Study of Various Digital Document System Using Artificial Intelligence.

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Abstract— In today's digital age, document management has become an essential aspect of various industries, including healthcare, finance, and government. The traditional paper-based document system has several limitations, such as physical storage constraints, difficulty in searching and retrieving documents, and susceptibility to damage or loss. Digital Document Systems (DDS) have emerged as a solution to these limitations, offering efficient storage, search, and retrieval capabilities. Artificial Intelligence (AI) has the potential to revolutionize DDS by enhancing their capabilities and improving document management processes. AI-powered DDS can automate document classification, extraction, and summarization, enabling efficient decision-making and improving productivity.

I. INTRODUCTION

In today's digital age, document management has become an essential aspect of various industries, including healthcare, finance, and government. The traditional paper-based document system has several limitations, such as physical storage constraints, difficulty in searching and retrieving documents, and susceptibility to damage or loss. Digital Document Systems (DDS) have emerged as a solution to these limitations, offering efficient storage, search, and retrieval capabilities. Artificial Intelligence (AI) has the potential to revolutionize DDS by enhancing their capabilities and improving document management processes. AI-powered DDS can automate document classification, extraction, and summarization, enabling efficient decision-making and improving productivity.

This study aims to explore various Digital Document Systems using Artificial Intelligence, focusing on:

1.Document classification and categorization

2. Document extraction and summarization

3. Document search and retrieval

4. Document security and authentication

5. AI-powered document analytics and insights

The study will investigate the applications, benefits, and challenges of AI in DDS, highlighting its potential to transform document management in various industries.

- Definition: Digital document systems (DDS) are software solutions designed to manage, store, retrieve, and process digital documents.

- Purpose: Enhance efficiency, reduce paper usage, and improve accessibility and security of documents.

Key Components of Digital Document Systems

- Document Management Systems (DMS): Systems for storing, organizing, and tracking digital documents.

- Content Management Systems (CMS): Platforms for managing digital content creation and distribution.

- Enterprise Content Management (ECM): Comprehensive solutions integrating DMS, CMS, and other tools for managing an organization's documents and content.

- Electronic Document Management Systems (EDMS): Focus on electronic versions of documents, including workflows and version control.

Digital document generator methods include:

1. Template-based generation:

Template-based document generation is a method used to create digital documents by populating predefined templates with specific data. This approach is widely used in various industries for generating consistent and professional documents efficiently. Here's an in-depth explanation of the template-based document generation method:

Definition:

Template-based document generation involves using predefined document structures, known as templates, which contain placeholders for dynamic data. These

placeholders are filled with specific data values to produce customized documents.

Purpose:

- Efficiency: Speeds up the document creation process.
- Consistency: Ensures uniformity in document format and style.
- Automation: Reduces manual errors and effort in document preparation.

2. Data-driven generation:

Data-driven document generation refers to the automated creation of documents based on structured data inputs. This method relies on data sources such as databases, APIs, spreadsheets, or other data repositories to populate templates and generate customized documents. Here's a detailed explanation of the data-driven document generation process:

Definition:

Data-driven document generation involves the automatic creation of documents by merging structured data with predefined templates. The process dynamically inserts data into specific placeholders within the templates to produce personalized and consistent documents.

Purpose:

- Automation: Eliminates manual document creation, reducing time and effort.
- Consistency: Ensures uniformity in document format and style.
- Scalability: Easily generates large volumes of documents.
- Customization: Produces tailored documents based on specific data inputs

3. Natural Language Generation (NLG):

Natural Language Generation (NLG) is a subfield of artificial intelligence (AI) focused on automatically generating human-like text from structured data. NLG is particularly useful in document generation, where it can produce detailed, coherent, and contextually relevant content based on data inputs. Here's an in-depth look at NLG for document generation:
Definition:

NLG involves creating text that is indistinguishable from human-written text using algorithms and models. For document generation, NLG systems convert structured data into narrative text, enabling the automatic creation of reports, summaries, and other written content.

Purpose:

- Automation: Eliminates the need for manual writing, saving time and effort.
- Scalability: Generates large volumes of documents quickly and efficiently.
- Customization: Produces personalized and contextually relevant content based on specific data inputs.
- Consistency: Ensures uniformity in language and style across documents

4. Machine Learning (ML) based generation:

Machine Learning (ML) based personal document generation leverages ML algorithms to create personalized documents tailored to individual needs and preferences. This approach utilizes data about the user and applies ML models to generate documents that are customized in content, style, and structure. Here's a detailed look at ML-based personal document generation:

Definition:

ML-based personal document generation involves using machine learning techniques to create documents that are tailored to individual users based on their specific data and preferences.

Purpose:

- Personalization: Provides highly customized content based on user data.
- Automation: Streamlines the document creation process by reducing manual effort.
- Scalability: Efficiently generates personalized documents for a large number of users.

Procedure AI algorithms for document creation include:

1. Transformers
2. Recurrent Neural Networks (RNNs)
3. Long Short-Term Memory (LSTM) networks
4. Generative Adversarial Networks (GANs)

5. Autoencoders
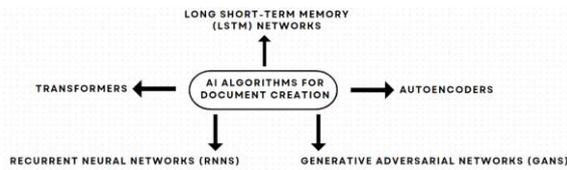
1. Transformers:

Transformers are a type of neural network architecture introduced in 2017 by Vaswani et al. They're primarily used for natural language processing tasks, such as language translation, text generation, and question answering. Transformers replace traditional recurrent neural networks (RNNs) and convolutional neural networks (CNNs) with self-attention mechanisms, allowing for parallelization and more efficient processing.

2. Recurrent Neural Networks (RNNs):

RNNs are a type of neural network designed to handle sequential data, such as time series data or natural language processing tasks. They have a feedback loop that allows information from previous time steps to influence the current step, allowing the network to capture temporal relationships. However, RNNs suffer from vanishing gradients and exploding gradients, making training difficult.

3. Long Short-Term Memory (LSTM) networks:

LSTMs are a type of RNN designed to address the vanishing gradient problem. They introduce memory cells and gates (input, output, and forget gates) to selectively retain and forget information, allowing the network to learn long-term dependencies. LSTMs are widely used in speech recognition, language modeling, and time series forecasting.

4. Generative Adversarial Networks (GANs):

GANs are a type of neural network that consists of two components: a generator and a discriminator. The generator creates samples (e.g., images or text) while the discriminator evaluates the generated samples and tells the generator whether they're realistic or not. Through training, the generator improves, generating more realistic samples, and the discriminator becomes more skilled at distinguishing real from fake samples. GANs are used in image generation, data augmentation, and style transfer.

5. Autoencoders:

Autoencoders are neural networks that learn to compress and reconstruct data. They consist of an encoder (which maps input data to a lower-dimensional representation) and a decoder (which maps the lower-dimensional representation back to the original data). Autoencoders are used for dimensionality reduction, anomaly detection, and generative modeling. Variants include variational autoencoders (VAEs) and denoising autoencoders.

These neural network architectures have revolutionized various fields, including natural language processing, computer vision, and generative modeling.

SCOPE OF WORK

1. Document Management:
- Design a document management system to store, retrieve, and manage digital documents.
- Implement version control, access controls, and search functionality.

2. Artificial Intelligence Integration:
- Develop AI algorithms for document analysis, extraction, and summarization.
- Integrate AI-powered tools for document classification, clustering, and recommendation.

3. Automation and Workflow:
- Automate document workflows, approvals, and notifications.
- Develop custom workflows based on organizational requirements.

LITERATURE REVIEW

In the year 2022, AigerimYerimbetova [1] discuss the However, every year a very large volume of documents with a regulated time of their processing is processed in public authorities, and the quality and efficiency of document interactions largely determine the efficiency and effectiveness of public authorities. As e-government develops, the number of requests processed can reach several thousand per day. At the same time, processes in government structures are typified, as are documents, so the application of intelligent algorithms will be more effective than in a structure with a complex and unique organizational structure. Machine learning can speed up document processing, prepare all the data necessary for human decision-making and also prevent human error. The history of document management goes back to the end of the nineteenth century with the invention of the filing

cabinet. In 1898, Edwin Granville Seibel's developed a vertical filing system in which paper documents are organized in boxes placed in folded cabinets. These cabinets would remain the primary method of document storage in the business world for most of the twentieth century [2]

In the year 2022, Yun-Chien [3] develop a neural multi-document summarization model, named MuD2H (refers to Multi-Document to Headline) to generate an attractive and customized headline from a set of product descriptions. To the best of our knowledge, no one has used a technique for multi-document summarization to generate headlines in the past. Therefore, multi-document headline generation can be considered new problem setting. Our model implements a two-stage architecture, including an extractive stage and an abstractive stage. The extractive stage is a graph-based model that identified salient sentences, whereas the abstractive stage uses existing summaries as soft templates to guild the seq to seq model. A series of experiments are conducted by using KKday dataset. Experimental results show that the proposed method outperforms the others in terms of quantitative and qualitative aspects.

In the year 2023, Prof. VelvizhiRamya R[4] AI-based template generators are powerful tools that utilize artificial intelligence algorithms to create a wide range of templates for various purposes. These generators are designed to automate the process of template creation, saving time and effort for users.AI-based template generators leverage the capabilities of machine learning and natural language processing to analyze and understand patterns within existing templates or example content. They then generate new templates based on this analysis, ensuring that the output templates are both relevant and consistent. These tools can be used in numerous domains and industries. For example, in the field of graphic design, AI-based template generators can create templates for brochures, flyers, social media posts, or presentations. In content creation, they can assist in generating article outlines, blog post structures, or email templates. They can also be utilized in fields such as legal documentation, resumes, and business proposals, among others.

In the year 2023, Joris Baan[5] Natural Language Generation (NLG) has long been one of the ultimate goals of artificial intelligence, exemplified by the Turing test (Turing, 1950) and systems such as ELIZA (Weizenbaum, 1966) and Watson (High, 2012). It includes a vast number of applications like translation, summarisation, question answering, story telling and image captioning. Recently, NLG systems are gaining traction as general purpose interfaces through which users can interact with any application using natural language (e.g., Google's Bard). Their widespread use makes it increasingly important to build NLG systems that are trustworthy and representative of the diversity of its users (Bhatt et al., 2021 [6]; Jacovi et al.[7], 2021; Liao and Vaughan, 2023 [8]).

In the year 2022, Tianyang Lin [9] Transformers have achieved great success in many artificial intelligence fields, such as natural language processing, computer vision, and audio processing. Therefore, it is natural to attract lots of interest from academic and industry researchers. Up to the present, a great variety of Transformer variants (a.k.a. X-formers) have been proposed, however, a systematic and comprehensive literature review on these Transformer variants is still missing. In this survey, we provide a comprehensive review of various X-formers. We first briefly introduce the vanilla Transformer and then propose a new taxonomy of X-formers. Next, we introduce the various X-formers from three perspectives: architectural modification, pre-training, and applications. Finally, we outline some potential directions for future research.

In the year 2022, Tianyang Lin [10] A new technique for producing hash values for text documents is introduced in this report. The method uses Recurrent Neural Networks (RNN). RNNs are functionally and temporally dependent on the input vectors of the neural networks (RNN). RNN 's capacity to integrate current values of inputs with previous values that manipulate the associations and the semanticists of the document constitutes a competitive framework for discovering internal interpretations of document details in a special way. In contrast to conventional approaches, two forms of RNNs are evaluated. Current approaches have been adequately examined and the effects of this study reveal the applicability of this artificial intelligence model to construct hash values for plain text. RNNs are very lightweight , portable and parallel in nature and their abilities are used as a potential professional document hashing technology is presented in this article.

In the year 2021, Tianyang Lin [11] Generative Adversarial Networks (GANs) is a novel class of deep generative models that has recently gained significant

attention. GANs learn complex and high-dimensional distributions implicitly over images, audio, and data. However, there exist major challenges in training of GANs, i.e., mode collapse, non-convergence, and instability, due to inappropriate design of network architecture, use of objective function, and selection of optimization algorithm. Recently, to address these challenges, several solutions for better design and optimization of GANs have been investigated based on techniques of re-engineered network architectures, new objective functions, and alternative optimization algorithms. To the best of our knowledge, there is no existing survey that has particularly focused on the broad and systematic developments of these solutions. In this study, we perform a comprehensive survey of the advancements in GANs design and optimization solutions proposed to handle GANs challenges. We first identify key research issues within each design and optimization technique and then propose a new taxonomy to structure solutions by key research issues. In accordance with the taxonomy, we provide a detailed discussion on different GANs variants proposed within each solution and their relationships. Finally, based on the insights gained, we present promising research directions in this rapidly growing field.

Expected Outcome

The outcomes of Digital Document Systems using Artificial Intelligence (AI) are numerous and significant, transforming the way organizations manage and utilize documents. Some of the outcomes include:

1. Improved Document Management: AI-powered document management systems enable efficient storage, retrieval, and search capabilities.
2. Automated Document Processing: AI automates document processing tasks, such as data extraction, classification, and summarization.
3. Enhanced Document Security: AI-based security features ensure document confidentiality, integrity, and availability.
4. Intelligent Document Analysis: AI algorithms analyze documents to extract insights, patterns, and relationships.
5. Smart Document Retrieval: AI-powered search engines retrieve relevant documents based on context and content.
6. Automated Document Generation: AI generates documents, such as reports, contracts, and invoices, with minimal human intervention.

CONCLUSION

In this Research identifying the problem, method, analysis of information and study to various digital document method.The development of a Secure Digital Personal Document Generation and Fingerprint Security System using Artificial Intelligence has achieved significant milestones in its first research progress phase. The integration of AI and fingerprint recognition technology has shown promising results in ensuring the security and authenticity of digital personal documents.The research finding the gap of document sector and collecting the information.The proposed system has the potential to transform the way personal documents are generated, stored, and secured. It offers a secure, efficient, and scalable solution for various applications, including identity verification, border control, financial services, and healthcare.

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