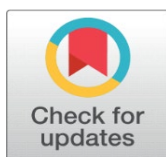
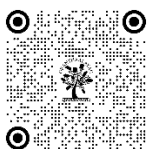


BIG DATA AND AI IN MARKETING: UNLEASHING THE POWER OF DATA-DRIVEN DECISION MAKING

Dr. Pradnya Bhandare¹✉, Dr. Jayalekshmi K.R.²✉

¹Controller of examinations and Associate Professor, Indus Business School, IIEBM, Pune

²Associate Professor, NCRD'S Sterling Institute of Management Studies, Nerul, Navi Mumbai



Corresponding Author

Dr. Pradnya Bhandare,
pradnyab.26@gmail.com

DOI

[10.29121/shodhkosh.v5.i6.2024.2109](https://doi.org/10.29121/shodhkosh.v5.i6.2024.2109)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Copyright: © 2024 The Author(s). This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

With the license CC-BY, authors retain the copyright, allowing anyone to download, reuse, re-print, modify, distribute, and/or copy their contribution. The work must be properly attributed to its author.



1. INTRODUCTION

Within the ever-changing field of Big Data Analytics, the increasing amount, speed, and diversity of data provide both possibilities and difficulties (Yang and Ge, 2022). Organisations are facing a growing demand for sophisticated statistical instruments as they struggle with huge databases. A subset of machine learning and the foundation of deep learning, neural networks have become a transformative tool for identifying mysterious trends in enormous datasets. The purpose of this study is to examine and clarify the function of artificial intelligence in the Big Data Analytics age, highlighting the opportunity for these technologies to provide insights grounded in data. During the discussions experts will delve into the design and capabilities of networks highlighting their adaptability in recognizing relationships and patterns. Moreover, the conversation will delve into applications as artificial neural networks have proven adept, at uncovering connections and patterns that traditional analysis methods may overlook. By delving into real life scenarios, the aim is to provide readers with an understanding of how AI powered neural networks facilitate data driven decision making

ABSTRACT

This study investigates the use of neural networks with respect to big data analytics, emphasizing the ways in which these potent tools may be used to mine massive data sets for insightful information. Using data-driven techniques, researchers explore the methods that allow the efficient using neural networks to improve big data processing and understanding. They go over how neural networks' innate ability to manage intricate relationships and trends in huge datasets makes it easier to find useful insights. We also emphasize how crucial it is to combine various data sources and use strong approaches to preprocessing in order to maximize neural network performance in big data analytics. Researchers illustrate the prospective effect of using neural networks in a variety of sectors, including finances, marketing, and healthcare, using research results and actual-life scenarios. This paper's principal objective is to provide a thorough analysis of the methods and approaches for using neural networks to their fullest capacity in analytics of large amounts of data, highlighting the significance of making decisions based on data for fostering invention and commercial success.

Keywords: Artificial Neural Networks, Big Data Analytics, Data-Driven Techniques, Pattern Recognition, Predictive Modelling, Data Preprocessing, Multi-Source Data Integration, Scalability, Explainable AI, Industry Applications, Healthcare, Finance, Marketing, Data-Driven Decision Making, Innovation, Commercial Success.

informed by analysis. The study elaborates on how intelligent machines can extract insights from datasets to bridge the gap, between theoretical knowledge and practical application.

2. LITERATURE REVIEW

INSPIRED BY AI INFORMATION: USING BIG DATA RESEARCH TO CREATE SUPERIOR PERFORMANCE:

The significant increase, in the body of evidence has spurred advancements across all sectors in today's interconnected environment. Big data, which refers to the amount of information gathered from sources presents both unprecedented opportunities and challenges for companies seeking a competitive edge. This wealth of information contains insights that can be easily extracted and applied to inform decision making. The combination of AI and analytics, in handling datasets amidst this data surge is reshaping the landscape. Transforming how businesses leverage their repositories of sensitive data. AI technologies enable organizations to analyse data sets and uncover patterns, trends and connections previously undiscovered (Milson and Levent, 2024). The collaboration, between large scale data analysis and artificial intelligence (AI) is transforming the business landscape by improving efficiency fostering innovation and enhancing customer satisfaction. By combining AI with data analytics businesses can benefit from recommendations in online shopping automated industry wide maintenance services and improved healthcare outcomes. This study aims to explore how AI generated insights contribute to the generation of amounts of data for growth. It will delve into the elements of this beneficial partnership discuss opportunities for industry transformation tackle challenges and ethical considerations and present effective strategies, for utilizing AI to drive businesses forward in today's data driven world.

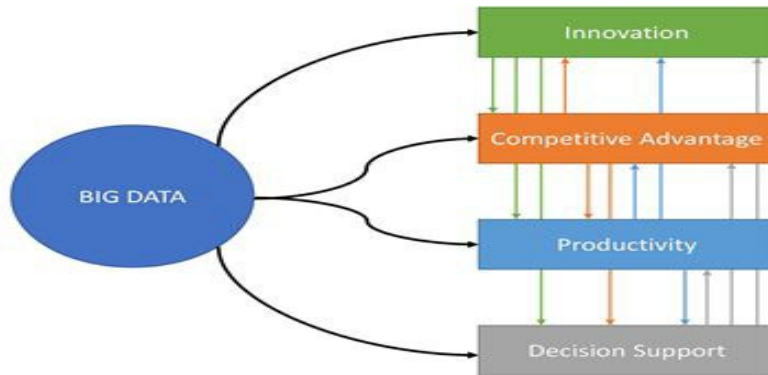


Figure 1. Big data Utilize

3. COMPREHENDING BIG DATA AND ITS OBSTACLES

Big data is defined by three factors; volume, velocity and variety. Every day an overwhelming amount of data is produced at a pace never seen before from origins. Given that standard analytical software often struggles to manage amounts of information more sophisticated methods are typically required (Naeemet al., 2022). The vastness and variety of data present obstacles, for intelligence methods yet they excel in handling small data sets. The rigid structure and slow adaptation speed of methods pose difficulties in extracting information, from the vast pool of data at our disposal.



Figure 2. Big data Challenges

4. UNCOVERING NEURAL NETWORKS' POWER

Influenced by the structure of the brain of an individual, brain networks are a family of artificially intelligent algorithms that can identify similarities and forecast outcomes. Such networks, which are made up of linked neurons or nodes, are perfect towards the changing dynamics of analytics for big data because they are capable of adapting and learning from data. Multiple layer neural networks, or deep neural networks, are used in deep learning, a type of machine learning. These networks are able to learn hierarchy-related characteristics because to its framework of hierarchy, which enables them to recognize complex patterns in vast and complicated information.

5. APPLICATIONS OF NEURAL NETWORKS IN BIG DATA ANALYTICS:

When it comes to predicting future trends based on patterns seen in previous data, neural networks are excellent at it. Neural networks are capable of identifying and deciphering correlations in audio and visual data. Artificial neural networks play a major role in domains such as security and healthcare by improving images and recognition of voice, which makes more comprehensive monitoring and diagnosis possible (Samek *et al.*, 2021).

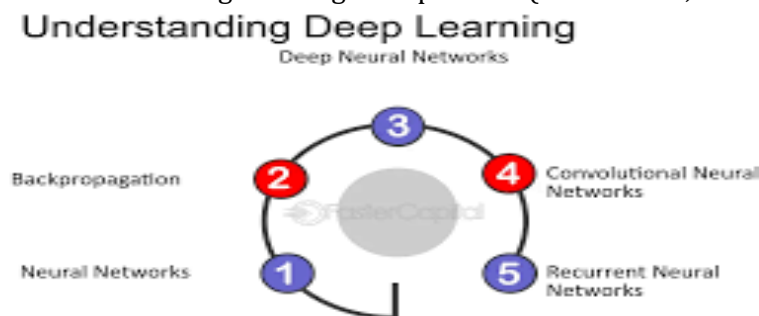


Figure 3. Neural Networks in Big Data Analytics

6. NATURAL LANGUAGE PROCESSING (NLP)

Neural network-powered NLP has become essential due to the abundance of uncontrolled textual input. Neural networks are used to improve the processing of natural language and comprehension in a variety of contexts, such as sentiment assessment, translation of words, and chatbot generation.

7. OVERCOMING OBSTACLES AND MORAL DETERMINATIONS

Even though neural networks are powerful tools for large data analytics, scalability issues need to be taken into consideration. Significant resources are needed to meet the high computational requirements of training powerful neural networks on large datasets. Scientists and technicians are now engaged on refining techniques and hardware to address these scaling concerns. Big data analytics using neural networks presents ethical questions about responsibility, prejudice, and privacy. Maintaining the ethical use of these potent instruments requires striking an agreement between invention and appropriate use.

8. METHODOLOGY

This research uses old data to look at the role that artificial neural networks play in big data analytics. Neural networks are used and how well they work in many areas can be learned in many places (Daradkeh *et al.*, 2022). Some of these are case studies, business reports, and scholarly journals. The study looks at deep examples and trends to find the pros and cons of using neural networks in big data settings. This way shows how things are done and how trends are being made right now. It also makes sure the outcomes are based on facts and real-life cases.

9. DISCUSSION

IMPLICATIONS AND BENEFITS

People now look at big data in a different way because ANNs help us find trends and guess what will happen. Because they can work with and look at a lot of data in different ways, they can find complex patterns and links that other study methods might miss. For better evaluations and treatment plans for each person in the healthcare field, ANNs can look

at DNA data, medical records, and imaging data (Hunter et al., 2022). This part not only makes patients healthier, but it also makes the best use of the resources that healthcare organisations have.

In the financial world, ANNs are used to manage risk, look for scams, and trade automatically. In real time, ANNs can find strange trends in very large datasets. This could be a sign of fraud or market problems. This lets banks act quickly and lowers the risks that might happen. In the same way, ANNs make production and logistics more efficient by checking quality and planning upkeep ahead of time. If businesses can guess when technology will break down before it does, they can cut down on downtime and repair costs. This helps the business make more money and get more done.

CHALLENGES

There are some good things about using ANNs in big data analytics, but there are also some bad things. It's important to be able to grow as needed. Big datasets need a lot of time and computing power to train deep neural networks. This can be a problem for groups that don't have a lot of resources. New technologies like GPUs and TPUs have helped solve some of these issues, but a lot of computer power is still required (Hsu and Tseng, 2021).

They are also hard to understand, which another problem is. These models, which are sometimes called "black boxes," don't tell people much about how they decide what to do or make predictions (Crabbe et al., 2020). There is a problem with this lack of openness, especially in healthcare and banking where it's important to know why a choice was made. Explainable AI (XAI) wants to solve this problem by making ANN models simple to understand. This helps people believe in them and makes it simple to use them when making important choices.

ETHICAL CONSIDERATIONS

When companies use ANNs for big data analytics, they should think about the moral problems that could arise. Some of the most important problems that need to be fixed are holding people responsible, keeping data safe, and ending bias that is done automatically. So things don't get worse, it's important to train neural networks on data that is both fair and right. To keep private data safe and make sure that laws like the General Data Protection Regulation (GDPR) are followed, you also need strong data control systems (Janssen et al., 2020). ANNs are being worked on to make them better, more useful, and simpler to understand. They will do well in the field of big data analytics in the years to come. A lot of people are interested in transfer learning and continuous learning because they help models switch between jobs and files fast. Edge computing and the Internet of Things (IoT) are two new technologies that could be used with ANNs in even more places. Part of this is smart cities and personalised health care.

PROSPECTS FOR THE FUTURE AND CONCLUSION:

THE CHANGING BIG DATA ANALYTICS ENVIRONMENT

In the years the combination of data analytics and neural networks, in technology will significantly influence decision making processes across various industries. The growth of network structures and advancements in technology could offer additional prospects, within the expansive realm of analytical data.

HUMAN EXPERIENCE AND ADVANCES IN NEURAL NETWORKS

The Function of Human Experience:

While neural networks offer promise it's important to recognize the impact of human insight, in the analytics process. Researchers and analysts are key in defining the issue selecting data and interpreting the outcomes of networks. Combining machine learning algorithms with judgment offers an approach to extracting valuable insights, from vast data sets.

HUMAN-IN-THE-LOOP APPROACHES

Collaboration, between experts and AI algorithms is becoming more popular. By combining their expertise, they can verify findings interpret patterns and improve strategies. With the increasing complexity of networks human involvement is crucial to guarantee the relevance and accuracy of insights generated.

ADVANCEMENTS IN NEURAL NETWORK ARCHITECTURES

Continual Learning and Transfer Learning

One of the challenges, with data mining is the changing focus of data sets. Neural networks have the ability to adapt and refine their algorithms quickly as new information becomes available through training methods. The application of "transfer learning" allows neural networks to be utilized across fields efficiently enhancing model training, for specific purposes.

Explainable AI (XAI)

The study of intelligence focusing on the workings of deep neural networks and their practical uses has seen a substantial increase. Understanding how artificial neural network algorithms make decisions in scenarios where awareness and transparency is crucial. These methods using XAI aim to boost trust and facilitate the integration of networks into critical decision-making phases by improving the understandability of choices produced by networks.

INDUSTRY-SPECIFIC APPLICATIONS

Healthcare

In the field of healthcare artificial intelligence has revolutionized the way patients receive diagnoses and treatments through the use of technologies. These tools play a role, in tasks such, as examining images and predicting the progression of diseases ultimately enhancing the precision of processes.

Finance

Artificial intelligence is often utilized in the financial sector to identify activities easily, simplify trade, and reduce risks. Real time analysis of datasets, by institutions helps them reduce risks and make informed decisions.

PRODUCTION AND LOGISTICS NETWORK

Neural networks improve manufacturing processes by enhancing quality control optimizing distribution network operations and preventing plant breakdowns. These advancements increase production, cut expenses. Enhance the well being of business environments.

RESPONSIBLE AI AND ETHICAL ISSUES

As we move towards an era of analyses powered by neural networks ethical concerns gain significance. Addressing biases stemming from algorithms safeguarding privacy and transparency, in data usage are aspects of AI implementations. Companies must set standards, for the deployment of artificial intelligence (AI) to ensure that the advantages of AI are harnessed without infringing upon fundamental liberties and societal norms.

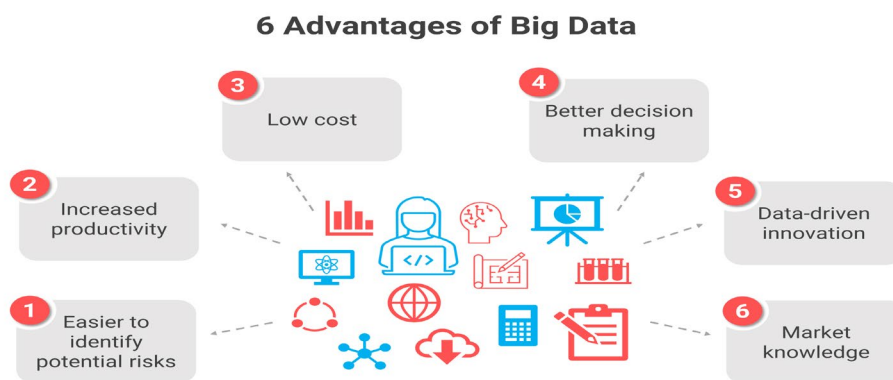


Figure 4. Advances in Neural Networks

OPINIONS AND SOLUTIONS

The significance of Artificial intelligence (AI) and big data for businesses from the perspective of advertising is discussed in this paper. According to the report, digital channels account for the great bulk of buying from customers. Almost no industry in existence today is where big data analytics has not had a significant impact. Big data helps organizations plan their everyday tasks and make strategic choices. It also helps them find opportunities for growth and developments and may assist with budgeting and decisions regarding marketing. The survey finds that companies operating in a broad range of sectors are concentrating more and more on collecting, storing, utilizing, and examining big data And AI on a daily basis. As a consequence, employing AI And big data in the modern era has several advantages for organizations. This research demonstrates that big data is a crucial component for organizations in the digital era as they progress toward modernization in order to achieve long-term success. Customers might create many electronic footprints when they browse the Internet. Companies that closely watch them may readily comprehend the intentions, wants, requirements, and behaviour of their customers. Therefore, in order to fulfil their consumers and establish long-term success, organizations need to use analytics for AI and big data.

10. FUTURE DIRECTIONS FOR STUDY

This research is restricted to an extensive review of the literature on AI and big data's advantages for companies. Though there aren't many research on the topic, AI and big data is an extremely vital topic. In subsequent research, statistical methods may be used to examine customer purchase patterns in relation to their socioeconomic attributes. Writers may

conduct discussions with companies in various industries to learn regarding their big data advertising methods and how they profit from them.

11. CONCLUSION

Big data and AI are an essential component that organizations need to succeed as they transition to digitalisation. The Internet has produced a multitude of digital user identifiers that companies may gather and handle, both in earlier times and in current times. Customers are producing vast amounts of data due to the fast developments in technology. Businesses can learn more about customer behaviour thanks to the amount, diversity, and speed of data that is generated. Businesses may close information gaps regarding their customers and get an economic advantage in their sector by properly analysing such data. This section reveals the value of AI in the context of internet advertising. In keeping with this goal, the research's first chapter reviews the meaning, elements, and outlets for big data, while the following part concentrates on the idea of digital advertisement. In order to build a lasting connection with their consumers in the highly competitive market of today, firms must constantly engage and communicate with their clients. Big data may provide firms with very comprehensive customer data in this way. Companies have the ability to generate unique and creative ideas, improve their efficiency, and make greater decisions as a result of the knowledge they get. Companies must leverage the client knowledge they get from AI and continuously refresh what's accessible in order to retain a customer-focused attitude.

CONFLICT OF INTERESTS

None

ACKNOWLEDGMENTS

None

REFERENCE

- Bawa, Surjit Singh. "Implementing Text Analytics with Enterprise Resource Planning." *International Journal of Simulation*
- Crabbe, J., Zhang, Y., Zame, W. and van der Schaar, M., 2020. Learning outside the black-box: The pursuit of interpretable models. *Advances in neural information processing systems*, 33, pp.17838-17849. https://proceedings.neurips.cc/paper_files/paper/2020/file/ce758408f6ef98d7c7a7b786eca7b3a8-Paper.pdf
- Daradkeh, M., Abualigah, L., Atalla, S. and Mansoor, W., 2022. Scientometric analysis and classification of research using convolutional neural networks: A case study in data science and analytics. *Electronics*, 11(13), p.2066. <https://www.mdpi.com/2079-9292/11/13/2066>
- Hsu, K.C. and Tseng, H.W., 2021, November. Accelerating applications using edge tensor processing units. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis* (pp. 1-14). <https://dl.acm.org/doi/pdf/10.1145/3458817.3476177>
- Hunter, B., Hindocha, S. and Lee, R.W., 2022. The role of artificial intelligence in early cancer diagnosis. *Cancers*, 14(6), p.1524. <https://www.mdpi.com/2072-6694/14/6/1524>
- Janssen, M., Brous, P., Estevez, E., Barbosa, L.S. and Janowski, T., 2020. Data governance: Organizing data for trustworthy Artificial Intelligence. *Government information quarterly*, 37(3), p.101493. <http://repositorio.inesctec.pt/bitstream/123456789/11779/1/P-00S-BP7.pdf>
- Kalyankar V, Anute N (2022) A Study on the Effectiveness of Google Analytics on the Business Growth of E-Commerce Companies in India, *Journal of Information Technology and Sciences*, e-ISSN: 2581-849X, Volume-8, Issue-3, Page no. 1-7 <https://matjournals.co.in/index.php/JOITS/article/view/829>
- Milson, S. and Levent, K., 2024. Deep Learning Applications in Big Data: Expanding Horizons with AI-Driven Solutions. https://easychair.org/publications/preprint_download/TGbl
- Mitchell, A., & Murphy, S. (2022). Unleashing the Power of Big Data: A Catalyst for Advancements in Artificial Intelligence.
- Mitchell, A., & Murphy, S. (2022). Unleashing the Power of Big Data: A Catalyst for Advancements in Artificial Intelligence.
- Naeem, M., Jamal, T., Diaz-Martinez, J., Butt, S.A., Montesano, N., Tariq, M.I., De-la-Hoz-Franco, E. and De-La-Hoz-Valdiris, E., 2022. Trends and future perspective challenges in big data. In *Advances in Intelligent Data Analysis and Applications: Proceeding of the Sixth Euro-China Conference on Intelligent Data Analysis and Applications*, 15–18

- October 2019, Arad, Romania (pp. 309-325). Springer Singapore.
https://redcol.minciencias.gov.co/Record/RCUC2_5996fd99e6eccb5ffe7f4e761f13a9e1/Details
- S. S. Bawa, "How Business can use ERP and AI to become Intelligent Enterprise
- Samek, W., Montavon, G., Lapuschkin, S., Anders, C.J. and Müller, K.R., 2021. Explaining deep neural networks and beyond: A review of methods and applications. *Proceedings of the IEEE*, 109(3), pp.247-278.<https://ieeexplore.ieee.org/iel7/5/9369414/09369420.pdf>
- Yang, Z. and Ge, Z., 2022. On paradigm of industrial big data analytics: From evolution to revolution. *IEEE Transactions on Industrial Informatics*, 18(12), pp.8373-8388.
https://www.researchgate.net/profile/Zeyu_Yang11/publication/361955520_On_Paradigm_of_Industrial_Big_Data_Analytics_From_Evolution_to_Revolution/links/64f7f4293a0697353daffb5e/On-Paradigm-of-Industrial-Big-Data-Analytics-From-Evolution-to-Revolution.pdf