North South University

CSE499B: Senior Design Project II

Sustainability & Environmental Effects

“Autonote: Transformative meeting summarization and highlighting points based on NLP “

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Sustainability & Environmental Effects

AutoNote

Transformative meeting summarization and highlighting points based on NLP

Overview

In modern workplaces, meetings are essential for collaboration and decision-making. Automatic meeting summarization, powered by Natural Language Processing (NLP), aims to address this challenge by distilling key meeting insights into concise summaries. Sometimes we miss meetings that are happening online due to some unavoidable circumstances. Again, sometimes we miss out on some important points of the meeting because of various reasons. However, before our important work or study time is very crucial so we need to do it in a faster or optimal way. That's why we need to summarize a long meeting so that we can be able to understand easily and a faster way within our due time. Therefore, a gist of an online meeting is often very important to those who missed it or those who try to recall it. There can be a system which can make a summary of a meeting while it is running online. Basically, this NLP summerizing develops a system that can automatically generate accurate and informative summaries of meetings. But this meeting summarizes and highlights points lot of sustainability and environmental effects, although the specifics may vary depending on the scale and context of its implementation.

Sustainability

In long run

- **Resource Efficient Decision Making**: By efficiently reducing meeting transcripts and other textual data, it reduces the time and effort required for manual note-taking. Because of this optimization, firms and organizations can allocate human and computing resources more effectively, increasing productivity and resource efficiency.
- **Resource Efficiency and Long-term Impact:** Our project allows it to enable it to efficiently handle growing computational demands and technological advancements. This ensures that the project can continue to meet the needs of users and organizations as they evolve over time, leading to increased productivity and effectiveness. By leveraging

scalable NLP models and computing infrastructure, our project is future-proofed against changes in technology and data requirements. This ensures that the project remains relevant and sustainable in the long run, capable of adapting to emerging trends and advancements in the field of natural language processing.

- **User-Centric Design:** Prioritize user experience and enhance the project's features and functionalities. By understanding and addressing user needs, the project can maintain relevance and user engagement over time.
- **Scalable Infrastructure:** Invest in scalable computing infrastructure that can accommodate increasing data volumes and user demands as the project grows. This ensures consistent performance and reliability, even as the project expands.
- **Continuous Innovation:** Foster a culture of innovation within the project team to drive ongoing improvements and stay ahead of technological advancements. Regularly explore new ideas, techniques, and technologies to maintain a competitive edge in the field.
- **Community Engagement:** Build a strong community around the project by engaging with users, contributors, and stakeholders. Encourage collaboration, knowledge sharing, and investment in the project's success.
- **Robust Documentation and Support:** Provide comprehensive documentation and support resources to facilitate user onboarding, troubleshooting, and continued usage. Clear, accessible documentation helps users navigate the project effectively and reduces barriers to adoption.
- **Sustainability Initiatives:** Incorporate sustainability considerations into the project's design, development, and operations. Implement environmentally friendly practices, such as energy-efficient computing and paperless workflows, to reduce the project's environmental footprint.
- **Educational Outreach:** Offer educational resources, training programs, and workshops to empower users and stakeholders with the knowledge and skills needed to maximize the project's value.
- **Long-Term Vision:** Maintain a clear long-term vision and roadmap for the project's evolution and growth. Set ambitious yet achievable goals and milestones to guide strategic decision-making and maintain momentum toward sustained success.

Effect on the mass use:

- **Technological Dependence:** Mass reliance on automated summarization technologies could lead to dependency on digital tools and platforms. Organizations may become overly reliant on our project's capabilities, leading to potential disruptions if there are issues with the technology or infrastructure supporting it.
- **Digital Divide:** The widespread adoption of our project may exacerbate existing disparities in access to technology and digital literacy skills. Organizations or individuals lacking access to digital resources or adequate training may be left behind, widening the digital divide and hindering inclusivity.
- **Privacy Concerns:** Mass use of automated summarization technologies raises privacy concerns related to the handling and storage of sensitive information. Organizations must implement robust security measures to safeguard data privacy and comply with regulations, addressing potential risks associated with unauthorized access or data breaches.

Environmental Effects

Carbon Footprint

The summary from a meeting session will be uploaded to cloud storage. So the paper usage will be less. That's why the carbon footprint will be less. Generating summaries from online meetings or classes, the carbon footprint is related to the environmental impact of the technology and infrastructure required to support the project.

- **Server Infrastructure:** The project involves processing video content to generate text summaries and highlighting points. This processing likely takes place on servers or data centers, which require electricity to operate. The carbon footprint is associated with the energy consumption of these servers. Using energy-efficient servers and data centers can help reduce this impact.
- **Video Streaming:** Online meetings and classes involve streaming video content to participants. The carbon footprint includes the energy required for video encoding, transmission, and decoding. Efficient video compression algorithms and content delivery networks (CDNs) can minimize the energy consumption associated with video streaming.
- **Softcopy:** After summarizing the meeting it will be printed as a softcopy. As it can be noted through only so in maximum cases hard copy use is

less. As a result, soft copy can reduce the use of papers. So that it reduces the carbon emission and carbon footprint lower for paper production and ink.

- **User Devices:** Participants in online meetings or classes use various devices, such as computers, tablets, and smartphones, to access the content. The carbon footprint also depends on the energy efficiency of these devices. Encouraging users to use energy-efficient hardware can indirectly contribute to a lower carbon footprint.
- **Data Storage:** Storing video recordings of meetings or classes and their corresponding summaries can also have an environmental impact. This includes the energy consumption of data storage infrastructure. Employing data storage solutions that prioritize energy efficiency and data center sustainability can mitigate this impact.
- **Internet Connectivity:** Accessing online meetings and uploading video content for processing requires internet connectivity. The carbon footprint includes the energy consumption of network infrastructure and data transmission. The efficiency of internet service providers and the choice of network technologies can affect this footprint.

Power consumption

The summarization which involves generating summaries from online meetings or classes through video analysis, power consumption is a critical aspect related to the energy requirements of the technology and infrastructure involved. The system converted into the software version will not affect the power usage of a PC. So, the system will not affect power consumption very much.

- **Video Processing:** One of the primary contributors to power consumption is the video processing phase. Analyzing video content, extracting key information, and generating text summaries and highlights demand computational resources. The power consumption is directly related to the computing power and efficiency of the hardware used for these tasks.
- **Server Infrastructure:** The servers or data centers that host the video analysis algorithms and services require a significant amount of power to operate. The more powerful and numerous the servers, the higher the overall power consumption.
- **Data Transmission:** When video content is uploaded to a platform and summaries are downloaded or accessed by users, data transmission occurs. This involves power consumption in network equipment,

including routers, switches, and data centers. The efficiency of data transmission can impact power consumption.

- **Electricity:** It powers data centers, servers, networking equipment, and user devices used for video analysis and summarization. The greenhouse effect refers to the trapping of heat in the Earth's atmosphere due to the accumulation of greenhouse gasses, primarily carbon dioxide (CO_2). Power consumption, particularly if it relies on electricity generated from fossil fuels, can contribute to increased CO_2 emissions. These emissions intensify the greenhouse effect, leading to global warming and climate change.
- **User Devices:** Power consumption also extends to the devices used by meeting or class participants. This includes computers, smartphones, tablets, and other devices that access and interact with the platform. Efficient device usage can help reduce the power consumption associated with your project.
- **Real-time Processing:** If this aims to provide real-time summarization and highlighting during live meetings or classes, it may require specialized hardware, such as GPUs (Graphics Processing Units) or TPUs (Tensor Processing Units), which consume varying amounts of power depending on their efficiency and usage.

Energy Efficiency

Hosting virtual meetings typically consumes less energy compared to in-person meetings, especially when considering factors like heating, cooling, and lighting of physical meeting spaces.

- **Reduced Environmental Impact:** Energy efficiency is crucial for minimizing the environmental footprint of the meeting summarization. By using less electricity and computational resources, it can contribute to lower carbon emissions and reduce its overall impact on the environment, helping combat climate change.
- **Physical Meeting vs Online Meeting:** Energy efficiency, comparing physical meetings to online meetings reveals important differences. Physical meetings typically involve travel, which consumes energy and emits carbon emissions, while online meetings require less energy for commuting. However, online meetings rely on electricity to power devices and data centers, introducing their own energy consumption concerns. The energy efficiency of online meetings depends on factors such as server infrastructure, data transmission, and device usage. Optimizing these elements can make online meetings more energy-efficient than physical ones, particularly when considering reduced travel-related emissions. Nonetheless, balancing energy

efficiency in both meeting formats is crucial for achieving sustainability goals.

- **Efficient use of Internet and Electricity:** Efficient use of the Internet and electricity is essential for maximizing energy efficiency. Regarding the Internet, using data compression techniques, content delivery networks (CDNs), and efficient data transmission protocols can reduce energy consumption during data transfer. This minimizes the environmental impact of online meetings and video analysis. Additionally, optimizing server infrastructure and algorithms can lower electricity consumption during video processing.
- **Cost Savings:** Improving energy efficiency can lead to significant cost savings. Lower power consumption means reduced energy bills, which can be especially important for data center operations and large-scale computational tasks.
- **Enhanced Scalability:** Energy-efficient algorithms and hardware can scale more effectively. As this grows, efficient resource utilization ensures that it remains cost-effective and environmentally responsible.
- **Related Energy:** Online meetings promote energy efficiency by reducing the carbon emissions and energy consumption associated with transportation to physical meetings. Additionally, they lead to less resource-intensive food production and waste, further enhancing their environmental benefits.

Finally, emphasizing energy efficiency throughout the online meeting summary is key to minimizing environmental impact, reducing costs, and aligning with sustainability goals, making it both effective and environmentally responsible.

Environmental Impact of Computation:

High Energy Consumption: Running complex algorithms and training large NLP models requires significant processing power. This translates to massive electricity demands, often met by sources like fossil fuels, leading to greenhouse gas emissions and contributing to climate change.
E-waste Generation: The continuous production, use, and disposal of electronic devices associated with computation lead to electronic waste (e-waste). Improper e-waste management pollutes landfills with toxic materials and poses health risks.
Resource Depletion: Mining the raw materials required for computer components can lead to environmental degradation through deforestation, water pollution, and soil contamination.

Some positive sides:

Reduced Paper Consumption: By automatically summarizing and highlighting key points from meetings, it eliminates the need for physical notes and reports. This translates to a substantial reduction in paper usage, saving trees and minimizing deforestation.

Increased Efficiency: This promotes a paperless workflow, fostering a more sustainable work environment. Easy access to condensed meeting information saves time and resources compared to manually reviewing lengthy recordings or notes.

Improved Decision Making: By effectively summarizing discussions and highlighting crucial points, the project ensures better understanding of meeting content. This can lead to well-informed choices based on the captured information, potentially promoting sustainable practices within the organization.

Conclusion

Transformative Meeting Summarization and Highlighting Points based on NLP represents a pioneering leap forward in the realm of communication and technology. By harnessing the power of Natural Language Processing, this project has the potential to revolutionize the way meetings are conducted and knowledge is shared. Its significance goes far beyond mere convenience and efficiency. It embodies a paradigm shift in the way organizations collaborate, significantly reducing the need for resource-intensive physical meetings. Moreover, it enables remote collaboration, further decreasing the need for physical meetings and commuting. By providing clear and concise summaries, the project facilitates better decision-making, including those related to sustainability initiatives, thereby contributing to more environmentally conscious practices within organizations. Furthermore, this serves as a testament to the transformative power of technology, seamlessly integrating with our daily lives to enhance productivity, reduce waste, and promote a more eco-conscious approach to business and communication. Overall, the project aligns with sustainability goals by promoting resource efficiency, reducing carbon footprint, and supporting environmentally conscious decision-making processes.

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