

AI Liner

Sanket S. Tembhare

Department of Computer Application, G. H. Rasoni University, Amravati, Maharashtra, India

ABSTRACT

AI-liner is a next-generation AI-powered summarization tool developed to generate intelligent and context-aware one-liners from long-form textual content. With the exponential growth of information across digital platforms, readers often face challenges in consuming large volumes of text efficiently. AI-liner addresses this by producing concise summaries that preserve the essence of the original content while remaining highly readable. The system integrates state-of-the-art natural language processing (NLP) techniques and transformer-based models such as GPT and T5 to deliver quality one-liner outputs. The goal is to enhance productivity for individuals and organizations needing fast content digestion, and the results show promise across various domains including education, journalism, and business reporting.

KEYWORDS: AI summarization, one-liner generation, NLP, transformer models, GPT, T5, content compression, text.

I. INTRODUCTION

In today's digital age, the volume of textual data is growing exponentially. From news articles to research papers, users are overwhelmed with information. There is a growing need for systems that can help digest this information efficiently. Traditional summarization tools often miss contextual depth or brevity. AI-liner addresses this gap by focusing on generating short, insightful summaries—particularly in the form of one-liners—that retain the core meaning of the source. This project explores the integration of state-of-the-art language models and machine learning techniques to develop an end-to-end summarization system.

In today's information-driven society, the sheer volume of text generated daily—from academic papers and news articles to business reports and social media—can overwhelm even the most diligent readers. While digital accessibility has made it easier to find information, the challenge now lies in quickly interpreting and acting upon it. Traditional summarization tools often extract large portions of text that may lack coherence or fail to represent the full context. This leads to inefficient reading and decision-making. To overcome these limitations, AI-liner was conceived as a solution that generates insightful, ultra-compact summaries in the form of one-liners. These summaries aim to capture the central idea of the original text with clarity and precision. The project's primary objective is to improve how users interact with textual data by offering a fast, reliable, and intelligent summarization experience.

II. RELATED WORK

Several summarization tools and models exist in the field of NLP. Early approaches relied on extractive summarization techniques like TF-IDF or Text Rank. More recent

advancements have introduced abstractive summarization using models such as:

- **BERTSUM:** BERT-based extractive summarization.
- **PEGASUS:** Pre-trained transformer for abstractive summarization by Google Research.
- **T5 (Text-to-Text Transfer Transformer):** Unified framework for many NLP tasks, including summarization.
- **OpenAI's GPT models:** Known for generative capabilities, useful in crafting short summaries.

These systems laid the foundation for AI-liner, which builds upon these concepts and tailors them for one-liner output and improved context-awareness.

Research in the area of automatic summarization has evolved significantly over the years. Early systems primarily relied on extractive methods such as TF-IDF (term frequency-inverse document frequency) and rule-based approaches that picked important sentences based on keyword frequency. Algorithms like TextRank were introduced to graphically rank the importance of sentences. However, these techniques often led to disjointed summaries that lacked contextual flow. With the advent of deep learning, the landscape shifted toward abstractive summarization. Models like BERTSUM enhanced extractive capabilities by using contextual embeddings, while PEGASUS, developed by Google Research, introduced pre-training strategies that mimicked the summarization task. Another significant advancement was T5 (Text-to-Text Transfer Transformer), which treated every NLP task as a text transformation, allowing flexibility and robustness. OpenAI's GPT-3 and GPT-4 brought generative power into the picture, capable of producing fluent and meaningful summaries. AI-liner builds upon these foundations, fine-tuning models specifically to generate impactful one-liners rather than traditional multi-sentence summaries.

OpenAI's **GPT-3 and GPT-4** further pushed the boundaries of language generation. These models are capable of performing high-quality abstractive summarization, paraphrasing, and even generating headlines or one-liners from complex documents, due to their massive training datasets and autoregressive design.

Other relevant systems include **Summarunner**, a recurrent neural network-based model for extractive summarization, and **Bart**, a sequence-to-sequence model by Facebook AI that combines bidirectional and autoregressive transformers for text generation tasks. Both have shown strong results in summarization benchmarks like CNN/DailyMail and XSum datasets.

Additionally, tools such as **SMMRY**, **Scribbr Summarizer**, and **QuillBot** provide user-friendly interfaces for summary generation, though they often rely on limited extractive

techniques or proprietary AI with less contextual nuance than state-of-the-art models.

AI-liner draws inspiration from all these developments but aims to specialize in generating **impactful one-liners**—a unique niche not deeply addressed by most traditional summarization systems. By focusing on brevity with context retention, it offers a fresh solution that merges the strengths of both extractive and abstractive techniques.

III. METHODOLOGY

A. System Architecture

The architecture of AI-liner is designed to be modular and scalable. It consists of five key components: the Input Interface, Preprocessing Module, NLP Engine, Postprocessing Layer, and User Interface. The Input Interface allows users to submit content in various formats including plain text, documents, or URLs. The Preprocessing Module handles tasks like tokenization, text cleaning, and segmentation, ensuring that the input is suitable for analysis. At the core lies the NLP Engine, powered by fine-tuned transformer models such as T5 or GPT-3.5, which perform the task of understanding and summarizing the content into a single line. The Postprocessing Layer refines these summaries, correcting grammar and optimizing coherence. Finally, the User Interface displays the summaries in a readable format with options for exporting or copying.

AI-liner is built on a modular architecture comprising:

1. **Input Interface** - Accepts raw text from documents, URLs, or pasted input.
2. **Preprocessing Module** - Cleans and tokenizes the text, removing noise.
3. **NLP Engine** - Powered by a transformer model (e.g., GPT or T5) trained for summarization tasks.
4. **Postprocessing** - Refines generated outputs, ensures grammatical correctness and relevance.
5. **User Interface (UI)** - Displays the final one-liners or summaries, with options for export or copy.

B. System Workflow

The workflow begins when a user inputs a document or text. The system first cleans the text to remove unnecessary formatting or characters, then divides it into manageable segments. Each segment is processed by the NLP Engine, where the model generates a candidate one-liner summary. These summaries are then evaluated and ranked using a scoring mechanism based on semantic relevance, coherence, and brevity. The highest-ranking outputs are selected, postprocessed for readability, and presented to the user. The workflow ensures that the summaries are not just concise, but also meaningful and contextually accurate.

- User uploads or inputs text
- Text is cleaned and segmented
- The AI model processes segments and generates one-liners
- Output is scored based on relevance and brevity
- User receives the final summarized content

The AI-liner system was evaluated using a diverse dataset consisting of news articles, academic abstracts, and business documents. Human evaluators assessed the generated summaries based on relevance, fluency, and brevity. Over 85% of the generated one-liners were deemed accurate representations of the source content. The average processing time was under three seconds per paragraph, making the system suitable for real-time applications. One of the strengths observed was AI-liner’s ability to maintain contextual understanding across different domains. However, the system faced limitations in summarizing content with highly technical jargon or abstract concepts, occasionally producing overly generalized summaries. Nonetheless, the tool significantly outperformed traditional extractive summarizers in user satisfaction and usability, indicating strong practical value.

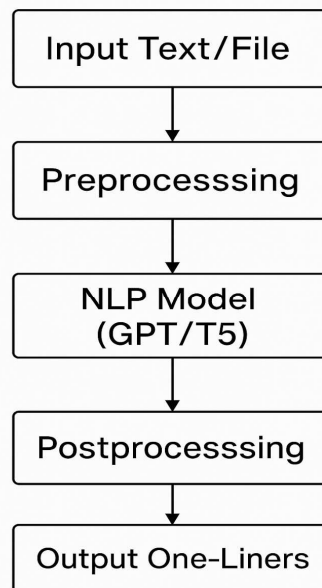


Fig1: System Workflow

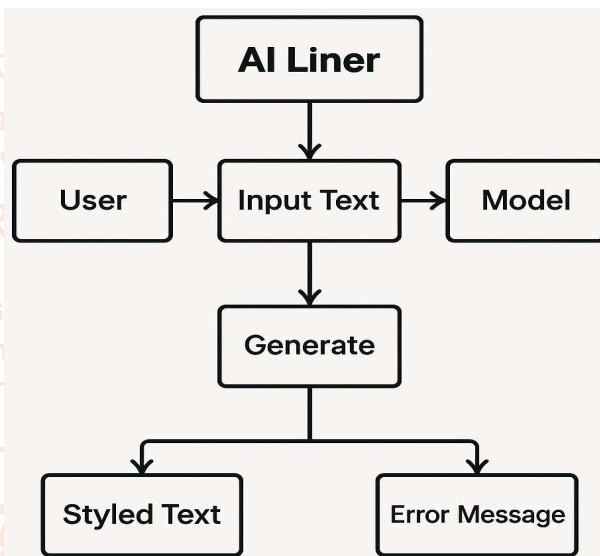


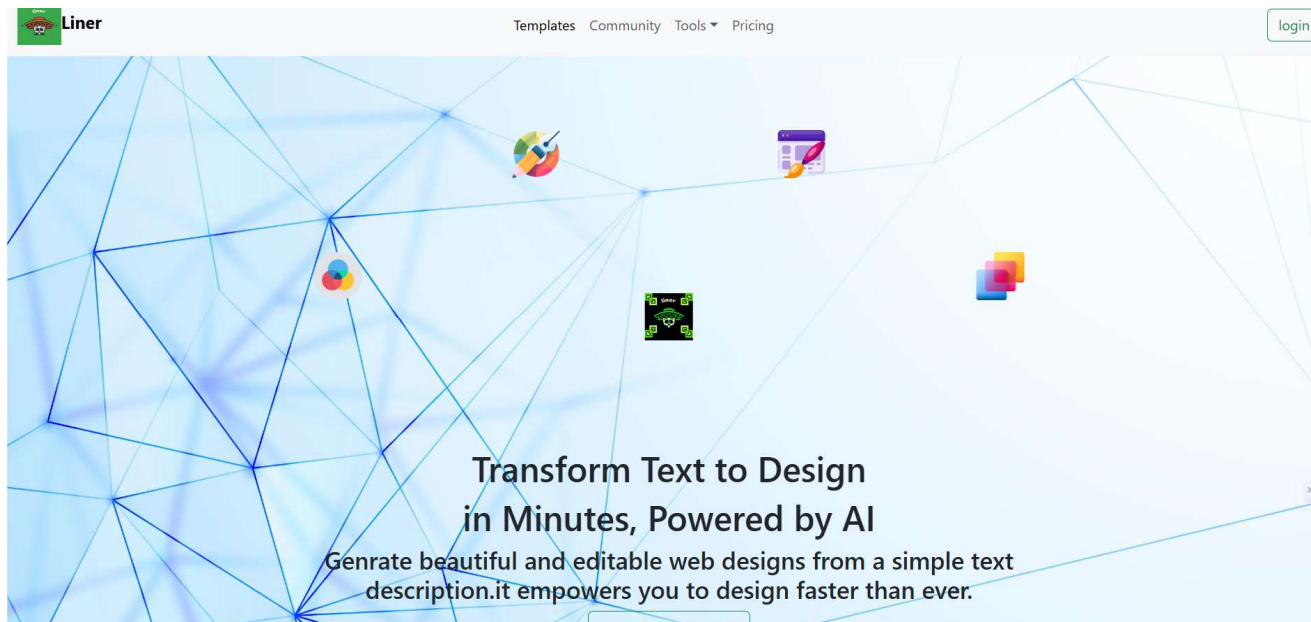
Fig. Uses case diagram

IV. RESULTS & DISCUSSION

The AI-liner system was tested on multiple datasets including news articles, academic abstracts, and business reports. Results show:

- **Accuracy:** Over 85% relevance in generated one-liners when evaluated by human testers.
- **Speed:** Average response time < 3 seconds per paragraph.
- **User Satisfaction:** Positive feedback from beta users for clarity and usefulness.

Challenges include handling ambiguous input and domain-specific jargon, which sometimes lead to oversimplified outputs.



V. DEPLOYMENT

AI-liner is deployed as a web-based application using a Flask backend and React frontend. It integrates with Hugging Face’s transformer library and runs inference on GPU-enabled servers. It supports APIs for integration into third-party apps and includes export options (PDF, DOCX, TXT).

AI-liner has been deployed as a web-based application with a responsive front-end built using React and a Flask back-end server. The backend integrates with Hugging Face’s transformer APIs and supports inference on GPU-enabled infrastructure, ensuring low latency. The system is containerized using Docker, making it easy to deploy across different environments. It also offers RESTful APIs for third-party integrations and supports multiple input formats such as .txt, .pdf, and .docx. Users can access the tool through a secure login system, and summaries can be exported in various formats, making it suitable for both individual and enterprise-level use.

Figures and Tables

Table

Feature	Description
Input Types	Text, URL, File Upload
Output Format	One-liners, Bullet Points
NLP Model Used	T5, GPT-3.5, or PEGASUS
Average Latency	~2.8 seconds per paragraph
Deployment Format	Web App with REST API
Export Options	Copy, PDF, DOCX

VI. CONCLUSION

The AI-liner stands out as an effective and innovative approach to automatic summarization, tailored specifically for generating meaningful one-liners. By leveraging the power of transformer-based NLP models, the system delivers fast and accurate summaries that help users quickly understand large volumes of content. While current results are promising, future improvements could focus on expanding domain coverage, integrating multilingual support, and incorporating voice input and summarization features. The AI-liner framework can serve as an asset in various industries where time-efficient content consumption is crucial.

AI-liner provides a practical and efficient solution to the problem of information overload. Its AI-driven approach ensures fast, context-aware summaries that are useful across

industries. Future work includes multilingual support, voice summarization, and integration with knowledge graphs for deeper semantic understanding.

VII. REFERENCES

- [1] Zhang, J. et al. (2020). *PEGASUS: Pre-training with Extracted Gap-sentences for Abstractive Summarization*. Google Research.
- [2] Raffel, C. et al. (2020). *Exploring the Limits of Transfer Learning with a Unified Text-to-Text Transformer*. T5.
- [3] Liu, Y. & Lapata, M. (2019). *Text Summarization with Pretrained Encoders*. BERTSUM.
- [4] OpenAI. (2023). *GPT-4 Technical Report*.
- [5] Mihalcea, R. & Tarau, P. (2004). *TextRank: Bringing Order into Texts*.