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Review on Automated PPT Generation from Textbook Content

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Abstract:

This article presents a framework that combines automated text overviews with human input. This combines an extractive and abstract method for creating coherent and informative summaries. The core of the approach involves a modified trance model that incorporates a pointer generator layer, which integrates word frequency data into an attention mechanism. This enhancement enables models to be more easily recognized and emphasized, although frequently disregarded in conventional summary systems. To enhance content selection, the method employs extractive preprocessing. This technique enables you. To document significant details from lengthy documents that are sealed. Incorporating extraction. Strategies ensures that the abstract model prioritizes the most important aspects of the text, resulting in. A more detailed summary. The findings validate that the combination of word frequency with. Extraction and abstraction significantly improve the relevance, consistency, and informational value of the produced abstracts.

Keywords — **Automated PPT Generation, Text Summarization, Extractive Summarization, Abstractive Summarization, Natural Language Processing (NLP), Transformer Models, GPT-2, BART, Pointer-Generator Mechanism, Frequency-Aware Attention, Topic Modeling (LDA), Key Point Extraction, Sentence Reordering (orderBERT), Graph-Based Methods, TextRank, Dependency-Based Noun Phrases, Evaluation Metrics, ROUGE Scores, Human Evaluation, Unsupervised Summarization, Hybrid Models, Slide Mapping & Formatting, Rare Words in Summarization, Coherence and Relevance**

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I. INTRODUCTION

As the need for fast and scalable ways to handle large amounts of text has increased, researchers have

created different methods that combine natural language processing (NLP) and deep learning. One method combines topic modeling , extractive and abstractive summarization, and transformer models like gpt-2 to automatically create editable presentation slides from raw text or pdf documents. This pipeline incorporates various techniques, including text rank, sentence segmentation, and key point extraction, to efficiently transform content into a well-organized slide format. One approach tackles the problem of rare but significant words being disregarded in conventional summarization models. By integrating a pointer-generator mechanism and frequency-aware attention into transformer architectures, this approach improves the representation of less common but crucial terms, particularly in longer documents. An unsupervised framework diverges from the traditional approach by emphasizing dependency-based noun phrase extraction and constructing phrase-level graphs. This approach minimizes the focus on frequently used words and utilizes a sentence reordering model to enhance coherence, without the need for labeled training data. A broader overview of deep learning-based summarization models highlights the evolution from traditional RNN based encoder decoder architectures to more powerful transformer-based systems, emphasizing attention mechanisms, common challenges such as repetition and hallucination, and the importance of datasets and evaluation metrics like rouge. Furthermore, another category of summarization techniques classifies them into structural and semantic models, promoting hybrid and transformer-driven approaches while highlighting the shortcomings of existing evaluation standards and the necessity for more semantically aligned metrics. Together, these approaches demonstrate the transition towards summarization systems that are more context-aware, coherent, and automated.

II. LITERATURE SURVEY

A. Automated PowerPoint Generation Using NLP Techniques(2023)

This paper presents a system designed to automate the creation of presentation slides from raw text or PDF files using natural language processing techniques. The method begins with text segmentation based on topic modeling (e.g., LDA) and groups sentences into coherent segments. These segments are then summarized, and key points are extracted for slide content. Title generation is achieved using transformer-based models like GPT-2, and all components are compiled into slide templates. For PDFs, existing structure is leveraged, while for plain text, a more detailed segmentation and summarization pipeline is applied. The presentation is finally generated using Google Apps Script to export the output as an editable .pptx file. This work addresses the time-consuming process of manual slide creation and offers a scalable solution for academic and business use[1].

B. Rare Words in Text Summarization(Natural Language Processing Journal,2023)

This research addresses a notable challenge in text summarization: the inadequate attention given to rare or infrequently used words, which often carry important meaning. The authors propose a modification to the transformer-based summarization model by introducing a pointer-generator mechanism that integrates word frequency information into the attention layer. This enables the model to better prioritize rare terms during summarization. The approach is hybrid—extractive techniques are used to pre-select important content, which is then passed to an abstractive model for summary generation. Experiments conducted on four benchmark datasets (CNN/DailyMail, XSum, Gigaword, DUC-2004) demonstrated that their model outperformed existing baselines in ROUGE metrics. The model also proved effective in domain transfer situations where training and test data had different word distributions.[2]

C. Unsupervised Text Summarization Using Dependency-Based Noun Phrases and order BERT(ROCYLING 2022)

This paper proposes a novel unsupervised extractive summarization framework that

constructs a phrase-level graph based on dependency-based noun phrases. Traditional graph-based summarization methods often overvalue sentences with common or function words, leading to suboptimal summaries. To overcome this, the proposed method focuses on noun phrases to represent key concepts and initializes edge weights using term frequency-inverse document frequency (TF-IDF). The most salient sentences are extracted using importance scores from this graph. Furthermore, the authors introduce orderBERT, a sentence reordering module that improves summary coherence by arranging selected sentences based on contextual flow. The method was evaluated using ROUGE scores and human judgment, outperforming standard unsupervised approaches in both semantic relevance and coherence[3].

D. *Deep Learning Based Abstractive Text Summarization: Approaches , Datasets , Evaluation Measures and Challenges(2020)*

This paper provides a comprehensive survey of deep learning-based approaches to abstractive text summarization. It categorizes models into sequence-to-sequence architectures using RNNs, LSTMs, GRUs, and transformers. The review also covers important datasets like CNN/DailyMail and Gigaword and discusses evaluation metrics such as ROUGE-1, ROUGE-2, and ROUGE-L. The authors analyze several model architectures and training techniques while identifying persistent challenges, including out-of-vocabulary (OOV) words, repeated phrases, and hallucinated (inaccurate) information in generated summaries. The survey concludes that while pretrained models and attention mechanisms have significantly improved summarization quality, issues like coherence and factual consistency still need better solutions[4].

E. *Comprehensive Review of Abstractive Summarization Techniques (2020)*

This review paper focuses on recent developments in abstractive text summarization and provides a classification of methods based on architecture and learning paradigms. It highlights the transition from traditional RNN-based models to more efficient and scalable transformer-based architectures. The review compares structured summarization approaches (e.g., rule-based, template-driven) with semantic-based ones (e.g., graph-based, multimodal models), examining how they encode meaning and context. It also discusses widely-used datasets and metrics, emphasizing that ROUGE remains the primary evaluation standard. Key challenges outlined include ensuring semantic relevance, minimizing redundancy, and generating coherent and factually accurate summaries. The paper underlines the growing importance of hybrid models and transfer learning in achieving state-of-the-art results[5].

Table 1: Summary of Reviewed Text Summarization Techniques

Ref	Year	Objective	Advantages	Disadvantages
[1]	2023	To automate slide creation from raw text or PDFs using NLP tools.	1. Reduces manual effort 2. Generates editable slides 3. Integrates summarization, title generation, and segmentation	1. Lacks standard evaluation metrics 2. Limited generalization to complex inputs
[2]	2023	Proposes a pipeline using TextRank, GPT-2, and LDA to extract and summarize content for slide formatting.	1. Improved content coverage 2. Better ROUGE performance 3. Robust to domain shifts	1. Computational complexity 2. Attention mechanism adjustments required
[3]	2022	Develops a model to generate coherent summaries using noun phrases and OrderBERT without prior training.	1. No training data required 2. Enhances textual coherence 3. High semantic relevance	1. Abstract result representation 2. May miss subtle meanings
[4]	2020	Analyzes deep learning-based abstractive summarization methods, datasets, and evaluation metrics.	1. Covers RNN, LSTM, and Transformer models 2. Highlights dataset usage 3. Evaluates using standard metrics	1. No novel model proposed 2. Largely theoretical analysis
[5]	2020	Reviews and categorizes various abstractive summarization architectures.	1. Emphasizes Transformer-based models 2. Discusses hybrid/semantic approaches 3. Identifies evaluation gaps	1. Lacks experimental validation 2. General observations only

III. DATASET

Text research is usually carried out by several well-known data sets used for text analysis. CNN/ dailymail and xsum are two popular sentences and a common one sentence. Gigaword supports headline

and headline design, and making slides is a breeze. To compare the total quality of the items, the DUC-2004 Rouge Metrics is used. In addition, text files, not users, are used to indicate integrated production without a preliminary mark in the case of uncontrollable methods. This data set supports all aspects of the configuration and evaluation of the integration and production presentation device

Paper Title	Model Type	Algorithms / Techniques Used
Automated PowerPoint Generation using NLP Techniques (2023)	Pipeline-based NLP System	- TextRank (summarization) - GPT-2 (title generation) - LDA (topic modeling)
Rare Words in Text Summarization (2023)	Transformer with Pointer-Generator	- Modified Transformer - Pointer-Generator mechanism - Frequency-aware attention
Unsupervised Summarization using Noun Phrases & orderBERT (2022)	Graph-based Extractive Model + BERT	- Dependency-based Noun Phrase Gra - TF-IDF (edge weights) - orderBERT (reorderings)
Deep Learning Based Abstractive Summarization (2020)	Various Deep Learning Models	- RNN. LSTM, GRU, Transformer - Attention Mechanism - Encoder-Decoder Architecture
Comprehensive Review of Abstractive Summarization Techniques (2020)	Survey of Multiple Architectures	- Transformer - Semantic-based & structured approa- - ches) hybrid & multimodal models

TABLE.2 Algorithms/Techniques used in the papers

IV. METHODOLOGY

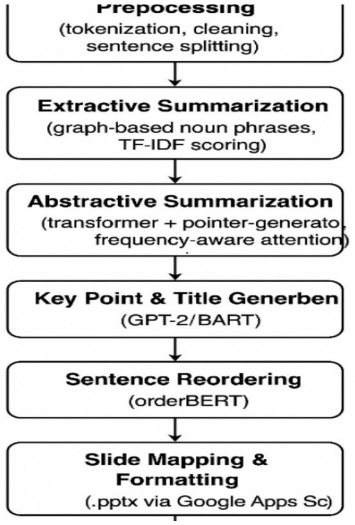

Fig. 1 Steps involved in PPT generation

1.Preprocessing:

The introductory step within the pipeline is preprocessing, which plans crude input content for encourage investigation. This includes a few sub-processes, counting tokenization, where the content is broken down into littler units such as words or sentences. Cleaning methods are at that point connected to evacuate clamor such as accentuation, halt words, or insignificant images. At long last, sentence part is performed to structure the content into coherent units that can be handled separately. This step guarantees the input is normalized and linguistically prepared for consequent summarization errands.

2.Extractive Summarization:

Following preprocessing, extractive summarization is utilized to recognize and hold the foremost imperative segments of the content. Usually ordinarily accomplished through graph-based strategies that center on thing expressions, speaking to key concepts within the record. Each phrase or sentence is scored utilizing term frequency-inverse document recurrence (TF-IDF) to measure its significance. The foremost instructive sentences are at that point selected to create the premise of the outline. This strategy guarantees that real and important substance is protected from the first input.

3.Abstractive Summarization:

To progress meaningfulness and diminish repetition, the extractive yield is encourage refined through abstractive summarization. In this arrange, transformer-based models such as BART or GPT variations are utilized to produce unused, brief sentences that capture the center meaning of the first content. Upgrades like pointer-generator systems are consolidated to handle uncommon or out-of-vocabulary words more viably. Frequency-aware consideration components are too utilized to guarantee that occasional but noteworthy terms are emphasized, creating rundowns that are both exact and familiar.

4.Key Point and Title Generation:

Once the center substance is summarized, the following step includes creating slide titles and bullet focuses that are reasonable for introduction. Transformer-based dialect models such as GPT-2 or BART are utilized to form expressive titles and highlight key focuses. These models are fine-tuned to create coherent and relevantly suitable features that adjust with the summarized substance. This

guarantees that each slide starts with a solid title and incorporates fundamental focuses for superior gathering of people comprehension.

5.Sentence Reordering:

To keep up a coherent stream and story consistency, sentence reordering is carried out utilizing models like orderBERT. This component is basic in organizing the substance in a way that mirrors human thinking and narrating. By analyzing the relevant conditions between sentences, orderBERT organizes them in an arrange that improves coherence and coherence. This step is especially valuable when the extricated and produced substance is divided or out of consistent arrangement.

6.Slide Mapping and Formatting:

The last organize includes mapping the handled printed substance onto slide formats and organizing it fittingly. This is often executed utilizing Google Apps Script, which programmatically creates PowerPoint (.pptx) records. The framework coordinating titles, bullet focuses, and visual formats into editable slides, making the yield user-friendly and presentation-ready. This robotization altogether diminishes the manual workload included in making organized and outwardly engaging introduction decks.

V. *OUTCOMES OF THE REVIEWED PAPER*

The five papers under review present diverse yet impactful advancements in text summarization and automated presentation generation, each with unique results demonstrating the effectiveness of their proposed methodologies. In the paper Automated PowerPoint Generation Using NLP Techniques, the authors successfully developed a system that converts raw text or PDF documents into editable PowerPoint slides. Although the study did not report numerical performance metrics like ROUGE scores, it emphasized the practical success of the system in reducing manual effort and time. The generated slides were found to be coherent, logically structured, and editable, making the system suitable for educational and business contexts.

In contrast, the paper on Rare Words in Text Summarization provided strong empirical evidence of its effectiveness. By integrating a frequency-aware attention mechanism within a pointer-generator transformer model, the authors were able to improve the model's ability to recognize and emphasize rare but important words. Their hybrid approach combining extractive and abstractive techniques was evaluated across four datasets—CNN/DailyMail, XSum, Gigaword, and DUC-2004—achieving superior ROUGE scores: ROUGE-1 of 38.22, ROUGE-2 of 15.07, and ROUGE-L of 35.79. The model consistently outperformed three baseline models and proved robust across datasets with varying word distributions.

The third paper, Unsupervised Text Summarization Using Dependency-Based Noun Phrases and orderBERT, also reported significant improvements. Without relying on labeled training data, the authors proposed a phrase-level graph and a sentence reordering mechanism (orderBERT) that enhanced summary coherence and relevance. Their method outperformed traditional extractive models like TextRank in both ROUGE-based evaluations and human assessments. Notably, the inclusion of orderBERT led to a 9% improvement in perceived coherence during human evaluation tasks.

Lastly, the Comprehensive Review of Abstractive Summarization Techniques provided a consolidated analysis of previous research outcomes. While it did not introduce new models or perform experiments, it summarized and compared existing techniques, concluding that transformer-based models consistently outperform traditional methods in fluency, coherence, and informativeness. It emphasized the growing importance of hybrid architectures and highlighted the need for new evaluation strategies beyond ROUGE, especially to assess semantic and factual accuracy.

VI. CONCLUSION

The reviewed papers collectively emphasize the growing importance of automatic text summarization and presentation generation in addressing the challenges posed by the overwhelming volume of digital information. The

paper on Automated PowerPoint Generation using NLP Techniques concludes that integrating natural language processing tools such as summarization, key point extraction, and title generation can significantly reduce manual effort in creating structured and informative presentations. It demonstrates the feasibility of using such systems in academic and professional settings

The study on Rare Words in Text Summarization highlights the limitations of traditional transformer models in capturing infrequent but semantically important words. By incorporating word frequency into the attention mechanism and applying a hybrid summarization framework, the proposed model significantly improves summary quality. The conclusion stresses that focusing on rare words and combining extractive and abstractive methods is key to enhancing performance, especially for long-form content.

In the Unsupervised Summarization using Noun Phrases and orderBERT, the authors conclude that their method, which relies on dependency-based noun phrase graphs and contextual reordering, can effectively summarize texts without requiring annotated data. The results show that the generated summaries are both coherent and relevant, suggesting that grammar-aware, unsupervised techniques can rival supervised models in specific contexts.

The paper on Deep Learning-Based Abstractive Summarization concludes that while encoder-decoder architectures and attention mechanisms have brought major improvements in summary generation, challenges such as out-of-vocabulary words, sentence repetition, and factual inaccuracies remain. The authors suggest that future research should focus on enhancing semantic understanding, contextual reasoning, and leveraging pretrained models for better generalization across domains.

REFERENCES

[1] Automated Power Point Generation using Natural Language Processing Techniques Sebin Thomas, V. G. John, Josin Chacko, Mariyam Shajahan, Sharon Sunny 2023 9th International Conference on Smart Computing and Communications (ICSCC). 0 Citations, 10 References

[2] Rare words in text summarization Danila Morozovskii, S. Ramanna Natural Language Processing Journal 2023.

[3] Unsupervised Text Summarization of Long Documents using Dependency-based Noun Phrases and Contextual Order Arrangement Yen-Hao Huang, Hsiao-Yen Lan, Yi-Shin Chen Taiwan Conference on Computational Linguistics and Speech Processing 2022.

[4] Deep Learning Based Abstractive Text Summarization: Approaches, Datasets, Evaluation Measures, and Challenges Dima Suleiman, A. Awajan Mathematical Problems in Engineering 2020.

[5] A COMPREHENSIVE REVIEW OF BASIC IMPRESSION TECHNIQUES FOR IMPLANT RESTORATIONS Aswati Soman, T. AbyMathew, Suja Joseph, A. Thomas, Minnu Harsha Kumar, Saranya Y.S 2020.

[6] Extractive Automatic Text Summarization Based on Lexical-Semantic Keywords

[7] ÁNGEL HERNÁNDEZ-CASTAÑEDA , RENÉ ARNULFO GARCÍA-HERNÁNDEZ, YULIA LEDENEVA, AND CHRISTIAN EDUARDO MILLÁN-HERNÁNDEZ Cátedras Conacyt, Autonomous University of Mexico State, Toluca 50000, Mexico Corresponding author: René Arnulfo García-Hernández (renearnulfo@hotmail.com) and Yulia Ledeneva (yledeneva@yahoo.com)

[8] A Combined Extractive With Abstractive Model for Summarization WENFENG LIU ,

[9] YALING GAO, JINMING LI, AND YUZHEN YANG School of Computer, Heze University, Heze 274015, China Corresponding author: Yaling Gao (gaoyaling@hezeu.edu.cn)

