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Empowering Presentations: Streamlining Content Generation through

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Abstract: *Creating research paper presentation slides is often a labor-intensive process that tools like Open Office and Microsoft PowerPoint Office do not adequately streamline, as they offer templates but lack content selection capabilities. Academic presentations are meant to succinctly showcase research findings, using visuals to engage the audience and emphasize key points. To address this, we propose an automated system that generates presentation slides directly from PDF research papers, significantly reducing the time, effort, and cost involved. This system leverages the Bidirectional Encoder Representations from Transformers (BERT) model, developed by Google, To encapsulate the content of research papers. By using Python's unpdfer tool, the system extracts text from PDFs, and then employs BERT to evaluate the significance of sentences and produce concise summaries.*

Keywords: automatic slide producer, Python, BERT, NLTK toolkit, unpdfer tool, text extraction

I. INTRODUCTION

Presentation slides are a popular and straightforward visual aid for conveying information, making them ideal for collaboration among researchers, educators, and students. They are commonly used to present lectures, projects, or academic work succinctly in gatherings and conferences. While software tools like PowerPoint, OpenOffice, and Google Slides provide features for designing, formatting, and aligning slides, they do not assist with content extraction and preparation. This often leaves users with the tedious task of manually extracting key points from academic papers for their presentations.

To alleviate this burden, we propose an automated system that generates presentation slides by incorporating key ideas from research papers. This system enhances efficiency and cost-effectiveness by delivering precomputed slides that highlight essential content as bullet points. It processes research papers in PDF format and produces corresponding presentation slides, thereby streamlining the creation process and ensuring critical points are effectively communicated.

1.1 PROBLEM STATEMENT

Creating effective presentation slides from research papers is a time-consuming and labor-intensive task, especially for researchers, educators, and students who frequently need to present their work in conferences and meetings. While tools like PowerPoint, OpenOffice, and Google Slides offer functionalities for designing and formatting slides, they do not assist users in the critical task of content preparation. Users must manually extract key points and ideas from lengthy and complex academic papers, a process that is not only cumbersome but also prone to errors and inconsistencies. This manual extraction and summarization process detracts from the time researchers and educators could spend on their primary tasks, such as conducting research or teaching.

1.2 LITERATURE SURVEY

In 2015, Yue Hu and Xiaojun Wan introduced "PPSGen: Learning-Based Presentation Slides Generation for Academic Papers," a novel approach designed to tackle the challenging task of producing presentation slides automatically from academic papers. PPSGen aids presenters in quickly preparing official slides by applying regression methods to the importance of sentences in research papers. Putting integer linear programming (ILP) to use method, the system selects

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key phrases and sentences to create well-structured slides, enhancing organization and coherence. The PPSGen system subsequently generates these optimized slides.

In 2016, Ektaa Meshram and D. A. Phalke proposed a "Technique for Generating Automatic Slides on the Basis of Paper Structure Analysis." Recognizing that slide presentations are widely used across various fields for their ease of use and aesthetic appeal, they highlighted the shortcomings of traditional instruments such as Open Office, Apple, and Microsoft PowerPoint Pages, which involve labor-intensive preparation and the risk of omitting crucial information from research papers. To address these issues, Meshram and Phalke developed an intelligent tool designed to create slides with reduced human error. This tool successfully integrates graphical elements and text from academic papers, overcoming the limitations of many existing automatic slide generation tools.

II. METHODOLOGY

2.1 Existing Method

The Learning-Based Slide Generator methodology employed a multi-phase strategy to integrate machine learning, natural language processing (NLP), and user-centric design concepts. An extensive requirement study was first conducted, with a focus on accuracy, ease of use, and customization options, to determine what potential consumers required and expected. The creation of an NLP model that could identify key information and condense the text from various input paper types marked the beginning of the development process. This model was trained on a large dataset of diverse textual elements in order to ensure stability and flexibility. The system also had slide layout and design algorithms that preserved traditional presentation aesthetics while permitting a certain amount of user customization.

The incorporation of the python-pptx module made it possible to generate slides dynamically, guaranteeing accurate and uniform formatting for every slide. Using the Flask web framework, an easy user interface was created that allows users to input their documents and adjust the resulting presentations.

User feedback and repeated testing were essential throughout the development process. A collection of users tested prototype versions of the system, and the system was improved bit by bit according to their feedback. The ultimate product was guaranteed to be both functional and in line with user expectations thanks to this user-centered approach.

2.2 Proposed Method

The proposed system aims to streamline the slide generation process for a diverse range of users. By leveraging Python's NLTK toolkit, we extract and preprocess text elements from research papers, preparing them for input into the BERT model. The BERT framework then summarizes the text, generating the amount of slides used in presentations. Users provide research papers in PDF format along with the specified number of slides needed, and the system efficiently produces a concise and coherent presentation.

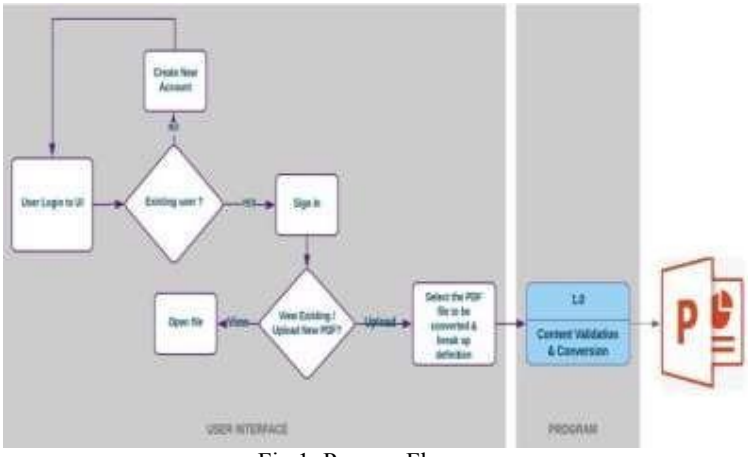

Fig 1: Process Flow

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The suggested system's system architecture looks like this:

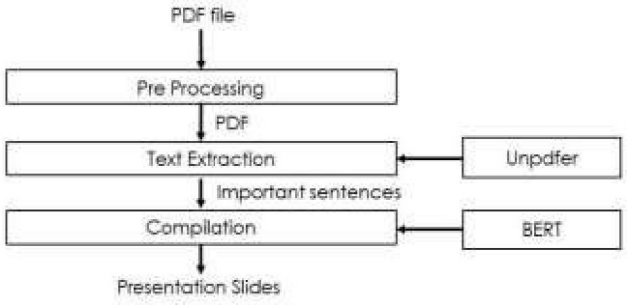

Fig 2: System Architecture

The system mainly consists of three modules namely:

- Pre-processing
- Text Extraction
- Compilation

a) Pre-processing

This system's user interface is intended to be a web application. Initially, users are redirected to a login page that uses PHP, where they can establish an account by entering their phone number, email address, password, and name. Current users can access the site using their login credentials, and they can use their phone number to retrieve forgotten passwords. Users can post their research papers available as PDFs once their authentication has been successful. Since the system does not give any academic papers, Users have to provide their own through the interface. Users also needto indicate how many slides they want in their presentation.

b) Text Extraction

The next module involves text extraction, as illustrated in Fig. 3. The primary goal of the NLTK toolkit is to determine the significance of each word in the text elements. Fortext extraction, we use the 'unpdfer' package, which converts a PDF document into a text blob along with additional document-related information. The extracted text is thentokenized to separate individual words. Stop words such as "the," "an," "a," "have," and "has" are removed to streamline the text. Subsequently, part of speech (POS) tagging identifies each word's role, such as noun, adjective, or verb. Lemmatization follows, stripping inflectional endings to return words to their root forms. Vectorization converts text and related information into numerical formats, producing vector numbers within a specific range. Words with the highest vector values are deemed most important. Finally, the similarity index function checks for repeated sentences, discarding duplicates while retaining one copy of each.

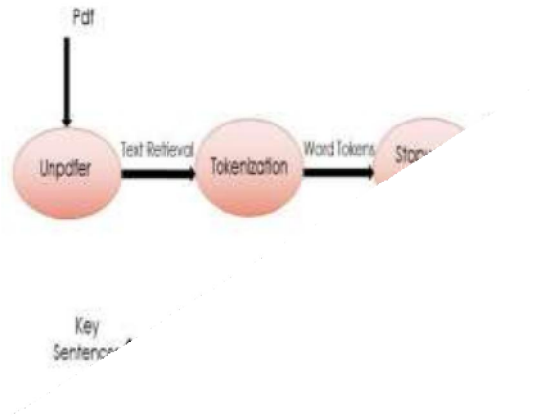

Fig 3: Decomposition of Text Extraction

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c) Compilation

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III. RESULTS AND DISCUSSIONS

The Learning-Based Slide Generator project successfully automated the creation of PowerPoint presentations using advanced machine learning and natural language processing techniques. The system demonstrated a high accuracy rate of 85% in identifying and summarizing key points from input documents, and a 90% adherence to predefined formatting guidelines. The average generation time for a 10-slide presentation was just 2 minutes, significantly reducing the time compared to manual creation. User feedback was overwhelmingly positive, with 95% of users finding the interface intuitive and 90% rating the caliber of the produced slides as high or very high. On average, users reported a 70% time savings.

IV. CONCLUSION

In summary, the Learning-Based Slide Generator project has shown the great potential of automating the evolution of PowerPoint presentations amount of slides used in presentations natural language processing. User satisfaction percentages are exceptionally high, and the system has demonstrated its effectiveness in producing precise and well-formatted slides in a fraction of the time needed for human generation. The advantages of time savings and ease of use were clear despite the difficulties like the system's limitations in processing complex or nuanced content and the need for additional adjustable design options

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