World Journal of Cyber Data Science Research (WJCDSR)
ISSN (Online): Request Pending
Volume-1 Issue-3 || Jul – Sep 2024 || PP. 11 – 13
https://wjcdsr.org

Data Governance Challenges in AI-Driven Cloud Systems

Dr. Sandeep Kumar
DCSE, Tula's institute Dehradun ,Uttarakhand India
sandeepkumarsiet@gmail.com

http://www.wjcdsr.org/ || Vol. 1 No. 3 (2024): July Issue

Date of Submission: 03-06-2024 **Date of Acceptance:** 19-06-2024 **Date of Publication:** 08-07-2024

Abstract— The intersection of artificial intelligence (AI) and cloud computing has transformed the way organizations process, manage, and analyze data. While the adoption of AI within cloud systems has also brought about enormous challenges regarding data governance, these involve aspects of data privacy, security, compliance, and ethical use of AI.

Fig.1 Data Governance, Source([1])

This manuscript delves into the intricacies of data governance in AI-powered cloud systems based on existing literature, practices, and real-world implementations. Through the identification of major challenges and suggesting potential solutions, this research seeks to offer insights on how to have sound governance frameworks to ensure regulatory compliance, data integrity, and ethical AI usage.

Keywords— Data governance, AI-driven cloud systems, data privacy, compliance, ethical AI, cloud computing, security, data integrity.

Introduction

The use of AI and cloud computing has revolutionized contemporary businesses, allowing them to use large data sets and sophisticated machine learning (ML) algorithms to make decisions, automate tasks, and innovate. Cloud computing offers scalable services and infrastructure, and AI contributes analytical and predictive power. They combine to form an environment that can process large amounts of data at previously unimaginable speeds and efficiency.

In spite of all these developments, the use of AI in cloud systems also brings with it several governance issues. Data governance—the set of rules for managing availability, usability, integrity, and security of information—is crucial to maintain adherence to regulations, safeguard sensitive data, and ensure stakeholders' trust. The distributed and dynamic

World Journal of Cyber Data Science Research (WJCDSR)
ISSN (Online): Request Pending
Volume-1 Issue-3 || Jul – Sep 2024 || PP. 11 – 13
https://wjcdsr.org

nature of cloud computing and the intricacies of AI algorithms together complicate issues of governance, making it hard to govern data flows, keep information private, and avert biases.

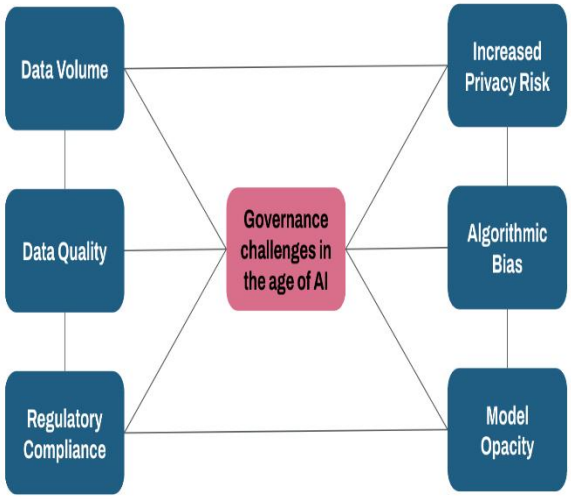

Fig.2 Governance Challenges in AI-Driven Cloud Systems,Source([2])

This manuscript delves into the critical challenges of data governance in AI-driven cloud systems and provides a comprehensive overview of current practices, methodologies, and emerging solutions.

Literature Review

Evolution of Data Governance

Data governance has shifted from being an organizational afterthought to a key element of enterprise strategy. In the past, governance initiatives centered around data quality and regulatory compliance with legislations like the Sarbanes-Oxley Act, HIPAA, and GDPR. Cloud computing brought about new models with an emphasis on shared responsibility and data lifecycle management.

AI in Cloud Computing

AI support within cloud infrastructure has revolutionized the way applications such as predictive analytics, NLP, and autonomous systems are made possible. Major cloud service providers like AWS, Azure, and Google Cloud provide AI services as part of their infrastructure. Although such services facilitate innovation, they also require strong governance to solve concerns such as data residency, cross-border data flows, and transparency of algorithms.

Key Governance Challenges

Data Security and Privacy

The use of cloud platforms to store sensitive information is causing concern regarding unauthorized access, breaches, and adherence to privacy regulations such as GDPR and CCPA.

Bias and Fairness in AI Models

AI models trained on biased datasets can perpetuate discrimination, necessitating stringent oversight.

Compliance and Regulatory Requirements

AI-driven cloud systems often operate across jurisdictions, complicating adherence to varying regulations.

Ethical Implications

Utilization of AI in decision-making raises ethical challenges, including the likelihood of AI developing opaquely or negatively making decisions.

Methodology

Research Design

This research uses mixed methods, integrating qualitative and quantitative analysis to investigate the challenges of data governance in AI-powered cloud systems. The primary data were gathered from interviews with stakeholders and surveys focusing on IT professionals, whereas secondary data were acquired through academic journals, industry reports, and case studies.

Data Collection

Interviews

World Journal of Cyber Data Science Research (WJCDSR)
ISSN (Online): Request Pending
Volume-1 Issue-3 || Jul – Sep 2024 || PP. 11 – 13
https://wjcdsr.org

With 15 cloud computing and AI governance experts from organizations in North America, Europe, and Asia.

Surveys

Administered to 150 IT professionals in charge of maintaining cloud-based AI systems.

Literature Review

Read 50 peer-reviewed articles and reports that were published between 2015-2024.

Analytical Framework

The data gathered was explored utilizing thematic analysis for qualitative findings and statistical techniques for quantitative patterns. The research aimed to establish common challenges, areas of deficiency in prevailing governance structures, and new best practices.

Results

Shared Governance Issues

Data Privacy

Over 70% of survey respondents identified data privacy as their primary concern. Cloud systems often store personal data, requiring strict compliance with laws such as GDPR and HIPAA.

Algorithmic Transparency

Interviewees pointed to a lack of transparency in the way AI algorithms work and produce outputs, making accountability more difficult.

Cross-Jurisdictional Compliance

Nearly 60% of organizations reported difficulties in managing data across borders due to inconsistent regulations.

Bias in AI Models

Specialists highlighted the potential of AI models to perpetuate social biases, especially in fields such as recruitment, banking, and law enforcement.

Best Practices and Emerging Solutions

Automated Compliance Tools

Solutions such as AWS Artifact and Microsoft Compliance Manager automate compliance with regulatory standards.

Data Localization Strategies

Data localization is being adopted by organizations to mitigate cross-border compliance challenges.

Explainable AI (XAI)

Methods such as SHAP (Shapley Additive Explanations) increase algorithmic transparency by giving straightforward explanations of AI choices.

Ethical AI Frameworks

Organizations are embracing ethical AI standards to make sure there is accountable AI use.

Conclusion

The implementation of AI within cloud environments has transformed data-driven decision-making but also brought with it formidable data governance issues. These range from data privacy, security, and compliance to algorithmic transparency and ethics. Solving these issues demands a multi-faceted response encompassing automated solutions, strong frameworks, and organizational dedication to ethical practice.Subsequent studies must prioritize building standardized models of governance that are tailored to the singular nuances of AI-powered cloud systems. Governments, industry players, and academia must join hands to ensure that these systems are safe, compliant, and ethical.