency that has revolutionized the whole decision-making process across the globe. Digital transformation of each aspect of the economy, making it possible to identify the untapped potential revenue streams as well as remove the bottleneck to smoothen the process, that resultantly enhance the profitability and business value. With the advent of the industrial revolution 4.0 where technological advancement is at its pinnacle, the majority of decisions are data-driven that allow improved productivity, increased efficiency, better flexibility, and informed and precise decision making. To grab opportunities and to avoid the inevitable, companies are continuously updating their technological and economic resources to keep up the pace with this transformation. As the only thing constant is change, otherwise companies may end up in history.

In pursuit to survive and gain a competitive edge, organizations are investing billions to collect and record data in real-time and in its purest of form. Companies are introducing a data culture throughout the organizations

“ With the advent of the industrial revolution 4.0 where technological advancement is at its pinnacle, the majority of decisions are data-driven that allow improved productivity, increased efficiency, better flexibility, and informed and precise decision making. ”

“ In pursuit to survive and gain a competitive edge, organizations are investing billions to collect and record data in real-time and in its purest of form. Companies are introducing a data culture throughout the organizations that allows the collection of complete, rich, reliable, and highly refined data. To ensure its reliability and authenticity standard procedures and governance frameworks has been established that will not only amplify its power as well as make analysis more precise. ”

“ In the real world high tech companies, like Google, Facebook, and Twitter are providing free services to their individual consumers but astonishingly recording billions of dollars as revenue e.g.; Alphabet, the holding company of Google the search engine giant generated an astonishing USD 257.63 billion revenue in the financial year 2021. Majority of the Google’s revenue are from advertisement, based on consumer data they gathered on daily basis. ”

that allows the collection of complete, rich, reliable, and highly refined data. To ensure its reliability and authenticity standard procedures and governance frameworks has been established that will not only amplify its power as well as make analysis more precise. To tap the uncover resources strong data foundations should be built to harness data that will provide flexibility and foresight for growth in almost all aspects.

The Collection of data is the most important step after its generation enabling to build an organization’s own database for further analysis as well as can help to generate revenue through monetization of data. Currently, established ways of data collection are websites, interviews, transactional tracking, social media monitoring, surveys, and user feedbacks. Data collected digitally with minimal human intervention is more reliable and cost-effective. Data collected through various channels need to be cleansed, validated, and organized before further processing as all the data collected is not useful to the organization’s need, therefore validation checks will be run over collected data that can remove duplicate records and basic errors. Once refined, it is ready for analysis that can extract meaningful intelligence. Visualization helps to present extracted data in a simple and precise way that can uncover trends by comparing datasets and observing relationships. Based on the outcome a strategy needs to be devised for further actions and to achieve desired outcomes.

In the real world high tech companies, like Google, Facebook, and Twitter are providing free services to their individual consumers but astonishingly recording billions of dollars as revenue e.g.; Alphabet, the holding company of Google the search engine giant generated an astonishing USD 257.63 billion revenue in the financial year 2021. Majority of the Google’s revenue are from advertisement, based on consumer data they gathered on daily basis. Similarly, Tesla one of the largest electric vehicle producers increased revenue by 71% to USD 53.82 billion in the financial year 2021, collecting a hundred terabytes of data per vehicle through their autopilot camera to increase customer safety and satisfaction by improving the self-driving mode by updating their neural networks. Companies are predicting customers’ behaviors based on data collection and devising business models and strategies to fulfill their requirements to achieve desired outcomes.

Data analytics refers to the process of analyzing historical data to answer questions, and extract intelligence and meaningful insights that can identify trends to drive decision-making process and strategy formulation. It starts with data collection proceeds to data organization and ends with trend identification. To achieve results, it uses computer programming, algorithms, and statistical analysis on past data to explore meaningful values, uncover patterns, and provide suggestions that can resolve the problem and improve performance. The focus is to extract meaningful data that can uncover patterns for predicting possible futures. In the following ways, it generates value for businesses.

“ Data analytics refers to the process of analyzing historical data to answer questions, and extract intelligence and meaningful insights that can identify trends to drive decision-making process and strategy formulation. ”

- **Cost Reduction:** It helps to predict customer behaviors for which expected demand can be estimated, therefore production can be accordingly adjusted to avoid inventory cost. More precisely it can help to optimize end to end supply chain and remove bottlenecks from the processes, resultantly reducing operational costs. Marketing campaigns will be more focused as a potential consumer within your target audience can be identified easily.
- **Fast, Better & Informed Decision Making:** it helps availability of real time data to each granule helps to make more agile and informed decision making across the organization to optimize the available resources.
- **Research & Development:** it helps to devise innovative products and services for individual customer based on his satisfaction and needs.
- **Budgeting & 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:** it helps to understand the likelihood of certain business risks occurred in the past and recommend suggestions to avoid or mitigate them to the least possible in a cost effective way.
- **Marketing & Sales:** it helps to understand key metrics, such as customer conversion rate, an analyst based on historical data can predicts the sales conversion rate and can inform the production process about the expected demand.

Companies use four types of data analytics based on the data they have and the knowledge they want to extract:

- **Descriptive Analytics:** what is happening? It examines, understands, and describes something that's already happened.
- **Diagnostic Analytics:** why did it happen? It investigates the reasons behind what happened.

- **Predictive Analytics:** what is going to happen? It analyzes historical data and trends to predict possible future.
- **Prescriptive Analytics:** what should happen? It suggests specific actions to reach desired outcomes.

A data analyst uses different methods and techniques to analyze data that range from mathematical, statistical, and machine learning. Data software tools like python, R, and Excel are available to swiftly acquire data, store information, process data, and report findings, commonly used method and techniques are as follow;

- **Regression Analysis:** try to estimate the relationships between variables to determine how changes to one or more variables might affect another
- **Monte Carlo Simulation:** model the probability of different outcomes happening. Often used for risk mitigation and loss prevention.
- **Factor Analysis:** summarize a large data set to a smaller one to uncover hidden trends like customer loyalty.
- **Cohort Analysis:** analyze a determined segment of users' behavior, which can then be grouped with others with similar characteristics
- **Cluster Analysis:** group a set of data elements in a way that said elements are more similar, for instance, insurance claims data.
- **Time Series Analysis:** the time series analysis is used to analyze a set of data points collected over a specified period of time or intervals e.g., weekly sales numbers. It is frequently used for economic and sales forecasting.
- **Neural Networks:** on the basis of intelligent algorithms, it attempts, to understand how the human brain would generate insights and predict values. Neural networks learn from each and every data transaction, meaning that they evolve and advance over time.
- **Sentimental / Text Analysis:** allows analyzing quantitative data to understand the intentions and emotions of a text by using computational linguistics programs, for example, if it's positive, negative, or neutral.
- **Conjoint Analysis:** allows recognizing how customers value different components or features of their products or services. It is one of the most effective methods to extract consumer preferences.



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Depreciation Scale

Vehicles of latest model but not older than 6 month	05%	2.50%
Vehicles of older model than 6 months but not exceeding 12 months	10%	5%
Vehicles of older model than 12 months but not exceeding 24 months	20%	10%
Vehicles of older model than 24 months but not exceeding 36 months	30%	15%
Vehicles of older model than 36 months but not exceeding 48 months	40%	20%
Vehicles of older model than 48 months but not exceeding 60 months	50%	25%
Vehicles of older model than 60 months but not exceeding 66 months	55%	27.50%
Vehicles of older model than 66 months but not exceeding 72 months	60%	30%

Standard ICAP Plan

05%	2.50%
10%	5%
20%	10%
30%	15%
40%	20%
50%	25%
55%	27.50%
60%	30%

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Growing Demand for Data Analytics Everywhere

Ms. Farheen Shehzad, ACA

We are living in a Digital age. Since the beginning of this century, we have seen and experienced drastic technological advancements which were beyond imagination. The world has become closer and easier to access virtually. This technological breakthrough has increased competition among companies and crossed borders. This has made people more knowledgeable and informative. They can search the web for their queries related to any product or service and can get instant answers to their queries resulting in quicker decision-making. All this has become possible with the availability of 'Data' across the search engines.

"In this world of big data, basic data literacy - the ability to analyze, interpret and even question data is an increasingly valuable skill," said Professor Janice Hammond, Harvard Business School. We all have heard about 'Big data'. Big data is large and complex data that cannot be handled manually.

Data is collected nowadays automatically due to advancements in technology. If we make a purchase, pay online, click a website, or put a like on social media, the data is collected and stored in some form and easily accessible. There are different stages through which data travels throughout its journey from inception towards conclusions to leveraging meaningful insights. They can be broken into eight stages. Generation, Collection, Processing, Storage, Management, Analysis, Visualization and Interpretation.

There are four types of Data Analytics an organization can use depending on the availability of data and the knowledge required from data.

Descriptive Analysis gathers, analyze and interpret data about something that happened in the past. Diagnostic Analysis is about 'Why' something has happened and is more detailed

than descriptive analysis. Predictive Analysis examine historical data and trends to predict about future happenings. Prescriptive Analysis helps an organization in developing a strategy to achieve its goals and objectives. Data analytics include the following set of features.

Data Analysis: The first and basic step is to sort and analyze the data to give a better and bigger picture of the data.

Dashboards: They are used by professionals and business users to give a summarized form of reports related to any data.

Custom and templated reports: Since dashboards are not accessible by all employees customized reports are generated for the users for their understanding. Data visualization and modeling: These techniques are used to create a better understanding of data in the form of graphics and pictures.

When we talk about data it is also important to maintain 'data privacy' and in no way be compromised. It is necessary to ensure that only people with authority can access the information and this usage of data should not threaten any individual or group of people. Cyber security has also become very important for an organization to eliminate chances of data theft and ensure the safety of data assets. Another important thing is 'data integrity' which means the data should be reliable, accurate, and complete in all aspects. This aspect of data refers to lots of attention and care while handling the data. The importance of reliable data cannot be undermined as incomplete or inaccurate data could lead to wrong decision-making on the part of stakeholders. A global KPMG survey has revealed that organizations are still not utilizing the full benefits of data analytics due to poor data quality and a lack of capable resources who can decode the data into meaningful insights.

The importance of big data has pushed companies to invest heavily in 'data analytics.' Machine learning, Artificial intelligence, Business intelligence, SQL, Python, R, etc. are developed as a result of this digital revolution and has changed the business models drastically. The global data analytics market is growing at a rapid rate and is expected to reach \$549.73 billion by 2028, compared to \$231.43 billion in 2021. Further, the market is estimated to grow at a CAGR of 13.2% during the 2021-28 period. This information is published by Fortune Business Insights in its report. Growth is coming from many different industries across the world with North America being the dominant one. Asia Pacific region is also growing its data analytics usage and capabilities with China on top of the list.

Organizations need data that is accurate and logical to enhance operational efficiencies and assist in decision-making. Therefore data analytics is in great demand and the need for business professionals who can understand and analyze the raw data is increasing. It is the need of every profession; be it healthcare, accounting, banking, manufacturing, wholesale, and retail. Data analytics is required in healthcare to collect and analyze data about patients to determine the effects of a particular treatment and

any changes required based on the analysis. Banks and financial institutions can reduce the occurrence of fraudulent activities through data analytics tools and can also gain insights about probable customers' default rates. Retailers can use it in gaining insights about future market trends and customers' demand and can maximize their sales through the use of data analytics by channelizing their efforts toward potential customers.

The accounting profession is also going through drastic changes after the emergence of AI, BI and data analytics. To be relevant in the profession, it has become necessary to upgrade oneself with these new applications and tools. Most of the work done by humans has been replaced by machines. A study from Oxford University has shown that about 47% of total US employment is at risk. It's not very far that most of the jobs will become redundant and disappear completely. However, new job opportunities will also arise as a result of this drastic change and the ways of doing business. So, it has become inevitable for the professionals to equip themselves with the Data Analytics' latest trends and become data literate.

Data Analytics is all about collecting, sorting, and analyzing the data to make informed decisions. It can be quantitative or qualitative. Quantitative data is easier to sort and analyze as compared to qualitative data. The former comprises numbers and later is all about patterns and behaviors and their logical interpretation. Quantitative data helps with analyzing historical numbers and then forecasting based on that analysis. Whereas qualitative data helps with analyzing consumer behaviors, demographics, their buying patterns over some time and then developing marketing strategies to fit future market demands and develop products accordingly.

Organizations are now going towards digital transformation which is not possible without digital data. For this reason, it is also important that the data should be streamlined, accurate, and widely available to the stakeholders across all the functions who can take decisions based on available data accordingly. It is not possible now to manually collect and analyze data to be competitive and capture the market. Those companies which have advanced data analysis tools are having an edge over those that do not because these tools provide faster and better decision making. To analyze big data it is necessary to be equipped with the right skills and education required in this field. A human is needed to judge and interpret the data and put it in meaningful ways. The current education system must be futuristic and develop data-literate people who can fulfill the demands of data-driven organizations.



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Data Analytics - A mastering tool for improved Business Performance

Mr. Faizan Muneer, ACA

Data Analytics or a mastering technical tool is the procedure of assembling and deconstructing the uncooked data and transforming in to an insightful information to reach to an informed conclusion. Data analytics is a disciplined technique that could be applied in various spheres such as Business, Science, Banking, Government, Education etc.

Analytics were anciently used in the Business from late 19th century by Freddi Win Taylor. Analytics began to gain more contemplation in the late 1960s when computers were used in decision support systems. Since then, innumerable developments have taken place in the arena of analytics which had led to the development of enterprise resource planning (ERP) systems, data warehouses, and other

powerful tools which includes Cognos and BI that has utterly transformed the initial analytical techniques to a different level.

Statistician John Tukey, defined Data Analysis in 1961 as “Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data.”

Following is a pictorial representation/ flow chart from doing data sciences by Schutt & O’Neil (2013):

Data analytics can be further classified in to following four

“ Data Analytics or a mastering technical tool is the procedure of assembling and deconstructing the uncooked data and transforming in to an insightful information to reach to an informed conclusion. ”

broad categories with a predefined notion to get an informed business decision.

- Descriptive Analysis – explanation of what has ensued in the past
- Diagnostic Analysis – why the said event ensued in the past
- Predictive Analysis – anticipating what will be ensued as a result of what has already been occurred
- Prescriptive Analysis – aims to provide actionable steps towards an elected goal.

Numerous statistical techniques are being used to undertake data analytics which includes Mutually Exclusive and Collectively Exhaustive (MECE) by breaking a quantitative problem in to further sub-components, Hypothetical Testing which involves considering the likelihood of Type I and Type II errors which relates to whether the data supports admitting or cast-off the hypothesis, Regression Analysis which is used to identify the extent to which the independent variables affect the dependent variables etc.

Several methods are being used to communicate the outcome of performing data analysis which includes (i) Time-series (ii) Ranking (iii) Part-to-whole (iv) Deviation (v) Frequency Distribution (vi) Correlation (vii) Nominal comparison (viii) Geographic or Geospatial (Eight types of quantitative messages by Stephen Few).

Data Analytics vs Business Intelligence (BI) – Battle to Substitute Decision Making with Software

Data Analytics and Business Intelligence, both these jargons are being interchangeably used these days. According to the renowned research, advisory and consulting firm, Forrester, business intelligence is described as: “a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making.”

By definition, if we link both, it apparently appears to have no strategic difference. However, practically speaking there are certain aspects that categorically make difference between the two which are illustrated underneath:

- BI accentuate forms conclusion based on past data i.e. backward looking approach whereas, data analytics is more geared towards forecasting future based on the historic data analysis i.e. forward looking approach.
- BI provide informed business decision using acumens obtained through data analytics whereas, data analytics convert raw data in to suitable insight that can be exploited for numerous reasons including BI.
- BI is primarily used by the users deputed at executive/ leadership position such as CEO’s, Business Heads, Corporate Heads, CFO’s etc. whereas, data analytics are being used by proficient staff which includes data scientists etc.
- BI focus on big picture i.e. to have an overall insight with respect to the organization prospects and growth whereas, data analytics effort on each and single aspect i.e. deep dive in to every single domain / area of the business.

Despite similarities and differences, business intelligence depends on data analytics whereas, on the contrary data analytics can operate even without business data since it is a tool adopted by business.

Primarily data analytics was being performed manually however, nowadays various data analytics tools have been developed that can perform such analysis scientifically through software to process the raw data in to astute information to make informed business decisions with reduced cost and dependency on human intelligence and maximize revenue generation.

Following are certain list of data analysis tools along with the solution offered in the market to perform data analysis.

S. No	Data Analysis Tool Category	Solution	Headquarters
1	Business Intelligence Tool	Datapine	Berlin, Germany
2	Statistical Analysis Tool	R-Studio	Boston, USA
3	Purpose Programming Languages	Python	Wilmington, USA
4	SQL Consoles	MySQL Workbench	Texas, USA
5	Standalone Predictive Analysis Tools	SAS Forecasting	North Carolina, USA
6	Data Modelling Tools	Erwin Data Modeler	New York, USA
7	ETL Tools	Talend	California, USA
8	Automation Tools	Jenkins	London, England
9	Unified Data Analytics Engine	Apache Spark	Wilmington, USA
10	Spreadsheet Applications	Microsoft Excel	Washington, USA
11	Industry-Specific Analysis Tools	Qualtrics	Provo, Utah, USA
12	Data Science Platforms	Rapid Miner	Boston, USA
13	Data Cleansing Tools	OpenRefine	Melbourne, Australia
14	Data Visualization Tools & Platforms	Highcharts	Vik I Sogn, Norway

Relationship between Big Data & Artificial Intelligence

The lines between Business Intelligence and data analytics are continually fluctuating and obscuring. Big Data refers to complex set of data sets that needs to be transformed in a manner that could systematically arranged data that can be utilized for decision making. On the other hand, Artificial

Intelligence is a technology which enable computers to make-believe human intellect. There appears to be a synergistic relationship between Big Data and AI since AI requires a gigantic volume of data to perform analytics and generate better-quality output for the user whereas, Big Data analytics powers AI for improved data analytics.

As the time evolves, organizations have learnt how to use their existing database to unearth their existing sales pattern and discover the way forward to boost their sales through exploitation of data. Fundamentally, organization have realized the need to move from the concept of knowing organization to learning organization.

A survey about Big Data and AI by New Vantage Partners of C-Level executives mentioned that 97.2% of executives stated the fact that their organizations are investing in Big Data and AI initiatives to achieve competitive advantage. 76.5% of the executives stated that since Big Data and AI are becoming interrelated that neither can survive without the one, therefore such gigantic data is enforcing the companies to make strategic investment in AI and cognitive ingenuities.

Role of Big Data Analytics in Business Sectors

Big Data Analytics can be used by the companies for their businesses for diversified objectives which includes retention of existing customer base, boosting their sales by pitching new customers and target market, manage their business risk profile etc. Investment in Big Data Analytics has become need of the century for achieving competitive advantage, reducing operational cost and boost percentage of customer retention.

Data Analytics is used in almost every business segment/ industry for diverse reasons. Manufacturing concern used business data analytics to condense its operational cost and increase its production capacity, Health care/ medical industries uses the data to analyze patients medical record and identify new methods of treatment or drugs that needs to be developed considering the medical issues being confronted, Retail Business uses the data to scan the customer buying pattern, their demands and accordingly launches new products to uplift their sales etc.

One of the leading examples of the company who cannot envision its survival without the use of data analytics though AI tool is Walmart – the American International company that has over 11,500 stores in 27 countries with more than 5,900 retail outlets and more than 700,000 associates that attend more than 100 million customers a week. Walmart gathers more than 2.5 petabytes of data from 1 million customer on an hourly basis. Analyzing this much expanse of data in the absence of any AI tool cannot be even imagined. Walmart has created 'Data-Café' an analytic hub through which it rigorously scrutinizes more than 100 million keywords to have an ear about the customer's opinion on social media.

Below enumerated are some of the other leading examples of the companies that uses Big Data Analytics to achieve their business objective.

- Coca-Cola uses Big Data for customer acquisition and holding. The company uses the data gathered through customer's feedback and other sources to make relevant content of advertisement for targeted audience and acquaint with content that vindicate with audience desire.
- Netflix with over 100 million subscribers, is another leading example that uses the historic/ watch data and perceive the type of movie in which a particular customer is attracted and accordingly send notifications/ suggestion for the upcoming movies.
- UOB Bank of Singapore is another example in the financial institution that uses risk management system based on Big Data to perform risk management and calculate value at risk in just a couple of minutes.
- Amazon Fresh and Whole Foods uses the data behavior with respect to what groceries are being procured by the customers and how grocers interact with these customers. This data gives an insight to Amazon to make necessary changes and avenues to offer to targeted customers to boost the sales as an effective sales strategy.
- Pepsi Co, a company that uses Big Data for effective supply chain management. The company ensures that adequate volume and type of beverages are being replenished with the retailer's shelves. The clients make available their records of inventory available at the Point of Sales and warehouse. Using the said data, the company plans to increase its manufacturing, reconcile the record and replenish the stock accordingly.

Nevertheless, the data analytics along with the BI tools is being used by banking industry these day to identify the customers to which various products can be offered following the pattern of customer transactions. BI tools are being used to can generate reports using the data extracted from the core banking system to assist the business to analyze various data sets in the way that could give them lead to improve their business and operational performance. Business uses these reports to boost their sale of products, CFO uses these reports to ensure adequacy of book keeping, internal audit uses these reports to perform various substantive analytical procedures and ensure adequacy & accuracy of the data, whereas compliance division uses the said data with different perspective particularly KYC/ AML risk.

AML/ KYC risk is one of the leading risks which are being faced by every other institution particularly banking industry. Regulator is keenly monitoring the said risk through various sources and penalizing the Banks on no-compliance with AML-CFT Regulations. Accuity Solution that consists of the gigantic sets of data that screen accounts the name engaged in any criminal offence/ activity or associated with any political exposed person and allied with any sanctioned regime. This solution enables the Bank to screen out such accounts at the time of establishing relationship and during

Big Data Analytics can be used by the companies for their businesses for diversified objectives which includes retention of existing customer base, boosting their sales by pitching new customers and target market, manage their business risk profile etc.

ongoing monitoring with the aim of timely updating the KYC of the account. FortyTwo Data, an AML technology company has mentioned that Banks spends around Sterling Pound 2.7 billion annually on such type of solutions to reduce the risk of financial crime and take preemptive measures.

Nonetheless, data analytics in combination with Artificial Intelligence in the field of audit (both internal as well as external) is gaining attention day by day. Many organizations as well as external audit firms across the globe have procured AI software that can complete defined audit procedures on a monotonous basis starved of any human intrusion by fetching the data itself from the core database and provide the desired output. This has absolutely transformed the way of doing the audit approach from re-active to proactive.

Impediments in Effective Data Analysis

- **Baffling Facts and Opinions:** As per Daniel Patrick Moynihan, "You are entitled to your own opinion, but you are not entitled to your own facts". One of the challenges being faced is difference of opinion that are being collected from various sources in the absence of evident record to establish that opinion built is accurate or specious.
- **Perceptive Biases:** As per CIA analyst Richards Heuer in his book Psychology of Intelligence Analysis, specifies that "Analysts should clearly delineate their assumptions and chains of inference and specify the degree and source of the uncertainty involved in the conclusions". Barrier that come across is the intellectual ability of the person analyzing the data who may disrepute the evidence if it does not support or conforms to his/her own presumption.
- **Usage of inaccurate analytical technique or assumptions:** Another hurdle that needs to be tackled is the analytical technique/ tool or the assumptions used to analyze a particular data set may mislead the ultimate outcome. For example, if the analysts are examining the financial statements to project future cash flows of the company, the assumptions, discount factor, beta rate, market rate

being used to calculate the present valuation of the company may be not relevant or imprecise that could mislead the results.

Way Forward Inclination of Data Analytics to Adopt Digital Transformation

There is no uncertainty that Business Data Analytics with AI technology is gaining popularity day by day. The data will grow immensely as the time evolves. As per the report of Seagate, IDC has projected that data sphere will reach up to 175 zettabytes by 2025. The reason for high amount of data is due to increasing number of users doing online business over the internet. Secondly billions of devices/ software gather, process and perform data analytics on daily basis across the globe. In Seagate report, IDC has estimated that 75% of the total population of the world will interact with online data on daily basis by 2025 which means that each user will have one data interface every 18 seconds.

Considering the prospective situation, many businesses/ organizations using Big Data analytics with modern AI technologies are heading towards cloud-based infrastructure for business agile and innovation. AWS, Microsoft Azure and Google Cloud Platform have already shifted on cloud substructure. Data-as-a-service (DaaS) will become a more common solution for data collection, processing and analytics as businesses will shift to cloud to revolutionize their arrangement.

Secondly machine language and AI will lead to a next level of technological progression that will substantially progress the computer's ability to learn from data and will be capable enough to interpret human emotions, drive vehicles and reconnoiter the space.

Besides, with the increase advancement in Big Data and analytical tools, there is a risk that there would be scarcity of data scientists with the competence to program machine languages, manipulates the data, keep knowledge of machine learning algorithms etc. As per the Harvey Nash Survey conducted in 2019, out of the most 5 scarce skills, Big Data and analytics skills were rated as top most scarce skill (i.e. 44% of the skills are available).

Additionally, increase in the quantum of collecting, processing and evaluating Big Data would have equal distress on the risk of data privacy and cyber security creating added challenges to save the data from cyber trespassers for which global security standards needs to be meticulously adhered to by the organizations.



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Data Analytics – An overview

Mr. Muhammad Hassan Aftab, ACA

We are living in Digital Data World, where everyone enjoys and pass on data and information. Though apparently a little obnoxious, the term Data Analytics simply means studying data to bring out meaningful information. Organizations use these valuable insights to enhance decision making capabilities and achieve their core objectives through improved performances.

To aid Data Scientists and Analysts, there are tailored software solutions comprised of various machine learning algorithms facilitating the research parameters. Whether data is historic or real-time, it may come from different sources like first party (collected by the organization itself from its stakeholders), second party (collected from a known service provider) and third party (set of aggregated data purchased from market).

Normally, these data relate to certain trends of user groups and may include information on demography, age brackets, brands, interests, activities, likings and beliefs. These may

‘ We are living in Digital Data World, where everyone enjoys and pass on data and information. Organizations use these valuable insights to enhance decision making capabilities and achieve their core objectives through improved performances. ’

also come from different actions across the customers for instance, likes of a social media post, feedback surveys, clicks on any ad, number of views, comments and reshares. This study is then used to predict customer behavior as well as assessing an organization's place in the market and serves as a guide on how to focus & target desired audience.

Let's have a quick look at the range of potential business uses that have been made possible because of data analytics:

- Banks and credit institutions use withdrawal and spending behaviors to safeguard customers' identities and prevent fraudulent activities
- Digital marketing service providers and giant e-commerce stores analyze traffic patterns on various websites to draw meaningful responses
- Healthcare service providers utilize patients' data like age factor, genetic history, illness period, and other basic body functions to predict the vulnerability of persons to specific fatal diseases like cardiac disorders, different forms of cancers and other body malfunctioning
- Cellular network operators evaluate users' data in building strong consumer relationships as well as targeting customers by introducing lucrative offers and promos for possible converters and slow users
- From a user's perspective, maps or google maps can be a best prototype to develop our understanding of this data science, which allows us to navigate the best route despite all the possible conditions of traffic, speed, distance and timing of travel

Huge volumes of data are analyzed at various stages of analytics, and based on the specific objectives of analysis, there could be broadly five (05) types of analytics, detailed as below:

- 01. Descriptive Analytics:** This type triggers, when we wish to know what is the real-time business position, with the help of data visualization tools including dashboards and other graphical presentations
- 02. Diagnostic Analytics:** This type comes into force once we have carried out a descriptive analytics as mentioned above. Now, we are more inquisitive about the root cause for the existing status of the business. Analysts tend to address the "Why this has happened" in this phase
- 03. Predictive Analytics:** This activity is the result of Descriptive and Diagnostic types, and focuses on determining the forecast behaviors based on available historic and real-time data
- 04. Predictive Analytics:** Based on the results, achieved from conducting activities in all the previous types, Predictive Analytics is used to suggest the best course of action that is crucial to key business metrics, and considered as the "need of the hour".

- 05. Cognitive Analytics:** This is blend of a number of prevailing technologies like artificial intelligence (AI), deep learning, machine learning algorithms to follow human intelligence in carrying out different tasks

While speaking about the technological support, Data Analytics uses modern and powerful tools to get quicker insights over deeper data. These technologies (as described in Cognitive Analytics as well) are mainly:

- **Machine Learning:** Being part of Artificial Intelligence (AI), which is field of using computer programs to perform human brain-like functions, Machine Learning involves algorithms of specific data sets. A machine learning algorithm can be trained on small data samples initially. Once the system grows on and gathers more data the system will also increase its capability with the results being more accurate gradually.
- **Data Management:** This is related to health and handling of the data before an analysis is conducted. The aim is to ensure high-quality data flows smoothly around the organization and is available across the board with intact reliability as per established standards.
- **Data Mining:** It relates to the process of dealing with huge amounts of data and ability to sort it out, in terms of relevance to the desired objectives for an analysis. This has enabled the organization to know which data is relevant, within no time. Thus decision-making process is cut short to minimum, which was never possible before.

Despite the fact, that Data Analytics has improved the decision-making process, there are few difficulties still need to be addressed in order to get a fast-track solution. These challenges range from data collection to valuable data extracts. Organizations need to make preferences at data collection stage along with the required tools to fetch data from ad clicks, website visits and other social media interactions and user trends. Securing data in usable formats and storing all the data from available resources, regardless of whether it is external or internal, structured or unstructured and online or offline.

There is also a dire need to lay out procedures, and staff trainings to ensure quality of data to secure accuracy of analysis results. Finally, working with the right peoples' force and awareness of knowledge and technological support can lead an organization to surpass all the obstacles and become a real user of this phenomenon.



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Data Analytics is not a Choice Anymore

Mr. Muhammad Farrukh Siddiqui, ACA

What is Data Analytics?

In simplest terms data analytics is collecting and analyzing or interpreting information and using the same to draw conclusions or identify certain patterns.

So what is the difference between the data analysis as performed by most of the accountants and auditors during normal business course, and data analytics? Basically, Data Analytics is a broader term which refers to an automated and a more structured way of obtaining information (either qualitative or quantitative), analyzing it and drawing conclusions that help decision makers.

In this article, I would focus on Data Analytics in Internal Audit Functions. Are the internal audit functions around the

world adopting new technologies? As per the recent surveys, focus has definitely shifted towards adopting new technologies and businesses have moved towards agile auditing.

Gone are the days when in order to issue internal audit reports, the auditors used to highlight control lapses or identify regulatory breaches, based on limited set of data, that too happened months after the event. In order to remain relevant to the stakeholders, internal auditors must be able to highlight control lapses on real time basis and on the complete portfolio, which is only possible through the use of data analytics. Another important expectation of the management from the internal audit functions, stemming basically from current economic turmoil around the world, is

the need to reduce cost and be more agile in analyzing data. Being an agile internal audit function; requires the department to use data in order to ensure rapid response to emerging risk/trends.

Let's look at the kind of expectations the managements have with the internal audit functions.

Expectations of Management

a) Regulatory Returns

Large organizations especially financial institutions are required to submit hundreds of returns to different regulators. Providing incorrect data is likely to result in regulatory fines which in recent years have been significant. These fines can also cause reputational losses to the institution. Hence, the management looks forward to the Internal Audit Functions to provide assurance with respect to the timeliness and quality of the data being submitted.

b) Anti-Money Laundering & Customer On-boarding

Although the Internal Audit acts/functions as a third line of defense, the management expects the internal audit function to ensure continuous monitoring of AML risk which is very high, while on-boarding of customers as well as monitoring the ongoing transactions.

c) Significant Control Breaches

Although the internal Audit Function does not provide absolute assurance with respect to detection of fraud, the management expects that Internal Audit will proactively identify significant control breaches which are likely to lead to Frauds.

Most of the above mentioned expectations can be fulfilled by a well designed/structured data analytics mechanism. However, there are number of challenges which restrict the internal audit functions from adopting data analytics throughout the internal audit cycle.

Challenges to Meet Management Expectations

a) Quality of Data

One of the most important challenges facing the internal audit functions in adopting data analytics, is the quality and integrity of the available information, as the analysis won't be of any use if the quality of data is not up to the mark.

b) Data Governance Policies/Processes

Number of companies have rigid data governance policies which does not allow ease to access data and restricts agility.

c) Lack of Skills

In order to make use of data analytics and technology, specialized skill set is required, which is not common yet in existing internal audit functions.

d) Inadequate Resources

Being a support function, it is already difficult for internal audit functions to showcase their worth or how they fit in

the organization, additional resources required in respect of data analytics may be difficult to accomplish.

e) Lack of Support

In most of the cases, getting the support of senior management/board may be difficult.

How to Overcome the Challenges

- Integration of the audit software with the core system can reduce the chances of inaccurate data being transmitted.
- IT governance and Internal Audit needs to go hand to hand with respect to implementation of data analytics.
- This may be resolved by hiring a competent resource having relevant experience of data analytics software which is easy to use.
- Support both from the top management and the technical functions is a must for the success of data analytics in internal audit functions.
- This can be overcome by presenting/highlighting to the management the potential benefits that data analysis can bring within the organization.

Advantages of having Data Analytics in Internal Audit Functions

Data Analytics can be advantageous to the internal audit in various ways:

- a) **Increased Assurance:** Since the data analytics allows availability related to bigger sets of data in limited time, it allows for greater deal of assurance. It basically, reduces the sampling risk faced by Internal Audit.
- b) **Improved Efficiency:** More automated reports will definitely result in better efficiency which is much desired by management.
- c) **Impactful Reports:** Reports containing graphs, charts are crisp and easier to understand for the stake holders and can be more impactful in decision making.

Data Analytics used to be a choice which was mostly opted by big firms, however, now it's no longer the case.

Managements of all the leading organizations expect the same to be implemented in some form in almost all the critical functions of the organization. In order to provide optimal results, the Internal Audit Function also needs to incorporate data analysis at all the three stages i.e. in planning, execution and reporting the audit findings.



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Data, Information & Wisdom

Mr. Safdar Ali, ACA

We are living in an Era of information age surrounded with too much data may or may not be in organised form. In order to extract information from this data, it is needed to be analyzed timely and correctly. Everyone in the world is in search of information available in any form of Data. The advance form of information is knowledge and the technique of how to apply that knowledge is intelligence. In the school books there is basic information for learners.

Human beings, being thirsty of knowledge, kept searching further in the quest for information. From microbiology to astronomy, every specialist is keen to know finer and further details about cell and universe respectively. So, is the case with every other walk of life and specialty. From individual life to collective lives information is of immense importance. Technology has developed such hard and soft tools that artificial intelligence is known used to discover personality traits. World's largest search engine use google analytics to give you list of suggested topics that you may be interested.

“ Everyone in the world is in search of information available in any form of Data. The advance form of information is knowledge and the technique of how to apply that knowledge is intelligence. ”

Some, decades before, it was analyzed that the data present on google pages requires as many as 15,000 years in order to go through all those web pages. Similarly, is the astronomers give name to each and every object placed in the universe as has been given to the planets and a star (Sun) in the solar system, it will require ages in billions of years just to read out once the names of all the stars, planets and objects in the universe. ”

Some, decades before, it was analyzed that the data present on google pages requires as many as 15,000 years in order to go through all those web pages. Similarly, is the astronomers give name to each and every object placed in the universe as has been given to the planets and a star (Sun) in the solar system, it will require ages in billions of years just to read out once the names of all the stars, planets and objects in the universe.

Similar is the case with our world. There has been so much knowledge present about each and every finer detail of every subject. The daily transaction or occurring in each and every detail of any subject matter is also enormous. Hence, the data about each and every subject matter becomes enormous. Businesses and the Information Technology (IT) industry have already developed special field of

Management Information System (MIS) to cater for their informational needs. So, is the idea being knowingly or unknowingly been transferred to all other subject matters and another science in management sciences have been emerged called as the data analytics. As said earlier, it is an information age and therefore the key to success is information. Data Analysis allows one to see into the data from an angle and from a point of view so as to have useful information that may lead to decision making for a particular purpose.

An individual who is head of the family requires information about various items. From financial point of view and in a hyperinflationary economy trend, the head will require information about government decisions and take action proactively to make savings. For instance, if government is going to increase oil prices that is usually reported by news agencies or may be known from other sources, the head of the family will fill up his vehicle petrol tank and may make household purchases for savings in kitchen cost of living expense in short term.

Similarly, petrol pumps are most probably expected to hold on current quantities of fuel in underground tanks for short term supernormal profits. General public are going to rush to petrol pumps in quest for filling vehicle tanks. Police are expected to provide security and maintain peace at pumps when the oil prices are going to be implemented from 12:00 am midnight. City dons are not expected to take risk at such a peak moment when police security is expected to be high alert.

Collective level strategy making from information received can be evidenced from organizational and business levels. For instance, transporters will also rush for filling fuel tanks to their usual supplier of fuel in case of a government published decision. Similarly, hotel and fast-food business will also rush for kitchen consumables in large quantities and may stock up large unperishable quantities as fuel prices hike are ultimately going to hit kitchen items soon.

The failure to analyze data properly or the failure to get into a wrong conclusion after a data is been analyzed properly will get into a disaster. For instance, one of the largest mobile phone manufacturers if not analyzing market technology data properly or concluding wrongly for not investing into android phone sets ultimately lead to a complete closure of their manufacturing facilities.



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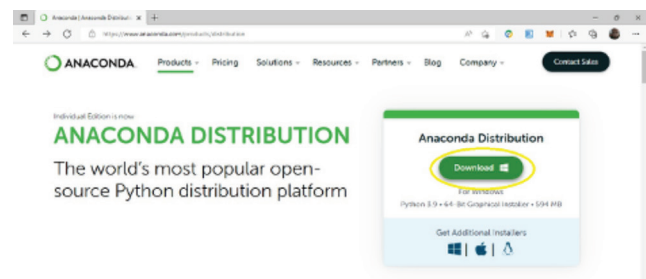
Data Analysis using Python – A Quick Exercise

Mr. Sohail Saleem, ACA

Let's start Data Analysis with Python right away. Open up your browser and enter following URL
<https://www.anaconda.com/products/distribution>

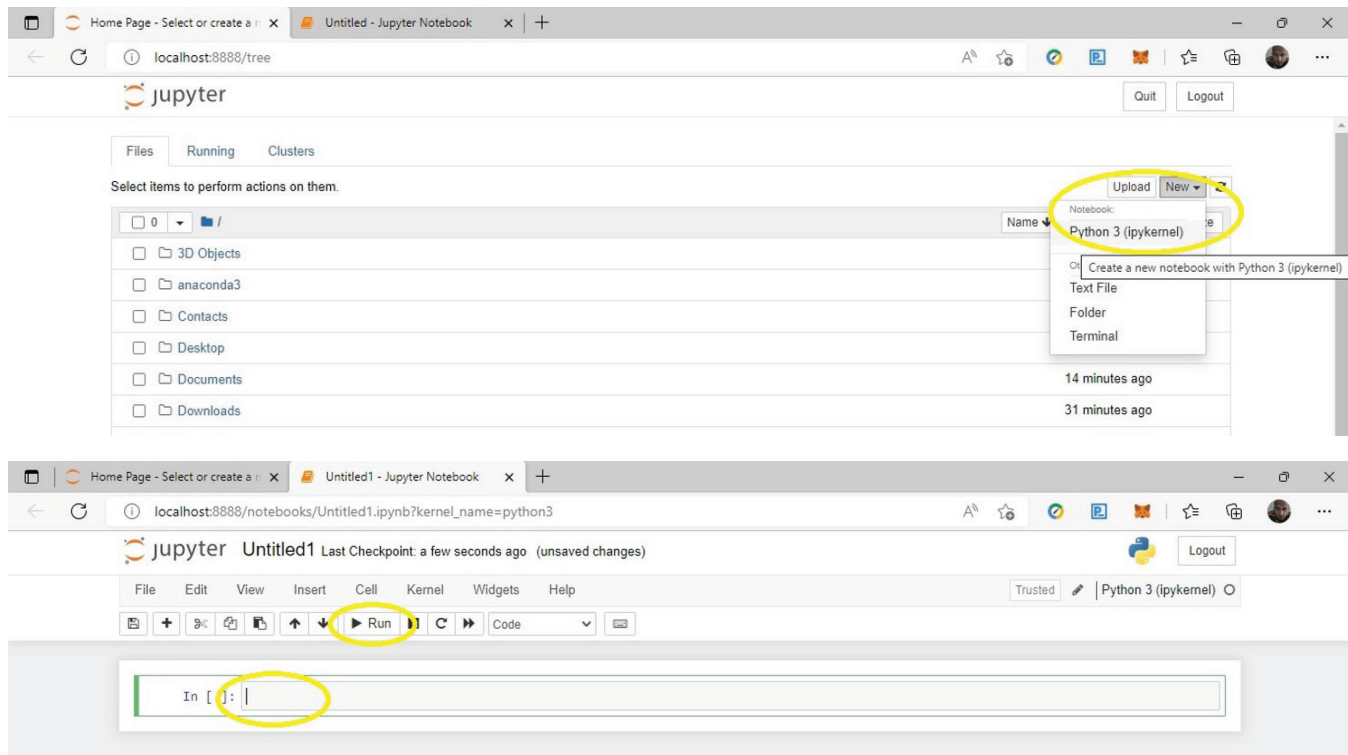
01. Press on Download button
02. After download is complete, open the Downloads folder in your computer and find the file named Anaconda
03. Now start installation. Just click Next on each screen. Once installation is finished, press Start button of Windows and find 'Jupyter Notebook' icon:

Click it and the browser will open up the Jupyter interface with the contents of user home folder. Now look at the upper right side and you'll find 'New' button. Click it and then click over 'Python 3' from the dropdown menu:



Another browser tab will open with 'Untitled' Jupyter Notebook:

Now we can enter Python code here. Type following Python command:
`print("hello world")`



and then press 'Run' button located at the upper bar. After the code was run, it automatically moved on to new line.

Now type following code in new line:
`print(5+6)`

Again press 'Run' button. Result is as expected. Now type following code in new line:

```
a = 5
b = 3
print( a+b )
```

Press 'Run' and result is as expected. Congrats! you've learned quite a bit of programming language. You've just seen how string ("hello world") and numeric variables (a, b) work. You've also used a `print()` function which sends output to display. Functions are fundamental element of any programming language; they are 'actions' or we may say 'verbs' like go, run, talk etc. There are around 68 built-in functions in Python just like `print()`.

But how about specialized functions like mathematical 'actions' e.g. square root, power, log etc. That's where packages / modules come in. Specialized functions are normally clubbed in named packages / modules which can be imported to perform a specific task. Let's import 'math' module to understand this. In new line enter following code:

```
import math as m
s = m.sqrt( 64 )
print( s )
x = 5
y = 3
p = m.pow( x, y )
print( p )
```

Let's analyze the above code. In first line we imported the 'math' module and gave it a nickname 'm' so that we type less the next time we call 'math' module. In second line we created a new variable 's' and then we called a function from math module i.e. `sqrt()` which actually reads the value given (parameter) within brackets of function and returns the square root of the given number. Then the assignment operator '=' assigns the value which was returned by `sqrt()` function, to the variable 's'.

Next, we defined two variables 'x' and 'y' and assigned them values '5' and '3' respectively. Then, we called another function from 'math' module i.e. `pow()` to calculate power. Here the function `pow()` expects two parameters - first is the number whose power is to be calculated and the second parameter is the power, therefore '5' is calculated with power of '3'. The important programming lesson here is that a function can accept one or more parameters, which are separated by comma. Another thing which you must have observed is that we used dot '.' when we call a function from a module.

Let's move towards playing with actual data. For this, we may use any file containing data or actual database such as Oracle, SQL Server, MySQL etc. To keep things simple, we'll use an Excel file which contains data - download this Excel file from:

<https://bittenbook.com/wp-content/uploads/2022/07/employee.xlsx> and then put it at C:\Users\yourusername\ folder – just replace "yourusername" with your actual Windows username; this folder is where your Jupyter Notebooks are also being saved by default.

6 This was a quick introduction to data analysis using Python and you can build your knowledge from here onwards. Technology is fiercely pushing every field to evolve, so remember that if you don't evolve, you dissolve!

Now, enter following code in new line:

```
import pandas as pd
data = pd.read_excel( "employee.xlsx" )
data
```

Here, in first line we imported the 'pandas' package and gave it a nickname 'pd'. In second line we created a new variable 'data' and then we called a function from pandas package i.e. read_excel() which actually reads an Excel file and returns the contents of that file. The assignment operator '=' assigns the contents which have been returned by read_excel() function, to the variable 'data'. At the last line we outputted the contents of 'data' - we didn't use print() here and voila! output got formatted nicely in table form.

Now let's do some sorting on the data. For that, move on to next line and then enter code as below:

```
import pandas as pd
data = pd.read_excel( "employee.xlsx" )
result = data.sort_values( "Employee Name" )
result
```

Here, we called a function sort_values() on data variable and gave it the column name as parameter i.e. 'Employee Name' and the returned contents are being captured in a new variable named 'result'.

Now let's do some filtering on the data, so that only those employees who belong to 'Finance' department could be returned. For that, move on to next line and then enter code as below:

```
import pandas as pd
data = pd.read_excel( "employee.xlsx" )
filter1 = data[ "Department" ] == "Finance"
result = data.where( filter1 )
result
```

Here, we created a variable named 'filter1' which holds the condition i.e. the "Department" column of data must be

equal to "Finance" (Note that it's '==' which means 'equal to', it's not single '=' which is assignment operator). In next line we called where() function on data variable and passed on 'filter1' as parameter. Finally 'result' variable gets the returned contents from data.where() function. Move on to next line and let's insert another filter as given below:

```
import pandas as pd
data = pd.read_excel( "employee.xlsx" )
filter1 = data[ "Department" ] == "Finance"
filter2 = data[ "Salary" ] > 75000
result = data.where( filter1 & filter2 )
result.dropna( )
```

Here, we created a variable named 'filter2' which holds the second condition i.e. the "Salary" column of data must be greater than 75000. In next line we called where() function on data variable and passed on "filter1" and 'filter2' (combining both conditions with &) as parameter. At the end we also called dropna() function on 'result' which eliminates the irrelevant record lines from output.

Last but not least, let's create a chart from data:

```
import matplotlib.pyplot as plt
import pandas as pd
data= pd.read_excel( "employee.xlsx" )
plt.plot( data[ "Salary" ] )
plt.title( "Employees Salaries" )
plt.xlabel( "Employee Name" )
plt.ylabel( "Salary" )
plt.xticks( data.index, data[ "Employee Name" ],
rotation="vertical" )
plt.show( )
```

Worth noting code here is importing matplotlib.pyplot module for plotting purposes. Then at fourth line we used plot() function and passed on "Salary" column data for plotting. Most eye catching line here is the second last where we used xticks() function to define ticks for x-axis; this function took three parameters - first parameter passed on the data index, the second parameter passed on "Employee Name" column from data and the third parameter passed on attribute for rotation of the names vertically.

This was a quick introduction to data analysis using Python and you can build your knowledge from here onwards. Technology is fiercely pushing every field to evolve, so remember that if you don't evolve, you dissolve!



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The Missing Life of Chartered Accountants

Mr. Altaf Noor Ali, ACA

“Prevention is better than cure” is not a fundamental accounting principle. However, its absence is a case of wealth without health.

Let's have a look at the dream lives of the Chartered Accountants

The standard of living, the lifestyle, the trust of superiors they enjoy, the authority they have in financial matters, the lavish interiors of the offices, goodies like cell phones, the cars they drive to go to their offices, the homes they live in, the drawing rooms with large LEDs hanging from the wall, all these luxuries need strong prices to pay.

No doubt such stature is achieved with a lot of education, training and qualification, smartness hard work, experience, and some luck.

“ The lifestyle, the trust of superiors they enjoy, the authority they have in financial matters, the lavish interiors of the offices, goodies like cell phones, the cars they drive to go to their offices, the homes they live in, the drawing rooms with large LEDs hanging from the wall, all these luxuries need strong prices to pay. ”

☞ The way it starts is not after we qualify but a long time before we do. For most, it is the time before qualifying when we sacrifice everything to qualify our exams. We study day and night. Once we qualify, we are told of our new milestones to achieve: The journey to prove yourself worthy has just begun! ☹

What can be wrong with such a “perfect” life? A sample of informal but focused conversations with fellow Chartered Accountants gives you a general but unscientific insight that appears to be loosely right than precisely wrong.

The general sense of the conversation relates overwhelmingly to the work-life balance. This is true for most Chartered Accountants I spoke to.

This balance is more tilted towards the work we do to strengthen our careers, opportunities, and livelihood. To follow these goals, we neglect our health. It’s no more a priority.

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With the euphoria of qualifying vanishing gradually, we are in midst of our so-called ‘practical life’.

This means our elders start worrying to ‘settle us in’ (like “sort-us-out” in military terms). Thus begins an activity at the end of which we find ourselves with spouses.

The pressure to live up to the expectation increases to the extent, that we are confined mainly to office-to-home and home-to-office.

Meanwhile, there are more newly arrived family members in one’s family from time to time. That begins another bout of visiting doctors and medical checkups which is actually a prelude to putting toddlers in schools and arranging related matters.

As we age, our faculties go dimmer gradually. We become plain victims of diseases such as high blood pressure or diabetes. We realize that health is such a wealth that is not reimbursable from those medical insurance bills. Curative health tests and checkups are not a complete response to what our health demands.

By then it’s almost too little too late for us to give our health proper attention.

The good thing is that most Chartered Accountants are not shy to face this issue. A sedentary lifestyle, 60-inch television, and many gigabits in smart cell phone aggravate the situation. A friend puts it well: “My cell phone is smart, I am not”.

The remedy: Get up early in the morning or any time. Put up your trousers and comfortable sports shoes and start moving to the park, to the gym, to the garden or to any block of your house. Fewer formalities make it easy, and adding formalities makes it difficult. Just do it!

And who is going to motivate you to do it every day? The same person who has been motivating you throughout your lives to put your time where it benefits you most. That is, you!

This is a difficult habit to form, especially, for those who only exercise using TV remote for flipping channels. That is not all. Make health your priority every day. Start with a 5 to 10 minutes duration and increase. More information is available online at your fingertips on the World Health Organization website.

Sure, you should have done that many years ago. Still, get a real-life for yourself. What you have been doing with your physical and mental health should not continue anymore.

When our parks get full of families taking care of their health, the queue to a doctor’s clinic reduce to zero.



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Leadership - Choice or a Position

Mr. Hamza Bilal, ACA

Leadership is an art of envisioning the future, setting up direction, influencing, motivating and engaging the individuals in shape of teams so that all work towards achievement of common goals which benefits and enables the achievement of overall group, organizational and social objectives which are in common interest of all those who are engaged in the process.

Let's visualize the key differences between management and Leadership in below table:

“ Leadership is an art of envisioning the future, setting up direction, influencing, motivating and engaging the individuals in shape of teams so that all work towards achievement of common goals. ”

Leadership	Management
Visionaries- Set the Direction	Compliance- Ensures execution as per guidelines
Engage- Influence, motivate and align	Organize- Manages resources, allocates responsibilities and ensure job is done
What and why – what needs to be done and why	How and When- How to accomplish and deliver plus when to do
Ability to Respond, take ownership and strategize	It's about execution of task through managing resources

As mentioned above we can view that in any setup both leadership and management are important because without execution envisioning is of no use and if direction is not set then all the efforts are in vain if not towards desired objectives. Management is more about the position and jobs assigned to individuals while leaders arise from their personalities, ability to inspire, engage, motivate, strategize and align.

Hence any individual who is able to demonstrate these skills becomes a leader irrespective of job, grade, position and authority. Leadership is an active demonstration of above-mentioned behaviors towards situations, task, and deliverables which will create engagement and ownership of objectives among people and as a result create the energy required for achievement of objectives.

Quote: "Leadership is a choice that lies in the space between stimulus and response" by Stephen R. Covey.
Key Traits of Leaders
key traits that are demonstrated by successful leaders are mentioned below:

■ Self-Mastery

- i. Leaders are able to plan, prioritize and deliver effectively.
- ii. Ability to manage stress and deliver under tough circumstances
- iii. Ability to manage emotions
- iv. Balance between work and personal life
- v. Caring towards people and able to view self in others shoes

■ Visionaries

- i. Ability to predict the future
- ii. Develop strategy for success
- iii. Are flexible and proactive
- iv. Ability to avail the opportunities

■ Master in Communication

- i. Listen others feedback
- ii. Ability to sell one's dream to others
- iii. Ability to inspire, engage and create ownership for objectives

■ Ability to Respond & Accountability

- i. Ability to respond to circumstances
- ii. Train others to take responsibility
- iii. Held self-accountable for results and train others to become accountable
- iv. Are flexible and proactive

■ Vocal about Objectives

- i. Ability to dream and sell it to others
- ii. Creates sense of ownership in the team for objectives
- iii. Are focused on long term results
- iv. Achieve goal congruence as individual and team objectives are common

■ Ability to Handle Complex Situations

- i. Ability to understand the issue
- ii. Takes feedback
- iii. Analytical and problem-solving skills
- iv. Works on root cause and ways to resolve

■ Question Status-Quo

- i. Question that how things are being done and why
- ii. Focus on improvement, efficiency, effectiveness
- iii. Prepare for future
- iv. Ready for uncertain situations
- v. Talk about innovation, technology and automation
- vi. Become change agents

■ Align, Inspire & Engage

- i. Believers on team work
- ii. Listen others, takes feedback and arrive upon decisions that are owned by all
- iii. Takes responsibility for decisions
- iv. Care for individuals and are willing to support
- v. Works on development of skills of team
- vi. Creates goal congruence so that there is ownership and affiliation towards common purpose
- vii. Develops relationship among team members so that all feel valued

■ Timely Decision Making

- i. Flexible and adaptable
- ii. Predicts future and prepares in advance
- iii. Able to make quick and informed decisions
- iv. Focus on keeping ahead of competition

Leadership Styles

There are number of styles of leadership each suitable in its own unique way and you need to evaluate and pick the one suitable for you. Those styles are as following:

- a) Autocratic Leadership- It works where individuals are looking for clear directions about how to accomplish objectives and decisions need to be made very swiftly in such team's leaders make decision and communicate to the team for execution.

This style works in highly regulated industries like healthcare and construction where predictable results are critical and where people believe on their leaders.



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