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AI Tools for Summarizing Research Articles: Transforming Information Access

The exponential growth of academic research articles in various disciplines presents both opportunities and challenges for scholars and researchers. While the abundance of information fosters innovation and knowledge dissemination, it also makes it challenging to stay updated with the latest research findings. In response, readers have begun to use artificial intelligence (AI) tools to summarize academic research articles for easier and faster comprehension. AI summarization works by leveraging natural language processing (NLP) algorithms to analyze papers and identify important points worthy of inclusion in an abbreviated summary. For instance, a 20-page paper on a new Alzheimer's treatment could be distilled into a 400-word summary focusing only on vital material. This allows readers to rapidly absorb core insights, without having to wade through less relevant details. There are two main approaches to automatic summarization: extractive methods and abstractive methods.

Extractive summarization involves identifying and extracting key sentences or passages from the original document to create a short, coherent, summary that preserves the original wording. This process involves ranking sentences based on measures of importance such as word frequency, sentence position, and similarity to the document title. For example, an extractive system might select wording from the research goals, methods, results and conclusions and compile those verbatim passages into a summary. Some examples of popular extractive summarization tools include Quillbot (<https://quillbot.com>) and Scholarcy (<https://www.scholarcy.com>). Pricing for these tools varies, but a general rule of thumb is that more sophisticated tools generally charge more for access.

Abstractive summarization, on the other hand, uses more advanced NLP techniques like paraphrasing, generalization, and recombination to interpret and generalize the source content. Rather than simply extracting sentences from the existing text, abstractive tools aim to generate new sentences that capture the overall meaning. This requires a deeper understanding of the text through semantic analysis to identify key concepts. ChatGPT (<https://chat.openai.com/auth/login>) and Claude (<https://claude.ai/login>) are two examples of general AI tools that can perform abstractive summarization while more customizable algorithms, such as T5 (Text to Text Transformer) (<https://github.com/google-research/text-to-text-transfer-transformer>), can be downloaded from GitHub and run locally.

When selecting a summarization method, it is important to consider the strengths of each option. Extractive summarization generally yields better results, because the goal is to accurately represent the source material without introducing any errors. Therefore, extractive summarization is particularly useful when the goal is to preserve the essence of the source material while reducing its length. Abstractive summarization, in contrast, has greater potential for distortion or misrepresentation of the original text, because it is generating new sentences. However, abstractive tools can be helpful when working with very long documents, because they can be more effective at paraphrasing and condensing repetitive information.

While AI summarization tools offer numerous benefits, they are not without challenges and ethical considerations such as:

- **Content Compression:** AI models may struggle to condense lengthy and complex academic articles into concise summaries without omitting critical information.
- **Domain-Specificity:** Many AI summarization models are trained on general datasets, which may limit their effectiveness in summarizing highly specialized research articles in niche fields.

- **Quality Assessment:** Determining the quality and accuracy of AI-generated summaries can be challenging. Users must be cautious of potential biases and errors introduced during the summarization process.
- **Ethical Concerns:** The use of AI to generate summaries raises ethical questions about authorship and intellectual property rights. It is essential to attribute the original work appropriately and ensure that AI-generated summaries do not misrepresent the source material.

Given their complexity, these issues will not be resolved quickly. Therefore, striking a balance between automation and human oversight is essential to ensure the quality and integrity of summarized content.

In conclusion, AI summarization tools represent an important step forward in knowledge dissemination. Extractive and abstractive summarization methods offer easy to use options for condensing complex research into concise summaries, which can save significant time when reviewing literature. However, these tools come with challenges, including content compression, domain specificity, and quality assessment, which need to be addressed to maximize their utility. As the field of AI continues to advance, it is imperative that researchers, developers, and users work together to address these challenges and other ethical concerns associated with AI-generated summaries. If successful, this technology has the potential to further democratize knowledge and make research literature more accessible and digestible than ever before.