



**Big Data Analytics, Algorithmic Governance, and Constitutional Ethics:  
Emerging Legal-Ethical Challenges in the AI Era**

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**ABSTRACT**

*Technologies are developing very rapidly in the modern era. Big Data Analytics has also grown significantly in recent times which influences decision-making processes across governance, business, healthcare, and other sectors. It enables efficient data-driven insights and improves operational effectiveness.*

*Further, the increase in use of these technologies also raises the challenge and concerns regarding privacy, security, personal liberty, arbitrary surveillance, and constitutional rights.*

*This paper examines the nature of Big Data Analytics and highlights both its advantages and its ethical and legal challenges. It mainly focuses on issues such as excessive data collection, misuse of personal information, increased surveillance, and risks of cybersecurity. This paper also explores the challenges of individual liberty, dignity, and privacy within the constitutional framework of India. This research also emphasises the need for strong regulatory mechanisms for protecting privacy in the digital era, including effective implementation of data protection laws, ethical governance practices, transparency, and public awareness regarding digital rights. Strengthening cybersecurity is also identified as a most important requirement for safeguarding sensitive data.*

*Further, the paper argues that a balanced approach is essential to ensure that the benefits of Big Data Analytics are realized without compromising constitutional values and individual rights.*

**KEYWORDS**

*Big Data Analytics, Constitutional Ethics, Data Protection, Data Surveillance, Right to Privacy, Fundamental Rights.*

## INTRODUCTION

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We are living in a digital age, where we are exchanging most of the data through the internet today which makes the exchange of data much faster than the earlier time period. Big Data refers to the excessive collection of data which cannot be managed easily by the traditional methods. Big Data Analytics is the process of examining and systematically analysing large amounts of data to discover new trends and patterns which assist organisations in making decisions on the basis of analytics.<sup>1</sup>

Big Data Analytics is useful in various fields like healthcare, banking, education, marketing and much more.<sup>2</sup> Big Data Analysis is also very useful for the government as it helps the government in collecting raw data across the nation which helps the government to understand requirements of the people in the society, making decisions and better initiatives, to manage the public sector more effectively.<sup>3</sup>

However, along with these benefits, several risks are also associated with Big Data Analytics in terms of privacy and surveillance. The excessive collection of data may lead to various risks like misuse of information, data malpractice, data breaches, issues with data ownership.<sup>4</sup> The development of the data exchanging through the digital network and surveillance technology raises various concerns regarding fake data generation, data mining issues, lack in security audits, data cleansing problems and much more.

Such activities directly affect the individual privacy and constitutional values. In our country the protection of personal data is directly linked with fundamental rights under the Constitution of India. Under Article 21 of Constitution of India<sup>5</sup> The Right of Privacy is protected and guaranteed as part of the right to life and personal liberty. The Supreme Court in the case of Justice K.S. Puttaswamy v. The Union of India observed that “privacy is the constitutional core of human dignity” and declared privacy as the fundamental right under Article 21 of the Constitution.

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<sup>1</sup> Bernard Marr, *What is Big Data?*, IBM, <https://www.ibm.com/think/topics/big-data> (last visited May 04,2026).

<sup>2</sup> Oracle, *What is Big Data?*, <https://www.oracle.com/in/big-data/what-is-big-data/> (last visited May 04,2026).

<sup>3</sup> INFOYS Public Service, *Bytes for Better Policies*, <https://www.infosyspublicservices.com/insights/blogs/bytes-better-policies.html> (last visited May 04,2026).

<sup>4</sup> Mark Smallcombe, *11 Big Data Security Concerns*, Integrate.io, <https://www.integrate.io/blog/big-data-security-concerns/> (last visited May 04,2026).

<sup>5</sup> INDIA CONST. art. 21.

In addition to Article 21 of the Constitution, the Digital Personal Data Protection Act 2023 was enacted for exclusive focus on digital data protection and security in India. Big Data is very helpful to make our lives better by providing efficiency in various sectors but it also raises serious concerns which directly impact Constitutional Ethics and Rights.<sup>6</sup>

Therefore, it raises serious questions with regards to the development and evolution of technology and privacy protection and surveillance and constitutional ethics.

The objective of the present paper is to analyse the challenges and concerns raised from big data analytics in relation to privacy, surveillance and constitutional ethics.

## LITERATURE REVIEW

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In today's digital world the excessive amount of data is getting stored by different techniques which has become valuable for companies to make decisions and strategies, but it also represents a risk for many users. According to IBM, Big Data Analytics includes storing, managing and continuously analysing that data, sometimes which becomes risky as it also stores some sensitive data which affects the dignity of the person.<sup>7</sup>

With the rapid growth in Big Data Analytics, Suja R. Nair, in the International Journal of Business Data Management, highlighted the concerns regarding privacy, surveillance and misuse of the information.<sup>8</sup> A study published in PLOS One observed that it also raises ethical issues about sharing and usage of data.<sup>9</sup> Many users are not aware that their data is being stored or analysed thereby breaching the Right to Privacy, which is protected by the Constitution of India under Article 21.

Studies on public administration and governance suggest that the government also extensively uses Big Data Analytics for welfare schemes, policy making, and to understand the necessity of the public. A report by Infosys Public Services suggests that the increasing use of Big Data by the Government is improving the decision making, public administration and more but it is also raising the question on the mass surveillance and misuse of the

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<sup>6</sup> Digital Personal Data Protection Act, No. 22 of 2023, INDIA CODE (2023).

<sup>7</sup> Bernard Marr, *What is Big Data?*, IBM, <https://www.ibm.com/think/topics/big-data> (last visited May 04,2026).

<sup>8</sup> Suja R. Nair, *Privacy and Security Challenges in Big Data Analytics*, Int'l J. Bus. Data Mgmt., <https://www.inderscience.com/info/inarticle.php?artid=106886> (last visited May 05,2026).

<sup>9</sup> PLOS One, *Big Data Privacy and Security Challenges*, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228987> (last visited May 05,2026).

power.<sup>10</sup> It also suggests the organisation and government to keep the transparency with the users and do the fair use of the data and having consent while storing, analysing and collecting the data.<sup>11</sup>

Further the government should keep and balance constitutional ethics with Big Data Analytics. A study published in the International Journal of Business Data Management also observed that increased use of surveillance by government and companies may lead to negative impact on the user's personal liberty.<sup>12</sup> A report published by Integrate.io also highlights the security challenges and concerns associated with Big Data Analytics including fake data generation, multi cloud computing, data mining issues, and cybersecurity threats. The research also observed that the hacker often targets the excessive database for the unauthorised activities or misuse of that data.<sup>13</sup>

In our country India under the fundamental rights we have Article 21 Right to life and personal liberty which itself includes Right to Privacy. Even the supreme court also recognised the importance of protecting the privacy of individuals in the landmark judgement of Justice K.S. Puttaswamy v. Union of India<sup>14</sup> where the court recognised Right to Privacy as the fundamental right in the Constitution of India.

Even after the protection under constitution, the Digital Personal Data Protection Act, 2023 was enacted to ensure effective protection of the data collection and privacy rights of users. Although the existing research and legal resources have discussed the challenges and risks created by Big Data Analytics, it has limited focus upon the relationship between Big Data and Constitutional Ethics in India. Henceforth, the objective of this is to analyse the Big Data with Constitutional Ethics in relation to privacy, surveillance and protection of user's rights which are guaranteed under Constitution of India.

## RESEARCH METHODOLOGY

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<sup>10</sup> Infosys Public Services, *Bytes for Better Policies*, <https://www.infosyspublicservices.com/insights/blogs/bytes-better-policies.html> (last visited May 07,2026).

<sup>11</sup> Mark Smallcombe, *11 Big Data Security Concerns*, Integrate.io, <https://www.integrate.io/blog/big-data-security-concerns/> (last visited May 07,2026).

<sup>12</sup> Suja R. Nair, *Privacy and Security Challenges in Big Data Analytics*, Int'l J. Bus. Data Mgmt. <https://www.inderscience.com/info/inarticle.php?artid=106886> (last visited May 08,2026).

<sup>13</sup> Mark Smallcombe, *11 Big Data Security Concerns*, Integrate.io, <https://www.integrate.io/blog/big-data-security-concerns/> (last visited May 08,2026).

<sup>14</sup> Justice K.S. Puttaswamy v. Union of India, AIR 2017 SC 4161

This research adopts the doctrinal and analytical method of research to explore the relationship between Big Data Analytic and Constitutional Ethics regarding privacy, security and surveillance concerns. Rather than only focusing upon the solely doctrinal analysis, the present research adopts the analytical approach to understand the actual challenges arising between Constitutional Ethics and Big Data Analytics regarding privacy and surveillance issues. The study is a comparative analysis of Article 21, the Digital Personal Data Protection Act, 2023, relevant judicial decisions, constitutional ethics and principles, and legal frameworks relating to Big Data Analytics, privacy and surveillance. The research also includes perspectives of different scholars, researchers and existing studies.

The study is primarily based on the Constitution of India, Article 21, Statutes, Digital Personal Data Protection Act 2023, Judicial Decisions and secondarily relies upon journal articles, legal blogs, academic articles, scholarly writings and online databases for understanding the Legal and Ethical challenges associated with the Constitution Ethics.

The main objective of this research is to understand and analyse actual challenges arising from Big Data Analytics regarding the privacy, surveillance and protection of fundamental rights in India. Further to examine the relationship between Big Data Analytics and Constitutional Ethics including personal liberty, human dignity and privacy.

The Study also attempts to examine how the excessive collection and storage of data may affect the personal liberty, privacy and democratic values and Constitutional protection of India. The researcher further highlights the importance of ethical governance, transparency, accountability and responsibility while using techniques like Big Data Analytics.

### **MEANING AND IMPORTANCE OF BIG DATA ANALYTICS**

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In today's era, the collection and generation of the data has rapidly increased due to growth in digital platforms and technology advancement. Due to this, there is increased use of smartphones, social media, online transactions and digital government has resulted in the collection of excessive data on daily basis of its users which is referred as Big Data Analytics.

In 1998 in Silicon Graphics (SGI) slide deck the term 'Big Data' was introduced by John Mashey with the title of 'Big Data and the Next Wave of InfraStress'. Big Data is a mixture of

large and varieties of data sets which is captured, stored, processed and analysed.<sup>15</sup> From commercial applications to research in multiple fields, Big Data holds the promise to solve some most challenging problems. The main attributes of Big Data traditionally were: Volume (excessive amount), Velocity (high speed processing) and variety (Different types of data). As the development in Big Data the attributed characteristics were added veracity, value and variability to other qualities like exhaustivity and complexity.

The European Commission defines the Big Data as:

A huge amount of data produced from different sources includes people, machines or sensors and this data may be in any form like digital pictures and videos, transaction records or GPS signals and more. The data may also involve the personal data or any information relating to an individual which includes name, photo, email address or any information.<sup>16</sup>

Similarly, in the United States, the National Science Foundation (NSF) refers the Big Data as:

Huge, diverse, complex or distributed set of data collected from instruments or any other digital sources.<sup>17</sup>

Big Data Analytics is the process of examining Big Data to discover new trends and patterns. Big Data Analytics is useful in various fields like academic, healthcare, banking, marketing even for the government. Although with the advantages and applications, Big Data also raises some major concerns.

### **PRIVACY AND SURVEILLANCE CONCERNS IN BIG DATA ANALYTICS**

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Although with the benefits and advantages the Big Data Analytics have some major serious concerns regarding privacy and personal liberty. Users generally don't know what will happen with their private information.

As the Big Data includes Personal Data including Bank details, medical reposts, location and sometimes sensitive data too which increases the risk towards individual personal liberty. The

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<sup>15</sup> Parmar Vinti & Yadav Jyoti, *Big Data: Issues and Challenges*, EBSCO, Research Database, [https://openurl.ebsco.com/EPDB%3Agcd%3A5%3A1647205/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A121481339&crl=c&link\\_origin=scholar.google.com](https://openurl.ebsco.com/EPDB%3Agcd%3A5%3A1647205/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A121481339&crl=c&link_origin=scholar.google.com) (last visited May 09,2026).

<sup>16</sup> European Commission, *The European Data Market Study*, <https://digital-strategy.ec.europa.eu/> (last visited May 10,2026).

<sup>17</sup> PLOS One, *Big Data Privacy and Security Challenge*, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228987> (last visited May 10,2026).

application of Big Data had raised unique sets of challenges for individuals and organisations including:

**a) Data Collection Without Consent**

Many organisations collect the personal data of users without their knowledge and consent. Sometimes in application there are long terms and conditions due to which many users cannot read and just give permission to assess the data. Big Data not only includes the name, emails but also location and as well as financial details which can cause the cybercrime and more if it got leaked or hacked.

**b) Data Breaches**

As the excessive amount of data is collected at one platform it raises the risks of leak and hack as the hackers targets the database. If the data got leaked or hacked then the financial details, health records or sensitive information of millions of users will be at risk. As identity theft can occur, financial fraud or any serious incidents may also occur.

**c) No Transparency**

While collecting data the organisations do not reveal what they will do with that data to the users. An individual often does not know what is going on with his personal information.

**d) Issues with Data Ownership**

After the collection of data, the biggest question is who is the actual owner of that data - the users whose data is collected or the companies who have collected that data. As the owner remains undecided then who has the rights upon the data is also undecided.

**e) Fake Data Generation**

The fake data is also generated sometimes which can lead to misinformation, fraud, manipulation in records, cybercrimes and wrong decision making.

Apart from the privacy issues, Big Data Analytics also raises issues regarding surveillance. Various organisations and government authorities continuously track and monitor the online activity including online transactions, location, browsing history and more through different technologies. The continuous monitoring upon each online activities of individuals creates fear of breach of their personal liberty and privacy. Continuous surveillance leads to negative impact upon the user's privacy, dignity and liberty.

Therefore, Big Data Analytics raises concerns with privacy and surveillance regarding individual dignity, liberty and rights.

### **CONSTITUTIONAL PROTECTION OF PRIVACY UNDER ARTICLE 21**

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In the Constitution of India, the protection of privacy is directly guaranteed under Article 21<sup>18</sup> That is Right to Life and Personal Liberty. Privacy is interconnected with the person's liberty. Therefore, the protection of personal data and information in today's digital world becomes quite difficult but important.

The techniques like Big Data Analytics will conflict with Right to Personal Liberty which is Fundamental Rights under Indian Constitution because the excessive collection of data may infringe the Right to Privacy, the continuation of surveillance affects personal liberty and the misuse of the information can damage an individual's reputation which may affect the dignity of the individual.

The Supreme Court in Justice K.S. Puttaswamy v. Union of India recognised the Right to Privacy as a fundamental right under Article 21 of the Constitution of India. The Court observed that privacy is an essential part of human dignity and personal liberty.<sup>19</sup> Privacy is a part of dignity, liberty, autonomy and freedom. The Judgment highlighted that every individual must have the protection against arbitrary surveillance and misuse of data.

Therefore, in today's era where techniques like Big Data Analytics used the judgment of Justice K.S. Puttaswamy v. Union of India becomes highly relevant because Big Data Analytics involves excessive collection, storage, and analysis of personal information.

Henceforth, the Constitution itself provides the safeguards against the misuse of data, arbitrary surveillance and violation of privacy rights under Article 21.

### **DIGITAL PERSONAL DATA PROTECTION ACT, 2023**

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The Digital Personal Data Protection Act, 2023<sup>20</sup> enacted on August 11, 2023, is the first legal framework which is governing the processing of digital personal data. The Digital Personal Data Protection Act, 2023 provides a legal framework for the processing of digital

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<sup>18</sup> India Consti., art.21

<sup>19</sup> Justice K.S. Puttaswamy v. Union of India, AIR 2017 SC 4161.

<sup>20</sup> Digital Personal Data Protection Act, No. 22 of 2023, INDIA CODE (2023)

personal data in a manner that recognises both the right of individuals to protect their personal data and the need to process such personal data for lawful purposes and for matters connected therewith or incidental thereto.

According to the Digital Personal Data Protection Act, companies should take the consent from the users before collecting their personal data. The users should know about the reason why data is collected and how it will be used by companies. The Act also provides rights to the users including access to data, correction of data, grievance redressal and deletion of the data.

Although, the Digital Personal Data Protection Act also puts obligations upon the organisation regarding protection of data, maintaining security, prevents misuse and responsibility towards the usage.

However, despite the legal protections under Digital Personal Data Protection Act there are still some challenges regarding effective implementation, awareness, digital surveillance and misuse of data. The risk of breach of data, hacking and unauthorised access also creates the fear regarding security.<sup>21</sup> Therefore, the Digital Data Protection Act is a step towards protection of privacy in the digital era in India.

## **CONSTITUTIONAL ETHICS AND NEED FOR ETHICAL GOVERNANCE**

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In democratic nation, like India where technology is developing rapidly, it should always function according to the Constitutional Ethics and Values. Constitutional Ethics involves the principle of dignity, equality, liberty, transparency and accountability which are protected and guaranteed under the Constitution of India.<sup>22</sup>

The technology and techniques like Big Data should work according to the Constitutional Ethics and Values<sup>23</sup> and it should not violate any Constitutional values. However, excessive surveillance and collection of data may breach the values.

Therefore, the organisation, government bodies or authorities who are collecting data should maintain the transparency and accountability with users while collecting as well as storing the

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<sup>21</sup> Mark Smallcombe, *11 Big Data Security Concerns*, Integrate.io, <https://www.integrate.io/blog/big-data-security-concerns/> (last visited May 11, 2026).

<sup>22</sup> Navtej Singh Johar v. Union of India, AIR 2018 SC 4321.

<sup>23</sup> Dr. B.R. Ambedkar, Constituent Assembly Debates (Nov. 4, 1948)

data.<sup>24</sup> Ethical governance becomes important to ensure the fair and responsible use of Big Data Analytics without breach of any Constitutional values.<sup>25</sup>

Hence, the balance between both technologies and Constitutional Ethics and Values becomes important.

## DISCUSSION AND RECOMMENDATIONS

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Big Data Analytics has rapidly developed which transformed the digital society by helping in improving decision making, governance, business strategies and more. However, along with the advantages, Big Data Analytics also has serious challenges like misuse of data, arbitrary surveillance, privacy and security and protection of constitutional rights.

As excessive collection of data threatens privacy, continuous surveillance affects liberty and dignity, the risks of misuse of data and also the cybersecurity concerns. The study observed that there should be some steps can be taken:

- The government should strictly implement the Digital Personal Data Protection Act to prevent misuse of data.
- Organisation should take proper care of the data of users and maintain transparency with the users.
- Cybersecurity should be strong to prevent the hacking and breach of data.
- Actively awareness about digital rights and regarding privacy should be spread among the users.
- To ensure the balance between the technology, constitutional rights and responsible use of Big Data Analytics there should be ethical governance.

Therefore, effective legal safeguards, ethical governance, transparency, and protection of constitutional rights are important and necessary for responsible use of Big Data Analytics in India.

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<sup>24</sup> Infosys Public Services, *Bytes for Better Policies*, <https://www.infosyspublicservices.com/insights/blogs/bytes-better-policies.html> (last visited May 13,2026).

<sup>25</sup> OECD, *Recommendation on Artificial Intelligence (2019)*, <https://oecd.ai/en/ai-principles> (last visited May 13,2026).

## CONCLUSION

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Big Data Analytics has developed rapidly over the time and significantly enhanced the decisions making, business strategy, and other sectors as well. Although with benefits, it also raises serious concerns and challenges regarding the misuse of data, arbitrary surveillance, privacy and security risks, and the protection of constitutional rights and values.

The excessive collection and processing of data threats to individual privacy and dignity and continuous surveillance also can impact personal liberty and dignity. Additionally, the misuse of data may lead to cybercrimes.

This study suggests that we should follow the multi-dimensional approach required to address these challenges. The government should strictly enforce the legal framework to prevent misuse of personal data. Organizations must ensure transparency, accountability and adopt responsible data handling practices to protect user information. The cybersecurity systems also need to be strengthened as it is essential to reduce the risk of hacking and data breaches. Furthermore, there is a need to increase awareness among users about digital rights and privacy is equally important.

In conclusion, it is very important to make the balance between the technology and constitutional rights, governance, transparency, accountability and responsible use of Big Data Analytics in India.