RESARCH REPORT

A review over development & prospects of Data Analytics

MUSKAN 1812125
MUHAMMAD ANAS 181210

MARCH 31, 2022
SZABIST
Submitted to: **Dr. Adeel Ansari**

A Review over development & prospects of Data Analytics

Abstract
Data analytics is currently getting really important in academics as well as in industries, with the term being used to describe a variety of topics, including data extraction from external sources, data storage, and data analysis and managing it, to using analytical techniques and tools to process it. As a result, the goal of this research paper is to provide an overview of current data analytics principles to emphasize the importance of data analytics in decision-making. Many businesses are turning to data analytics to analyze their huge amounts of data, with the results informing their decisions. Many studies have demonstrated the benefits of using data in various industries, and this research paper work discusses various data analytical approaches and tools in order to analyses the use of data analytics in a variety of areas. The domain of data analytics and its findings are based on an examination of historical and contemporary trends and behaviors. Data analytics encompasses both descriptive and predictive data analysis. Various fields of data analytics are explored in this paper. Data analytics tools and services have arisen as a solution to this challenge in response to this requirement. Libraries, information centers, and grey literature repositories are well positioned to take advantage of these new tools and services.

Keywords
Data Mining, Data Warehouse, Machine Learning, Data Integration, Data Science, Data Engineering.

Introduction

To begin, what exactly is data analytics? The application of data, information technology, statistical analysis, quantitative methodologies, and mathematical and computer-based models is referred to as data analytics. This enables managers to obtain a better understanding of their business operations and make more informed decisions.

If we talk about data first, Data is shorthand for "information" and this process has always been an element of head start program operations, whether it's gathering, evaluating, or analyzing data. From manufacturing to healthcare to retail and banking, data analytics is employed in practically every industry. Companies utilize Data Analytics to improve customer happiness, streamline company processes, and solve business challenges.[2]

Data analytics fundamental goal is to extract useful insights from data that an organization can utilize to inform its strategy and, in turn, achieve its goals. These are some of the domains where data analytics plays a vital role in making different decisions, it is a pretty vast field and different things fall under this category, (Big data, Machine Learning, Data mining and Data warehouse)

Data analytics can be used for a variety of purposes, including [1]

1. **Budgeting and forecasting**
   An analyst can determine the budget and investments needed to make a company's future growth ambitions a reality by analyzing historical revenue, sales, and cost data alongside the company's future growth goals.

2. **Risk management**
   An analyst can provide cost-effective recommendations to assist mitigate specific company risks by understanding the chances of them occurring and the costs associated with them.

3. **Marketing and sales**
   A marketing analyst can determine the amount of leads needed to fill the sales funnel by studying important data such as lead to customer conversion rate.

4. **Product development (or research and development)**

An analyst can help influence future product development, design, and user experience by studying how customers reacted to previous product developments.

Data has been the main baseline for various activities, it could be any occurrence. Whether its education, technology, healthcare or a country it all depends on data. It's safe to say everything is relatively moving from product based to data focused. A single byte of information can be manipulated for a payoff. Data Analytics is said to be booming more than ever till the year 2025 [1] and almost every other organization will be using it, typically on a small scale or a broad scale according to the needs. It won't be surprising if algorithms and data architecture would be the main key factors before taking any considerate decision for the organization. We are rather optimistic about the future and what data analytics holds for the future.

Problem Statement

As the volume of data grows, so does the requirement of data analysis, resulting in the emergence of Big Data analysis, one of the most challenging aspects of data. The current issues and most often used approaches of data analysis are examined in this research paper which includes

1. Huge Volume.
2. Large number of data resources.
3. Unstructured data.
4. Dynamically changing data and many more

Solution Statement

Organizations have been depended extensively on analytics which offers a competitive advantage and it is considered to be more effective when compared with the previous several decades. Analytics have become a standard element of business operations, and they no longer give the benefits they previously provided. [3] Organizations are increasingly being driven to delve deeper into their data in order to discover new and inventive ways to boost efficiency and competitiveness. Organizations are embracing larger, more complete analytics strategies as a result of recent developments in science and technology, particularly in machine learning. This research outlines some of the business prospects for machine learning, as well as how to overcome some of the primary hurdles of implementing machine learning into an analytics strategy

Literature Review

Data analytics has been a vast field where research is being carried out from decades, its self-evident data analytics has a bright future ahead, since our paper is based on research, you can review table 1.1 where we have listed some of the papers that have helped us with our research. These papers are based on surveys, systematic methodologies and telephonic interviews as well.

Table 1.1

S. NO	TITLE	YEAR OF PUBLICATION	METHODOLOGY	LIMITATIONS
1	RESEARCH ON DATA SCIENCE, DATA ANALYTICS AND BIG DATA	May 2020	Conducting online assessments inside the university	The potential capabilities of data were only utilized within organizations
2	Data Analytics in Operations Management	July 2017	Focus on searching via Web of Science portals on papers published in SCI/SSCI journals	Their main focus was only primary keywords, information was very limited.
3	Big Data Analytics in Intelligent Transportation Systems A Survey	February 2018	Non-parametric statistical methodology & Systematic methodology	The biggest limitations were the inadequacy and

				inaccessibility to resources.
4	Demystifying Big Data Analytics for Business Intelligence through the Lens of Marketing Mix	February 2016	A research based on past market surveys.	Analysis models developed based on a single data source provided limited insights
5	Big data analytics a survey	June 2015	A research based report.	A very small amount of anonymous users reviewed for valuable comments and suggestions on the paper.
6	BIG DATA ANALYTICS	November 2011	Surveys and telephonic interviews with technical users, management experts.	This paper hasn't covered all data models and tools. Plus the survey size was very small.

However the main focus of this research is Data Analytics and its impact but the way it is helping in the enhancement of business is commendable, Some of the papers we considered had limitations where a limited amount of surveys had sampling error or a very small minimal amount of surveys that were carried, But majority turned out to be significant in our research and had a great impact.

Methodology

Our paper is based on research methodology where qualitative data was analyzed and a proper approach was identified for the paper, below figure 1 is the method how a data analysis is carried out. We sourced different research papers for our help.

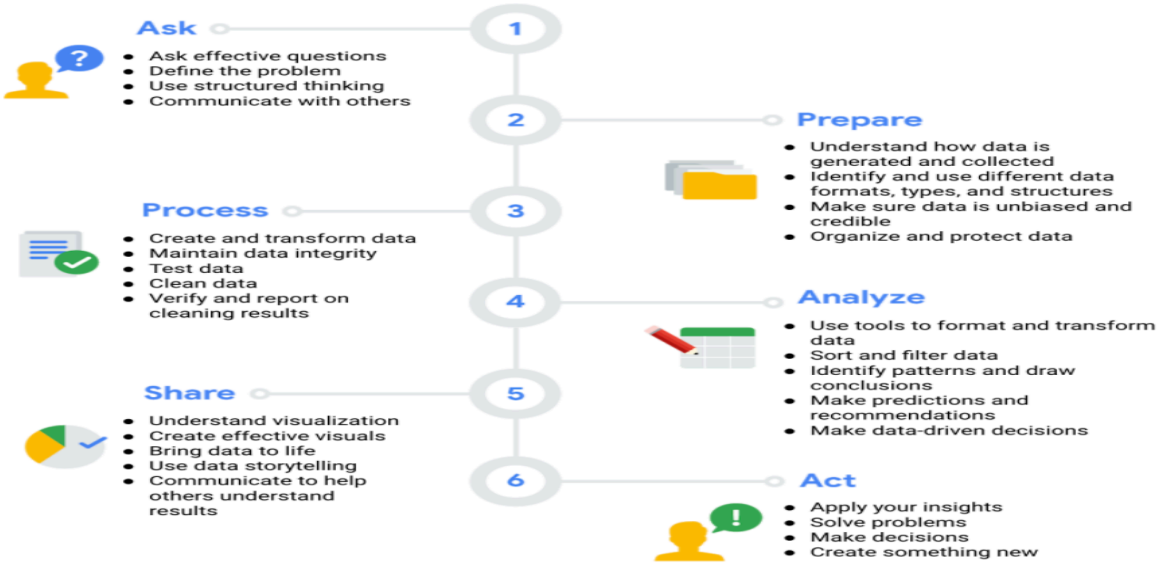

Figure 1

Even though this methodology is very common but is known to be the most useful and impactful method for writing a paper. A total of ten papers were analyzed and were taken into consideration.

Future of Data Analytics

The current generation could be witnessing revolutionary products or technologies however this is just the start, the advancement in the field of Data is something enriching and promising as well. According to different surveys and predictions we can see almost tenfold increase in the amount of data we create. We would have a total of 163 Zettabytes of Data by 2025 or even more [8]. Data Analytics would be the most buzzing technology to play with data. These data can be in different forms whether it is a server, web logs, customer sales data or transactional data. Data analytics aim to process all the relevant information from the data by analyzing very large and complex data sets. These insights could be business predictions or even used to increase efficiency of any data relevant work. The four basics of Data analytics are

1. Improved Decision Making
2. Better Customer Service
3. Efficient Operations
4. Effective Marketing

These basics seem to be basic business derivatives however it implies on various other sources. Data analytics can be used on our daily life schedule as well. We can tailor our own needs through personalization of our data. Until a later time we won't be needing these tools to analyze these traits but a simple clicks would do our job. Data Science and Data analytics are to be done through AI in near future.

Research Objectives

1. **To determine how issues in data analytics are resolved.**

Objective 1 Discussion

In data analytics, we can see that a vast volume of data is being generated every day as a result of digitalization. Most of us have now understood the value of incorporating data analytics into our organizations. However, unfortunately even today there are many organizations which are not utilizing data to its full potential. Why is that? Why are not businesses able to make use of data? What are the most common data analytics difficulties faced by most businesses?

If you want to use a super power like data, you must grasp the hurdles in data analytics to create a data-driven culture in your company. And strategies for overcoming these data analytics difficulties.

Here are some issues we could face regarding data analytics

1. Quality and relevant data.
2. Data analytics tools (Data processing and visualization tools).
3. Different data resources.
4. Data security.

To resolve these kind of issues, we could use different tools and technologies and different analytical strategies. Like, for data relevancy we need to understand the business problem and the goal of the organization, then there will be a clear understanding of the relevant datasets we should be having to resolve a business problem.

Objective 1 Conclusion

In order to solve a business problem successfully, we need to understand the issues and limitations we might have faced and plan the strategies accordingly. Once these issues are highlighted, we need to evaluate and choose the right tools. Lastly, the results are evaluated and discussed with the stakeholders for data-driven decision making.

2. **To determine the scope of data analysis and what tools are being used**

Objective 2 Discussion

If we talk about Data Analytics and its scope in upcoming year, it is now one of the most important techniques for businesses to expand and respond to market volatility. In today's world, the study of data analytics science is extremely important. The raw data is quite useful. And maximizing the benefits from it takes the company to the next level. We will be given you some facts in this discussion that will make you believe in the data analytics future. [9]

So let's have a look at them

1. Big firms are advertising attractive job openings with great salaries.
2. Experts' expects great future of data analytics.
3. Creating new job roles regarding data analytics.

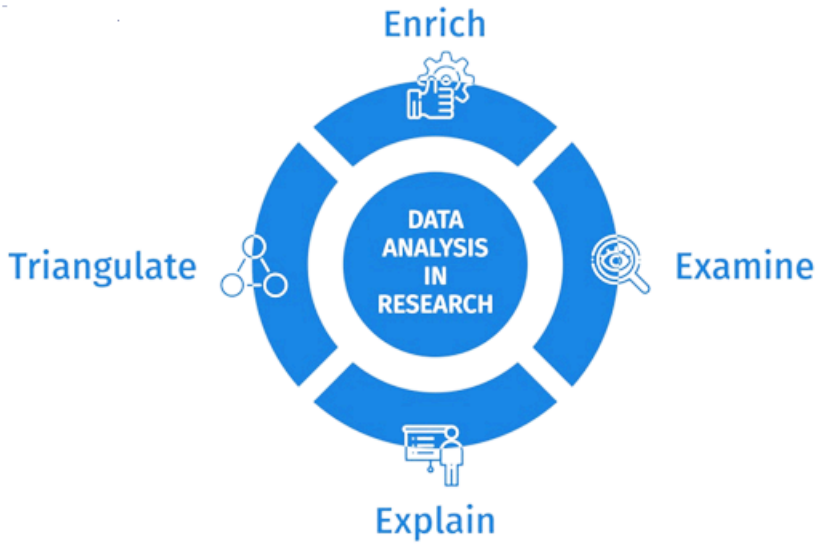

Figure 2

Now if we talk about Data analytics tools, it provides comprehensive insights into a variety of business events. When data analytics and big data are used properly, they can help people make faster and better decisions. This gives you a major competitive advantage while also accelerating your digital transformation.

Figure 2.1

There are some technologies which is being used in Data industry till date are mentioned below, You can also refer to Fig 2.1 for the reference. The tech giants and software's include

1. IBM
2. MicroStrategy
3. SAP
4. SiSense
5. Microsoft
6. QLIK
7. Tableau
8. SAS

Objective 2 Conclusion

To conclude this, when anyone is making a professional change, it's natural to have reservations. However, you must be secure and confident in your profession and competence. And, in terms of data analytics, it might be one of the most secure and well-paying professions. Data Analytics is extremely important in today's world, and we've uncovered all of the facts and tools about data analytics as well as its future potential.

3. To determine an optimal solution for business needs

Objective 3 Discussion

Right now, this is a very popular question regarding data analytics that how we can change our businesses by using data. As the world gets more intelligent, data will increasingly become the key to competitive advantage, implying that a company's capacity to compete will be determined by its ability to utilize data, apply analytics, and integrate new technologies. According to the International Institute for Analytics.

So, it's evident that data is now a valuable business asset that's changing the way businesses operate in almost every industry.

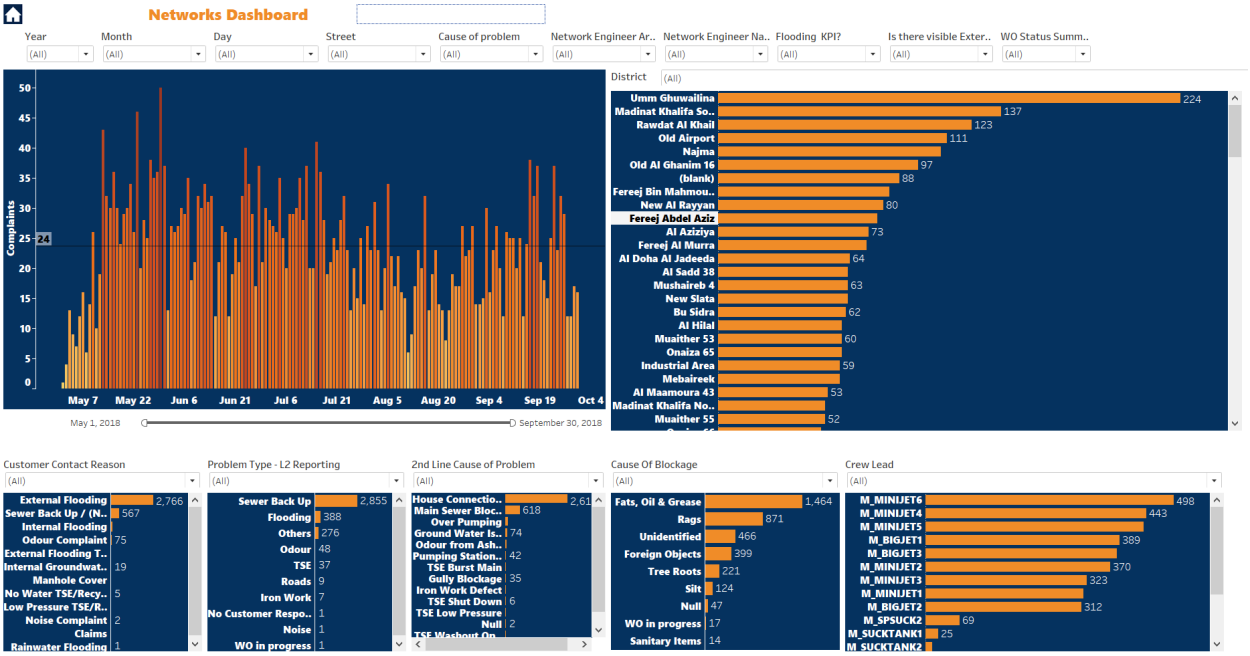

Figure 2.2

In fact, every company, regardless of size, must now be a data company. And, because every business is a data business, every firm need a strong data strategy. As shown in Fig 2.2 we can analyze the business needs and interpret results accordingly. In figure 2.2 we have a networks dashboard where the complaints of households are being managed and company is interpreting the main causes in the networks and rectify those issues accordingly.

Objective 3 Conclusion

Concluding this Information is power in business, and Data is giving us access to the solutions we couldn't have imagined collecting or analyzing only a few years ago. With the tremendous rise of Data and Data analytics and the quickly expanding methodologies for data analysis, data will become increasingly important in every part of business. Companies who regard data as a strategic asset and build sophisticated data and analytics strategies will thrive in this new data-driven environment. [10]

4. To determine the limitations of data analysis

Objective 4 Discussion

Now many people and organizations believe that data analytics is the key to achieving success and progress. However, while data analytics is a fantastic tool for making business go bigger and more profitable, it is not without its drawbacks. Given below some of the data analytics limitations

1. Security & privacy.
2. Data collection inconsistency.
3. Unstructured and semi-structured data.
4. Bad quality of data.
5. Too many data resources with lesser quality tools.
6. Complexity and Biasness.

Objective 4 Conclusion

Right now various data sources are producing and collecting great data volume, and to encounter that we still need better tools to deal with such amount of data. First, much current data includes audios, videos, text and much more, and extracting data from thousands of resources meaning the data is becoming increasingly important as well as more complex. We still have some limitations and day by day new solutions and technologies are being created to overcome data limitations and to improve the analytics.

5. To determine how to achieve the goals with new technologies and practices.

Objective 5 Discussion

Few years back, businesses of all sizes, large and small, have not been relying on data and analytics, because it was not as famous or needed back then nor the technologies were helping to organize and process the data. But now, these businesses are relying on super power like data to improve customer experience and achieve more focused marketing. As years are passing, many firms have developed data science and data analytics departments. Those businesses who were struggling by past years' problems have grown stronger, all thanks to the data analytics and its new technologies.[10]

Many new technologies in data analytics have been developed. Given below are some of them

1. Data as service
2. Responsible and Smarter Artificial Intelligence
3. Predictive Analytics
4. Quantum Computing
5. Edge Computing
6. Natural Language Processing
7. Hybrid Clouds
8. Dark Data
9. Data Fabric
10. XOps

Objective 5 Conclusion

As years are passing, new technologies and best approaches towards data in Data Analytics are constantly evolving and making it more professional and much needed. As a result, those firms who did not adopt Data Analytics best are now making it must to apply the appropriate trends in order to stay ahead of their competition. So, these mentioned above are the new Data Analytics trends for 2022 and beyond.

Final Conclusion

Data analytics and Data Science are marked as the foundation of the future industries, Countries will be adapting various ways to analyze the problems and emerge with lavish yet effective ways to solve the problem. People would consider requirements and deal with any uncertainty before opting for this way because this could be the most effective way to meet the business needs.

The current advancements is nothing with what future beholds, Artificial Intelligence and Data science will be evolving beyond our prolonged thoughts. It is everyone's responsibility to promote these healthy innovations and manipulate them in a way everyone can be benefited from it.

Acknowledgement

We'd like to express our deepest thanks to Professor Adeel Ansari and extend our gratitude for sharing the pearls of his knowledge with us and the insights that were dispensed.

We are immensely grateful for the reviewers and our colleagues for their proficient input in the paper. This research was fully sanctioned by SZABIST and we thank them for this opportunity and making it successful.

References

1. Zhu, Li, et al. “Big Data Analytics in Intelligent Transportation Systems A Survey.” *IEEE Transactions on Intelligent Transportation Systems*, vol. 20, no. 1, Jan. 2019, pp. 383–98. *DOI.org*
2. Qin, S.Joe; Chiang, Leo H. (2019). Advances and Opportunities in Machine Learning for Process Data Analytics. Computers & Chemical Engineering, ()
3. Choi, Tsan-Ming; Wallace, Stein W.; Wang, Yulan (2017). Big Data Analytics in Operations Management. Production and Operations Management
4. Zou, Benyuan, et al. “Survey on Learnable Databases A Machine Learning Perspective.” Big Data Research, vol. 27, Feb. 2022, p. 100304. ScienceDirect
5. **Nadikattu, Rahul Reddy. Research on Data Science, Data Analytics and Big Data. SSRN Scholarly Paper, ID 3622844, Social Science Research Network, 17 Apr. 2020. papers.ssrn.com**
6. Fan, Shaokun; Lau, Raymond Y.K.; Zhao, J. Leon (2015). Demystifying Big Data Analytics for Business Intelligence Through the Lens of Marketing Mix. Big Data Research
7. Tsai, Chun-Wei, et al. “Big Data Analytics A Survey.” Journal of Big Data, vol. 2, no. 1, Dec. 2015, p. 21. DOI.org
8. Chen H, Chiang RHL, Storey VC. Business intelligence and analytics from big data to big impact. MIS Quart.
9. Kitchin R. The real-time city? big data and smart urbanism. Geo J. 2014;79(1)1–14.
10. Philip Russom, “ Big Data Analytics”,TDWI Best Practice Reports. TDWI Research.

Final Research

ORIGINALITY REPORT

9%	3%	0%	9%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to University of Greenwich Student Paper	1%
2	www.coursehero.com Internet Source	1%
3	Submitted to MAHSA University Student Paper	1%
4	Submitted to Coventry University Student Paper	1%
5	Submitted to University of Ulster Student Paper	1%
6	Submitted to Buckinghamshire Chilterns University College Student Paper	1%
7	Submitted to Cavite State University Student Paper	1%
8	Submitted to Westcliff University Student Paper	1%
9	Submitted to University of Johannsburg Student Paper	1%