

Application and Challenge Analysis of Large Language Models in Government Document Management

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Abstract: As the global process of information technology advances, the role of document management in government operations becomes increasingly crucial. Governments generate vast amounts of documents, which pose significant challenges to traditional document management systems due to their growing volume and complexity. To address these challenges, the development of Artificial Intelligence (AI) technologies, especially Large Language Models (LLMs), has introduced new possibilities for improving the efficiency of government document management. LLMs models trained on large datasets are capable of understanding and generating text with a high degree of semantic understanding, making them valuable for automated document management, text categorization, information extraction, and natural language querying. This paper discuss the ways of traditional government document management and their limitations, focusing on the application of LLMs to government document management, emphasizing their potential to increase automation of document management, reduce human error, and improve the accuracy and efficiency of data processing. Also discussed the limitations of LLMs in government document management, such as bias in training data, potential errors in generated information, and challenges related to data privacy and legal compliance. LLMs offer powerful auxiliary functions in government document management, further research is needed to address these limitations and ensure responsible and effective use of this technology.

Keywords: Government document management; Large Language Models; Artificial Intelligence; Application; limitations.

1. Introduction

As the global process of information technology continues to advance and the functions of government agencies in various countries become increasingly digitised, the status and role of document management in government operations become more and more important. While carrying out their functions, government organisations generate a large number of documents, which cover a wide range of aspects such as project plans, policy documents, progress reports and final outcomes. Over time, the volume and complexity of documents have continued to increase, posing unprecedented challenges to traditional document management systems (Eom & Lee, 2022).

In the face of these challenges, the development of artificial intelligence (AI) technology in recent years has injected new vigor into the field of government document management. the rise of Large Language Modelling (LLM) has opened up new possibilities for solving many problems in document management. By training on large-scale datasets, large language models have mastered the complex syntactic structure and semantic relationships of language and are able to understand and generate text in depth (Mandvikar, 2023). This makes large language models show great potential in automated document management, text classification, information extraction and natural language query. Although significant progress has been made in document management in general domains, there is still relatively little research on the application of the Big Language Model to specific

domains, especially in the management of government project documents. Government project documents are usually highly specialised and complex, involving cross-cutting knowledge from multiple domains, and the requirements of document management are not only limited to classification and retrieval, but also include a wide range of requirements such as confidentiality, timeliness and compliance of information (Luitse & Denkena, 2021; Harrer, 2023). Therefore, how to effectively apply the powerful capabilities of large language models in government project document management has become an important direction of current research. This article will also focus on studying some specific applications of LLM in government document management.

2. Traditional Government Document Management Methods and Limitations

Traditional document management systems emphasise the life-cycle management of documents, i.e., the management of documents from their creation to their destruction. In traditional systems, the document life cycle is usually divided into four stages: creation, use, archiving and destruction. Each stage has a corresponding operation process and management requirements, document administrators need to follow the prescribed process of document management (Akbarieh et al., 2020). As shown in Figure 1 below, it is a life cycle flow chart of document management

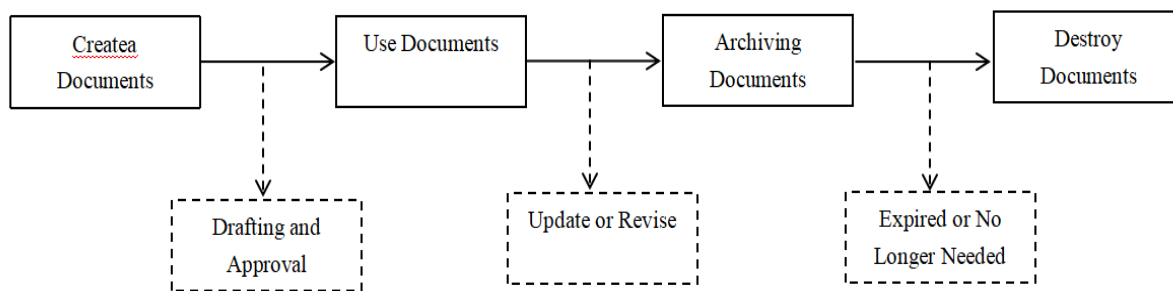


Figure 1. The life-cycle flowchart of Document management

Traditional government document management methods typically involve a series of paper or electronic record collection, classification, storage and retrieval. Traditional government document management is usually divided into paper document management and electronic document management.:

1. Paper Documents Management: The creation of documents is usually done through typewriters or by hand, and these documents are physically filed into folders and cabinets as they are generated.

File cabinets and archives: Government agencies usually have special file cabinets and archives to store paper documents.

Classification and indexing: Documents are classified by subject, date, type, etc., and indexed for easy search.

Security measures: In order to protect sensitive information, documents are usually stored in a secure environment and appropriate confidentiality measures are taken.

2. Electronic Documents Management: Electronic

Document Management System (EFMS): Government agencies may use an electronic document management system to store, manage, and retrieve electronic documents.

Digital Archives: Some government agencies may establish digital archives to digitize important paper documents for long-term preservation and online access.

Data backup and disaster recovery plan: Electronic documents need to be backed up regularly, and a corresponding disaster recovery plan should be formulated to prevent data loss.

Comply with relevant laws and regulations: Government document management needs to comply with privacy protection laws and data protection regulations, such as the «Privacy Law», «the Data Protection Law» etc.

Access control: Access to documents needs to have appropriate authority control to ensure that only authorized personnel can access sensitive information.

Table 1. Limitations of Traditional Government Document Management Methods

Date	Author	Research Content
2020 2021	Ghani et al. Elaturoti	Paper documents are susceptible to environmental factors, such as humidity, temperature, light, and insect infestation, leading to damage and corrosion.
2022	Elhussein et al.,Jiang et al	Manual management methods are difficult to cope with the diverse file formats and complex data structures in modern organisations, limiting the effectiveness of information management.
2023	Chandwani et al.	Index-based retrieval methods usually only support keyword matching for text documents, making it difficult to handle the content of non-text documents. This leads to the low utilisation of multimedia files and fails to play its role in information transfer and decision support.
2022	Alzoubi et al.	Traditional document management systems usually lack the support of automation tools, and document administrators need to complete each operational step manually, further increasing the complexity and tediousness of their work.
2024	Cuconasu et al	The content of paper documents is usually in the form of text, and traditional systems are unable to automate the processing and analysis of document content, making it difficult to achieve efficient retrieval and information use.

Overall, although traditional document management methods provide important support for the effective management and utilization of document resources by government agencies and other organizations, with the increase in the number of government documents, the diversity of document formats and the complexity of security management, problems have also emerged. Therefore, government agencies need to actively explore and introduce new document management technologies to improve the

efficiency and quality of information management and ensure the security and effective utilization of document resources.

3. Application of Large Language Models in Government Document Management

With the rapid development of information technology, large language models (LLMs) are increasingly used in

various fields, and LLM technology has gradually shown great potential in document management. Traditional document management systems are often overwhelmed by massive data and complex management requirements, while LLM technology has brought new revolutions to this field. Advances in LLMs in the field of Natural Language Processing (NLP) have made it possible for computers to not only understand human language, but also to generate textual

content with a high degree of semantic understanding. This capability makes it possible to apply LLMs in document management, especially in automatic classification of documents, information retrieval, content generation and data analysis. There are significant differences between traditional document management methods and document management methods based on NLP technology, as shown in Table 2.

Table 2. Traditional methods Compare with LLM.

Feature	Traditional methods	LLMs
Context Understanding	Minimal	Extensive
Adaptability	Low	High
Setup Time	Long (rule development)	Short (minimal configuration)
Handling Variability	Poor	Excellent
Accuracy with Complex Data	Inconsistent	High
Scalability	Limited	Scalable across multiple document types

This section will discuss LLM technologies in government document management and their corresponding practical application cases.

A national tax bureau is faced with an increasing number of tax return documents and financial reports, and the traditional manual review and classification methods can no longer cope with the huge amount of data. In response, the department introduced an intelligent document management system based on natural language processing (NLP) and machine learning (Overesch & Wolff, 2021). The system is able to automatically categorise tax returns, extract key data and identify possible anomalies or errors. This automated processing greatly improves efficiency, reduces the burden of manual review, and significantly reduces the incidence of human error. In addition, the system is able to optimise the accuracy of classification and identification over time through machine learning algorithms (Basri et al., 2021). Over time, the system's performance has become more accurate, further improving the overall efficiency of the department.

In recent years, large-scale decision making (LSDM) has become an emerging and rapidly developing research field. Professor Ding (Ding et al., 2020) proposed that LLMs can help process and integrate data from different channels, such as text data, social media data, expert opinions, etc. so as to provide the government with more comprehensive and accurate decision-making basis. At the same time, when dealing with uncertainty and ambiguity in LSDM, LLMs can help better express and process the opinions and preferences of decision makers through in-depth understanding and analysis of language. For example, through NLP technology, useful information and knowledge can be extracted from large amounts of text data. The government can use these technologies to analyze policy documents, news reports, research reports, etc. to obtain more comprehensive decision support information. Using the pattern recognition capabilities of LLMs, the government can discover potential laws and trends from historical data and text information, and provide predictions and references for future decisions.

With the continuous growth of legal data in the legal industry, the demand for timely and accurate decision-making, and the desire for higher efficiency, the legal industry is constantly exploring the potential and application of AI technology in this area, such as recommendation systems. Chen (Chen & Rodriguez, 2024) proposed that NLP is a core component of legal recommendation systems, enabling the system to understand and extract meaningful

information from unstructured text in legal documents, case laws, and other legal sources. NLP techniques, such as text classification, named entity recognition, and sentiment analysis, enable legal recommendation systems to understand the nuances and context of legal language, thereby providing more accurate and relevant recommendations. For example, NLP-driven legal recommendation systems can analyze the language and structure of legal contracts to identify key terms, obligations, and potential risks. By understanding semantic relationships and domain-specific terminology, these systems can generate personalized recommendations for contract review, negotiation, and risk mitigation [9,10].

In summary, the application of large language models in government document management can greatly improve the level of automation in government work, reduce human errors, improve the accuracy and efficiency of data processing, and ensure the compliance and security of document management. With the continuous advancement of technology, these applications will become more intelligent and efficient.

4. Limitations of LLMs in Government Document Management

Although LLMs have great potential in government document management applications, but they also have some limitations. LLMs are trained on large amounts of data, which is often generated by humans, they may contain human biases. The model may amplify or replicate the discrimination and bias in the training data, resulting in biased results (Bubeck et al., 2023). LLMs may generate erroneous information, such as errors in mathematics, programming, attribution, and high-level concepts, which may appear reasonable or consistent with real inferences without careful examination and fact-checking, therefore, it is difficult to identify. In the process of generating artificial intelligence models, a large amount of data needs to be collected, processed and analyzed. If the data is not handled properly, it may lead to privacy leakage, abuse of sensitive information and the spread of training data bias. (Fui-Hoon Nah et al., 2023). Content generated by AI may directly or indirectly infringe copyright. It's a challenge for governments to ensure that the use of AI complies with laws, regulations and ethical standards (Taeihagh et al., 2021). Government workers need to master the principle of prompt engineering when using models, that is, designing inputs to generate valuable outputs. The ambiguity of human language can lead to errors or misunderstandings in human-

computer interaction, so the quality of prompts is crucial(Liu and Chilton, 2021).

5. Conclusion

LLMs can provide powerful auxiliary functions in government document management, helping government workers improve work efficiency, reduce work intensity, and improve the quality and efficiency of government services. Of course, there are many limitations in practical applications. In the future, we will further explore the use of LLMs technology to help the government improve document management efficiency while protecting data privacy and legal compliance.

References

- [1] Eom, S. J., & Lee, J. (2022). Digital government transformation in turbulent times: Responses, challenges, and future direction. *Government Information Quarterly*, 39(2), 101690.
- [2] Mandvikar, S. (2023). Augmenting intelligent document processing (idp) workflows with contemporary large language models (llms). *International Journal of Computer Trends and Technology*, 71(10), 80-91.
- [3] Luitse, D., & Denkena, W. (2021). The great transformer: Examining the role of large language models in the political economy of AI. *Big Data & Society*, 8(2), 205395172111047734.
- [4] Akbarieh, A., Jayasinghe, L. B., Waldmann, D., & Teferle, F. N. (2020). BIM-based end-of-lifecycle decision making and digital deconstruction: Literature review. *Sustainability*, 12(7), 2670.
- [5] Overesch, M., & Wolff, H. (2021). Financial transparency to the rescue: Effects of public Country-by-Country Reporting in the European Union banking sector on tax Avoidance. *Contemporary accounting research*, 38(3), 1616-1642.
- [6] Basri, M. C., Felix, M., Hanna, R., & Olken, B. A. (2021). Tax administration versus tax rates: evidence from corporate taxation in Indonesia. *American Economic Review*, 111(12), 3827-3871.
- [7] Ding, R. X., Palomares, I., Wang, X., Yang, G. R., Liu, B., Dong, Y., ... & Herrera, F. (2020). Large-Scale decision-making: Characterization, taxonomy, challenges and future directions from an Artificial Intelligence and applications perspective. *Information fusion*, 59, 84-102.
- [8] Chen, S., & Rodriguez, M. (2024). LEGAL RECOMMENDATION SYSTEMS: APPLICATIONS, TECHNOLOGIES, AND FUTURE DIRECTIONS IN THE DIGITAL AGE.
- [9] Wang, X., Wu, Y. C., Zhou, M., & Fu, H. (2024). Beyond surveillance: privacy, ethics, and regulations in face recognition technology. *Frontiers in big data*, 7, 1337465.
- [10] Chen, X., Liu, M., Niu, Y., Wang, X., & Wu, Y. C. (2024). Deep-Learning-Based Lithium Battery Defect Detection via Cross-Domain Generalization. *IEEE Access*.
- [11] Bubeck, S., Chandrasekaran, V., Eldan, R., Gehrke, J., Horvitz, E., Kamar, E., ... & Zhang, Y. (2023). Sparks of artificial general intelligence: Early experiments with gpt-4. *arXiv preprint arXiv:2303.12712*.
- [12] Fui-Hoon Nah, F., Zheng, R., Cai, J., Siau, K., & Chen, L. (2023). Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. *Journal of Information Technology Case and Application Research*, 25(3), 277-304.
- [13] Taeihagh, A., Ramesh, M., & Howlett, M. (2021). Assessing the regulatory challenges of emerging disruptive technologies. *Regulation & Governance*, 15(4), 1009-1019.
- [14] Liu, V., & Chilton, L. B. (2022, April). Design guidelines for prompt engineering text-to-image generative models. In *Proceedings of the 2022 CHI conference on human factors in computing systems* (pp. 1-23).