University of Münster

Department of Information Systems

Popularity and Controversy: A Location-Based Event and Sentiment Analysis of Donald Trump and Boris Johnson

Reflection Report

in the context of the seminar

Urban Analytics

submitted by

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DIGITAL INNOVATION & THE PUBLIC SECTOR

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1 Contextualization and Motivation

Generative Al has made leaps in recent years with ChatGPT, making OpenAI the fastest-growing company ever, with 100 million weekly users (Porter, 2023). Thus, it is useful to understand how these significant technological advancements affect academic work in the context of this seminar. This reflection report has three central goals:

1. The reflection report supplements the documentation of generative AI usage and enables a **contextualization** of the intention and objective of each ChatGPT interaction.

2. It aims to provide insights into **lessons learned**. Thus, researchers from the chair of Information Systems at the University of Münster can avoid the mistakes and problems made in this seminar course and apply the outlined best practices.

3. The understanding of how **generative artificial intelligence (AI) usage**, especially in the context of academic projects and specifically in the seminar thesis, is improved. The reflective question for this report is: **How can generative AI be effectively used in academic projects**? To answer that question, the **required cost** and **time input**, **output quality, and reliability** are considered.

To understand the usage of generative AI in the context of the seminar thesis, it is helpful to understand the topic, objective, and background of the seminar thesis. It explores the influence of geographic location on public perceptions of the political leaders Donald Trump and Boris Johnson between 2018 and 2022 through a detailed analysis of Twitter/X posts from Los Angeles, New York City, Birmingham, and London. The research objective is to determine the factor and effect of geographic location on public sentiment and attention concerning the previously named political leaders. A comparative and an event analysis are performed to address the research objective. Each analysis comprises a combined post count and sentiment analysis to identify patterns, baselines, and outliers. The Normalized Post Count (NPC) is used to identify levels of public attention and crucial events, and the Compound Sentiment Score (CSS) enables to determine the popularity and public opinion of a leader and perception of an event (see Table 1). The research contributes to urban analytics by highlighting the importance of geographic context in shaping political perceptions. The seminar thesis offers valuable insights into how political events lead to specific local and cross-national reactions.

Metric	**Comparative Analysis**	**Event Analysis**
NPC	Levels of public attention	Crucial events
CSS	Popularity and public opinion	Perception of an event

Table 1 Usage of NPC and CSS in Comparative and Event Analysis

2 Application of Generative AI

There are multiple generative AIs, which could be used in this seminar. The most significant technological improvements were made with ChatGPT (Chui et al., 2023; Herrera, 2023; Université, 2023). So, this seminar primarily focused on ChatGPT as its focus on large language models fits the purpose and scope of the seminar. ChatGPT-4 enables custom GPTs suited for specific purposes. These are also summarized hereafter under the term ChatGPT.

In this seminar, generative AI was used in the use case domains. First, it is outlined how ChatGPT was used to get an overview of the theoretical background by performing quick literature research. Second, the knowledge gained from the theoretical background is applied in an own implementation with X data. It is examined which roles ChatGPT played in the implementation phase. The implementation enables the observation of patterns in the data and visualizations. Third, these observations were contextualized and explained by research supported by ChatGPT. Moreover, ChatGPT also aided the creation of the seminar thesis in the writing phase.

2.1 Theoretical Background

ChatGPT can act as a **research assistant** by providing a basic understanding of the theoretical background, for instance, relations of different fields of study (ChatGPT, 2024g, 2024k). Furthermore, it can perform a brief literature research by suggesting and classifying relevant literature. ChatGPT was used to extract relevant insights from papers applicable to this seminar thesis's research question. Moreover, it can summarize papers and aid in evaluating the title, abstract, and keywords at the hand of the three selected relevance criteria (ChatGPT, 2024g). It can also find sources to back up statements, adjust citations, and generate BibTeX (ChatGPT, 2024g, 2024o).

2.2 Programming

In the use case domain of the programming, ChatGPT plays three roles. First, it helps in the **realization and implementation** of the programming code. ChatGPT enables the quick generation and adjustment of code, for instance, manipulating and

filtering Pandas DataFrames (ChatGPT, 2024c). Second, ChatGPT provides **quality control** by quickly enhancing code by enforcing coding best practices and improving code quality; for instance, it reduced the code runtime of the bigram similarity algorithm (ChatGPT, 2024b). Third, the quality control aspect also applies to ChatGPT's role as an **assistant and teacher**. For example, it explains warnings, solved errors, and aided in debugging to improve code quality and maintainability (ChatGPT, 2024c). ChatGPT also clarified concepts, methods, or code. For example, the normalization of the post count was developed with ChatGPT's support (ChatGPT, 2024i). It also guided how to use repositories to filter spam with machine learning (ChatGPT, 2024f).

2.3 Thinking, Research and Writing

Besides programming and academic literature research, ChatGPT can also perform regular **research** and aid in thinking tasks, such as brainstorming. In this seminar thesis, it was used to supplement manual research and thinking by researching events that could explain observed data patterns and outliers; for example, elections explain a higher NPC (ChatGPT, 2024d, 2024l, 2024p, 2024q). The explanation of events also provides **inspiration** for the analysis, as explanations of one pattern can sometimes be transferred to another. Thus, ChatGPT provides ideas for brainstorming and aids in divergent thinking. For instance, it aided in brainstorming and checking possible spam filtering approaches (ChatGPT, 2024e, 2024f). Moreover, ChatGPT can be an **auditor** or **quality checker** as it can quickly check the performed research and implementation approach against previous approaches in the same domain to find mistakes or disregarded steps and factors (ChatGPT, 2024h). It can also revise the written text, search for improvements, and write an abstract (ChatGPT, 2024k, 2024m). This **language support** has a wide range of applications, such as improving low-quality sentences and helping to find fitting words. It can also condense and rewrite text (ChatGPT, 2024d, 2024g, 2024n).

3 Discussion and Reflection

The usage of generative AI in the previous chapter is discussed and reflected upon in this chapter. The discussion and reflection comprise the surfaced problems, possible solutions, and an outline of best practices for using ChatGPT in the three previously named use case domains. In the theoretical background, ChatGPT supported the thesis by summarizing relevant literature, suggesting classifications, and aiding in literature research. In the programming domain, it assists in code generation, quality control, debugging, and explaining coding concepts, significantly enhancing code efficiency and understanding. The thinking, research, and writing are aided by ChatGPT in brainstorming, event research, quality checking, and language support, facilitating idea generation and improving written content.

3.1 Theoretical Background

Compared to manual research, it was beneficial and much more efficient to use ChatGPT to gain insights from the scientific sources that are transferable from papers to the seminar thesis. The generation of BibTeX with ChatGPT is overall not recommended here because ChatGPT used non-unique identifiers, left out the author field, made the publisher the author, used an incorrect or placeholder date, or used a 'howpublished' instead of a 'url' identifier (ChatGPT, 2024d, 2024g, 2024o). It also damaged the BibTeX file structure while incorrectly applied the title case (ChatGPT, 2024o). This dodginess overshadows some satisfactory high-quality ChatGPT output when working with BibTeX files. Thus, it was necessary to program a Python script to apply the title case to a BibTeX file (Giesen, 2024). While providing a solid overview of the theoretical landscape in political sentiment analysis, the literature research from ChatGPT is incomplete overall. Research with ChatGPT is still a black box and transparency and repeatability by other researchers are crucial in academic research. Thus, it is paramount to perform a separate complete literature research. Nevertheless, it is recommended to use SciSpace to get an overview (ChatGPT, 2024s). Moreover, it can speed up the scientific paper evaluation process by summarizing articles and applying criteria of relevance to the contents of the paper. Consequently, it is necessary to acknowledge ChatGPT's limitations and identify use cases where ChatGPT provides reliable and high-quality outputs.

3.2 Programming

Generating LaTeX tables and visualizations in Python is very efficient and saves time because the validity of the code can be checked very quickly. For example, features like highlighting the ten most significant points were added to the visualization (see ChatGPT, 2024r; ChatGPT, 2024g, 2024j). ChatGPT displays great opportunity in acting as a programming assistant, because well-defined concepts, such as the bigram similarity, can be explained and implemented more quickly and with a smaller risk of errors (ChatGPT, 2024b).

3.3 Thinking, Research, and Writing

Currently, it is impossible to execute multiple analyses and research steps reliably at once with ChatGPT. It is necessary to break down the task into subcomponents of a procedure, perform each step separately, and check each intermediate output to guarantee reliable, high-quality results. For example, direct data interpretation with the graphs or data was unusable because of low-quality insights because of incorrect observations (ChatGPT, 2024d). So, the data was visualized and manual observation, pattern identification, outlier detection, and analysis were performed. These observations were used as input for the generative AI to perform research and explain the events. ChatGPT can be helpful by proofreading the seminar thesis text, providing suggestions for improvement, and finding limitations one might have missed earlier (see ChatGPT, 2024a; ChatGPT, 2024g). It does not make tools like Grammarly redundant because they might offer valuable suggestions for more precise wording.

3.4 Overarching Best Practices

It is paramount to check the validity of ChatGPT's output and conduct your own research. For instance, the evaluation of scientific papers was overall helpful, but it can be faulty. Further, ChatGPT can make mistakes in improving the code. The researched events and explanations were partly false and incomplete. For instance, on January 5th, 2020, there was a particularly low CSS in Great Britain, and ChatGPT could not find any correlation with specific events or statements. However, after a quick research, the assassination of the Iranian major general Qasem Soleimani happened two days prior, which caused wide media coverage (Rasihidi & Mashhadi, 2020). ChatGPT claimed that the significant dip in CSS about Trump in early August 2019 was connected to the intense criticism following the George Floyd protests. However, the George Floyd incident happened half a year later, on May 25th, 2020

(Knott, 2020). While searching for sources, ChatGPT sometimes inserted incorrect links and used fake or placeholder sources in academic and event research (ChatGPT, 2024d, 2024g, 2024o).

Sometimes, ChatGPT performed poorly in condensing and rewriting long texts (ChatGPT, 2024d). It is recommended to stick to a short to medium output length (one to about four paragraphs), which is the ideal length in personal experience, which Somoye, Funmi also replicated. The output quality can be improved with a precise yet comprehensive context and instruction (Browne, 2023; Macready, Hannah, 2023). Additionally, the output quality declined with the duration of the chat, and earlier instructions were disregarded (ChatGPT, 2024o). In this case, the simple solution is to open a new chat to overcome this challenge. The generation of visualizations, such as a flow chart was unsatisfactory, so it is suggested to visualize simple flow charts yourself (ChatGPT, 2024h).

4 Conclusion and Outlook

Because of significant technological advancements, it is possible to support academic work with generative AI. It was used in this seminar successfully to speed up, improve the quality of and aid in research, programming, thinking, and writing. Multiple issues with generative AI usage have surfaced in this seminar, and many limitations have become apparent. It generated faulty BibTeX entries and performs incomplete literature research, highlighting limitations and the need for manual practices and research to counteract dodginess. Nevertheless, ChatGPT proved overall helpful in efficiently providing insights and speeding up the literature review process. It demonstrated high efficiency in generating LaTeX tables and Python programming code. Additionally, it improved the text quality by proofreading. The central best practice is to check and validate ChatGPT's outputs and conduct independent research to verify its findings. Moreover, the generation of long texts and usage of one chat over extended interactions is to be avoided due to low output quality. Custom GPTs is recommended to use custom GPTs for specialized use cases, such as SciSpace for a broad overview of academic literature search and LaTeX Helper for LaTeX-related tasks. However, the default GPT works sufficiently in most cases.

Despite the outlined limitations, problems, and cost of 20€, there are many opportunities that ChatGPT brings (Filges & Niemsch, 2023). With the correct usage, it efficiently provides reliable, high-quality output and is therefore recommended with the constant reflection of its usage. As an outlook, it might be helpful to combine the insights from all students of this and the previous seminar into one coherent overview for all students and academic employees to enhance and foster the academic usage of generative AI. What is more, it might be helpful to students to have an outline of how to efficiently and effectively use generative AI for programming, for instance, with the Code Documentation Creator and GitHub Copilot.

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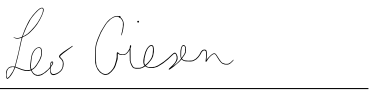

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