"What do you all actually use ChatGPT for?": The use of ChatGPT among Reddit users

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`https://github.com/mibar3/smda_final_project`

1 Introduction and motivation

The rapid proliferation of artificial intelligence tools, particularly large language models like ChatGPT, has generated widespread interest and varied applications among users across the globe. With 180.5 million users worldwide as of June 2024 [2], ChatGPT has become an integral part of many people's daily lives, offering diverse functionalities. This project explores the various ways in which users engage with ChatGPT, using Reddit as the primary data source. Reddit, one of the largest online communities with 82.7 million daily active users as of March 2024 [1], offers a rich repository of user-generated content through its subreddit structure, allowing for topic-specific discussions. To investigate how Reddit users utilize ChatGPT, this study poses three research questions: (1) Is there a significant difference in the types of tasks for which ChatGPT is used? (2) Do the comments predominantly focus on academic applications of ChatGPT? (3) Are users more likely to mention using ChatGPT for problem-solving or for generating creative content? To address these questions, I employed a combination of descriptive statistics, word clouds, sentiment analysis, and topic modeling, with Latent Dirichlet Allocation (LDA) serving as the primary method for uncovering thematic patterns in the data. However, it is important to acknowledge the limitations of using LDA in this context. While LDA is effective at identifying general themes, it has limitations in capturing the nuanced and overlapping contexts that often characterize user-generated content on platforms like Reddit. These limitations became apparent during the analysis, particularly in the difficulty of clearly answering two of the research questions using LDA alone. Additionally, the relatively small dataset, despite efforts to enhance it by splitting comments, posed challenges in ensuring a comprehensive analysis. These constraints suggest that while the study provides valuable insights, a more robust methodological approach could yield deeper understanding of how users interact with ChatGPT.

2 Data retrieval

PRAW (Python Reddit API Wrapper) was used to retrieve the comments from 6 different community subreddits titled "What do you all actually use ChatGPT for?" or almost identical. Usernames, comments and each comment's like count were stored in a csv file. Exclusively top-level comments were included, which are the primary responses or contributions made directly to a discussion thread. These comments are not replies to other comments but rather stand-alone inputs that appear directly beneath the original post or question. This is how I could make sure each comment was answering directly the question. 1456 comments were retrieved.

3 Data processing

In order to clean the data, four steps were initially taken. First, if any "username" had been deleted, the row containing this username would dropped. Second, any row containing a NaN value in the

"comment" column was dropped. Furthermore, rows containing empty strings or "AutoModerator" as username were also dropped, leaving the dataframe with 1362 comments.

The average comment length in characters was 277, and the average comment length in words 49, meaning most people would elaborate their answers. The average like count per comment was 6. I had a presumption that there might be a relation between comment length and like count. The comment with the highest like count (838) had a word count of 97, whereas the longest comment (936 words) only had 1. When taking a deeper look into these two comments, it is clear that the comment with most likes evoked a certain emotional reaction among users, since it was about using ChatGPT to assist in a medical emergency. The graphs in the Appendix further display the slight relation between like count and comment length. The user engagement statistics showed an average of 1.03 comments per user with most users contributing just 1 comment, while a few users have significantly higher engagement, the top contributor posting 12 comments.

The next step consisted of splitting and normalizing the comments. This was important since many users included multiple paragraphs in their one comment, sometimes merely to organise their thoughts, but sometimes to share multiple ways in which they use ChatGPT. The comments were split in order to best diversify the data, considering the rather low number of comments I was working with. After splitting, the data consisted of 2297 comments. Text normalization was achieved using the Natural Language Toolkit (nltk) library in Python. Some custom stopwords were added such as "chatgpt","thing", "help", "question", "something" among others that did not provide insight the applications of ChatGPT. The most common words were identified and displayed in two different world clouds, one containing the normalized data and custom stopwords, and the other containing the same but only nouns. When looking at both clouds there is a clear pattern, many users used work related words. The noun-only cloud provides a clearer overview, and makes two words stand out "everything" and "anything". It also highlights how "time" is one of the most relevant factor for the users, aside from emails and code. This might just provide some insight into what will come next.

(a) World cloud with custom stopwords   (b) World cloud with custom stopwords and only nouns

Figure 1: World clouds

Furthermore, sentiment analysis was modestly conducted using VADER for an overall sentiment overview. Results showed that most comments were categorized as positive (1237 comments, 53.85%), then neutral (773 comments, 33.65%) and finally negative (287, 12.49%). It is important to note that for this data there is no ground truth, so accuracy scores weren't included. In addition, the already split comments were fed to VADER, meaning there are multiple sentiments per comments. This was relevant because if comments include multiple uses for ChatGPT, a user might have different sentiments regarding the different uses.

4   Topic Modeling using LDA

As mentioned, I decided to use Latent Dirichlet Allocation (LDA) to conduct my topic modeling. LDA is commonly chosen because it effectively discovers the underlying topics in a large collection of documents by modeling the distribution of words across topics, making it a widely used and well-established method for uncovering hidden thematic structures.

My first model included all, non-filtered tokens in order to first see how the model could perform when including all normalized data, without excluding any word i.e. using stopwords. I began with

13 topics and 30 passes. One of the most challenging parts, if not the most challenging part of topic modeling is determining the right number of topics, and then finding the balance between topic number and number of passes. The latter refers to the number of times the algorithm will pass over the entire corpus during the training process. I quickly realised that 13 topics was not enough, and kept increasing the topic number, each time manually looking at the topics and searching for any discrepancies in the word selection for each topic. Eventually it became clear that the best overview would be achieved by excluding all words other than nouns. Nouns already typically represent key subjects, topics, or entities that are central to the purpose and context of text. Once I started using only noun tokens the topics became more clear. Indices were also included, in an attempt to support my topic number choice. The chosen indices were: Coherence Score: Measures the semantic similarity of words within topics; higher values indicate more interpretable topics, making it a key metric for topic quality, u_mass Coherence Score, c_npmi Coherence Score, Perplexity, Average Jaccard Diversity, Average Topic Exclusivity. Together, these scores would assess the quality, coherence, distinctiveness, and predictive power of the topics generated by the model, helping to identify the optimal number of topics for clear and meaningful insights. However it is relevant to point out, that these values cannot be the sole basis on choosing the topic number, and the researcher should ultimately consider the research question(s) as guidance for the selection.

In order to orientate myself further, I looked at the main coherence score, and tested topic numbers ranging from 10 to 75, in steps of 5, keeping the passes at 20. The best score came from 55 topics, 0.5096. However, when looking at the topics, there was too much granularity and overlapping of the topics. The Markdown file "LDA_topic_number_results.md" contains the attempts at finding the appropriate topic number. Ultimately, 20 topics with 20 passes was selected as the best combination, which wasn't too granular but still managed to cover the uses of ChatGPT holistically. With 20 topics the model produced worse indices than with 55 topics, but with the purpose of the project in mind, 20 topics were still considered better than 55. With the help of ChatGPT I titled every topic. To see the full list of topics see the Appendix.

4.1 Using ChatGPT for topic modeling

In addition to my own selection of topic number, I fed the dataframe to ChatGPT to see how many topics it would find fitting, also explaining the purpose of the project. The LDA model from ChatGPT identified 9 topics based on the noun tokens in my dataframe data. The comparison between my chosen topic model (20 topics) and that of ChatGPT reveals that while both analyses cover similar thematic areas like work, communication, coding, and language, there are key differences in granularity and scope. ChatGPT's LDA analysis produced broader, more generalized topics that combine related themes, such as merging coding with technical assistance or planning with suggestions. In contrast, my analysis identified more specific, narrowly focused topics, like "Children and Educational Activities" and "SEO and Team Contracts." The similarities indicate a common understanding of the general use cases of ChatGPT, but the differences highlight varying interpretations of how these themes are grouped and categorized. Overall, the takeaway is that both analyses offer valuable insights, ChatGPT providing an even more holistic view and my model delivering a detailed, segmented understanding of user interactions. To see the full list of the topics identified by ChatGPT see the Appendix or the "chatgpt_created_topics.md" file for even more details.

4.2 Topic intrusion test

In order to validate my results, I conducted a topic intrusion test with four subjects. In LDA, an intrusion test (or topic intrusion test) is a human evaluation method used to assess the quality of the topics generated by the model. The goal is to check how coherent the topics are by testing whether humans can identify when an unrelated word (an "intruder") is introduced into a list of words associated with a specific topic. Since LDA is an unsupervised learning algorithm, traditional metrics like accuracy or precision aren't applicable. The intrusion test offers a qualitative way to assess the model's performance. I therefore chose a sample of 6 topics based their thematic differences: Daily routines, work-related activities, internet use, language and communication, children's education, and technical topics like scripting and AI. The intruders were manually selected based on other topics' most salient

words. Participants were asked via a Google questionnaire to select the intruder among each topic, with no contextual information about the project. They were also asked about the difficulty of it, and if there was a specific question that posed particular difficulty. The file "topics_for_intrusion_test.md" contains the LDA results, all categories, chosen topics for the test and intruder words. These were the topics and respective intruders chosen.

- **Daily Routines and Practices (Topic 0)**: "video" (from Topic 7)

- **Work and Interviews (Topic 1)**:"grammar" (from Topic 4)

- **Google and Online Content (Topic 2)**:"therapist" (from Topic 5)

- **Language and Communication (Topic 4)**:"life" (from Topic 13)

- **Children and Educational Activities (Topic 7)**: "recipe" (from Topic 19)

- **Scripting and AI (Topic 11)**: "minute" (from Topic 17)

The upcoming table displays the results of the intrusion test. Each row corresponds to one participant, under each topic number are the answer each participant selected as the intruder. Participants performed well, all achieving over 50%, 3/4 finding the test difficult. Topic 0 and Topic 7 were the only ones where the intruder wasn't successfully identified. Not included in the table are the answers to the final question: if there there were any difficult questions in the questionnaire, which ones. To this the users answered: - , 1, 4, 1 respectively. For a full list of the words used for each question, please see the Excel file "Intrusion_test" containing the full questionnaire with answers.

Points	Topic 0	Topic 1	Topic 2	Topic 4	Topic 7	Topic 11	Difficult?
6 / 6	video	grammar	therapist	life	recipe	minute	No
5 / 6	video	grammar	therapist	life	philosophy	minute	Yes
5 / 6	practice	grammar	therapist	life	recipe	minute	Yes
4 / 6	video	hour	therapist	life	philosophy	minute	Yes

Table 1: Intrusion Test Results

5   Analysis

Table 2: Topics Overview

Topic Number	Topic Name	Topic Number	Topic Name
0	Daily Routines and Practices	10	Reports and Writing Styles
1	Work and Interviews	11	Scripting and AI
2	Google and Online Content	12	Questions and School Planning
3	Games and Support Systems	13	Business and Life Studies
4	Language and Communication	14	Work and School Knowledge
5	Advice and Problem Solving	15	Data and Content Creation
6	Coding and Learning	16	SEO and Team Contracts
7	Children and Educational Activities	17	Research and Jobs
8	Ideas and Email Communication	18	Software and Documentation
9	Stories and Characters	19	Recipes and Design

Research question 1: Is there a significant difference in the types of tasks for which ChatGPT is used?

The topics table reveals significant differences in the types of tasks for which ChatGPT is used. I would say the results categorize these tasks into academic, professional, creative, and general assistance domains. Topics such as language and communication (Topic 4), educational activities (Topic 7), and school planning (Topic 12) fall under academic use cases. Professional tasks include work and interviews (Topic 1) and SEO and team contracts (Topic 16). Creative uses are seen in topics like games and support systems (Topic 3) and stories and characters (Topic 9). General assistance is represented by topics such as daily routines (Topic 0) and coding (Topic 6). The word clouds reinforce these categorizations by highlighting key terms associated with each domain. Common words like "work," "code," "email," and "google" appear frequently in professional and general assistance contexts. Creative domains are marked by terms like "story" and "idea," while academic contexts feature words like "research," "language," and "information." This variation underscores a significant difference in the types of tasks users associate with ChatGPT, showing a diverse range of applications.

Research question 2: Do the comments predominantly focus on academic applications* of ChatGPT? *i.e., to support educational and scholarly tasks, such as researching, writing, studying, tutoring, preparing presentations.

To address this question, examining the word clouds is more informative than LDA topic modeling alone. The word clouds indicate that academic-related terms such as "research," "language," and "information" are present but not the most frequent overall. Although these terms appear in the top nouns, they do not dominate the entire set of words. Topics directly related to academic applications include language and communication (Topic 4), educational activities (Topic 7), and school planning (Topic 12). However, the prominence of terms like "work," "code," "email," and "google" suggests that ChatGPT is also widely used for non-academic purposes. Thus, while academic applications are a notable part of the usage, they are not the predominant focus. The broader spectrum of uses captured by the word clouds highlights that ChatGPT serves a variety of purposes beyond just academic applications.

Research question 3: Are users more likely to mention using ChatGPTfor problem-solving or for generating creative content?

The word cloud data provides a clearer answer to whether users are more inclined to use ChatGPT for problem-solving or creative content. Terms associated with creative content, such as "story," "idea," and "create," are prominent. In contrast, problem-solving-related terms like "research," "information," and "data" appear less frequently in comparison. LDA topic modeling categorizes uses into problem-solving (e.g., advice and problem solving (Topic 5), coding and learning (Topic 6)) and creative content (e.g., games and support systems (Topic 3), stories and characters (Topic 9)). The word clouds show a stronger presence of creative content terms, suggesting that users are slightly more inclined to use ChatGPT for generating creative content. Although problem-solving remains a significant use case, the data highlights a marginally greater focus on creative applications.

5.1 Comparison to prompt websites

Out of curiosity, I wanted to briefly compare the topics I achieved to the categories/filters prompt websites use to distinguish the different uses for ChatGPT. My topics encompass a diverse range of subjects, including daily routines and practices, work and interviews, online content, and educational activities, which closely align with categories found on platforms like ChatGPT Prompts Hub [9] and The Prompt Index [10]. For instance, topics such as "Coding and Learning" and "Scripting and AI" align well with the "ChatGPT for Coding" and "Coding" categories, reflecting the focus on programming and technical skills. Similarly, "Business and Life Studies" resonates with categories like "Business Startups" and "Business," indicating a shared emphasis on entrepreneurial and professional development. Educational topics such as "Children and Educational Activities" and "Questions and School Planning" fit within broader educational categories, though they offer more specific insights into pedagogical and planning aspects. However, some topics, like "Daily Routines and Practices" and "Games and Support Systems," may not directly align with more specialized categories like "Customer Service" or "Gaming," yet they fit within broader categories such as "Personal Development" and "Fun." Overall, while my topics provide a detailed and specific breakdown of subject areas, they map onto existing categories from prompt websites, highlighting both overlaps and unique distinctions. The

exact categories/filters of each website can be found in the Appendix.

6   Conclusion

In conclusion, this study provides a nuanced exploration of how Reddit users engage with ChatGPT, revealing a diverse range of applications and user interests. Through comprehensive data analysis and topic modeling, I identified significant differences in how ChatGPT is utilized, with notable distinctions between academic, professional, creative, and general assistance tasks. My findings indicate that while academic applications are a key aspect of ChatGPT's use, they do not overwhelmingly dominate the discourse; instead, a broad spectrum of uses, including professional and creative applications is evident. The analysis also highlights that users are slightly more inclined to use ChatGPT for generating creative content than for problem-solving. This trend is supported by the prominence of terms related to creativity in the data, as compared to problem-solving terms. The topic modeling and word clouds collectively suggest that ChatGPT serves a wide variety of functions, from assisting with daily tasks and professional activities to fostering creative endeavors. Additionally, a comparison with prompt websites reveals that my identified topics align closely with existing categories, underscoring the relevance and applicability of my findings. Overall, this study underscored the versatility of ChatGPT and its broad appeal across different domains, providing a comprehensive overview of its multifaceted uses and user-driven applications.

7   Critique

This study offers valuable insights into the diverse ways Reddit users utilize ChatGPT, yet it is not without its limitations. The primary limitation lies in the reliance on Latent Dirichlet Allocation (LDA) for topic modeling. While LDA is a widely recognized method for identifying latent topics within text data, it struggles with the complexity and overlap inherent in user-generated content. This challenge was particularly evident in the difficulty of selecting an appropriate number of topics, which directly impacted the clarity and coherence of the findings. The mixed results from the topic intrusion test further highlighted these issues; participants found it difficult to consistently identify intruding words.

Another significant limitation is the dataset itself. Although 1,456 comments were retrieved and processed, this sample size is relatively small for a comprehensive analysis of ChatGPT usage across Reddit's vast platform. The decision to split comments to increase the dataset size, while necessary, may have inadvertently distorted the context and meaning of individual comments. Moreover, the study's exclusive focus on top-level comments excludes potentially richer, more nuanced discussions found in replies, which could have provided a deeper understanding of user interactions. Furthermore, Reddit, as a source, inherently represents a select group of individuals who are more active online and engaged with platforms like Reddit. The comments analyzed in this study are from users who chose to participate in discussions about ChatGPT, which may not capture the full range of ChatGPT's uses across all types of users. Consequently, the sample may be skewed toward certain types of interactions or applications, potentially missing out on other significant uses of ChatGPT that are not represented in the comments.

The study also relied on word clouds and sentiment analysis to provide a general overview of ChatGPT usage. While these tools offer useful insights, they lack the depth needed to fully understand the specific contexts in which ChatGPT is applied. The sentiment analysis, in particular, is limited by the absence of a ground truth for accuracy, reducing its reliability.

Despite conducting a topic intrusion test, no changes were made to the 20-topic model based on the results. This decision was influenced by the challenges of translating the intrusion test results into actionable changes, especially given the limited number of participants. Asking participants to identify intruders for all 20 topics would have been exhaustive and may not have yielded clear improvements.

In conclusion, while this study provides a foundation for exploring the varied uses of ChatGPT, its findings are constrained by methodological limitations and the inherent biases of the source data. I believe future research could benefit from more advanced topic modeling techniques, larger and more diverse datasets.

References

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A Appendix
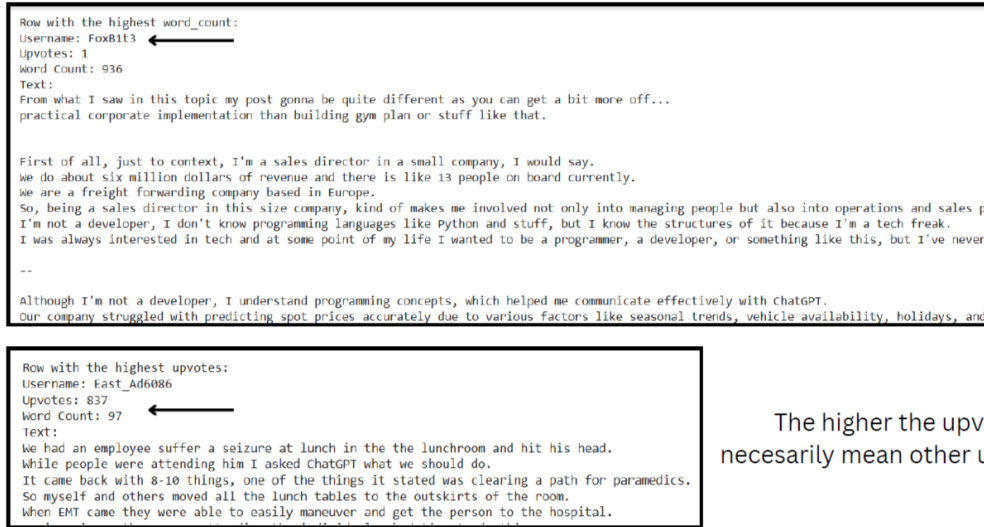
A.1 Like Count vs. Comment length

Figure 2: Comment with highest word count vs. Comment with highest Like count
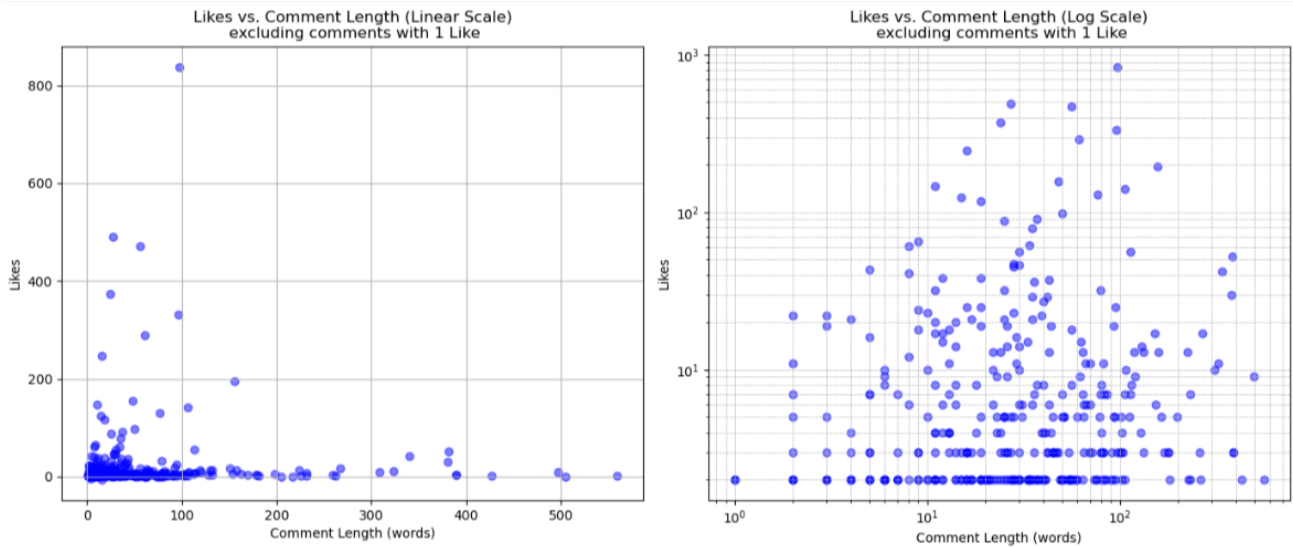

Figure 3: Scatter Plots for Like - Comment length relation

A.2 Final Topic Selection

- **Topic 0: Daily Routines and Practices**
  Salient Words: "way," "day," "practice," "house," "university"

- **Topic 1: Work and Interviews**
  Salient Words: "work," "interview," "job," "hour," "document"

- **Topic 2: Google and Online Content**
  Salient Words: "google," "description," "site," "post," "picture"

- **Topic 3: Games and Support Systems**
  Salient Words: "play," "support," "game," "assistance," "training"

- **Topic 4: Language and Communication**
  Salient Words: "language," "information," "translation," "conversation," "grammar"

- **Topic 5: Advice and Problem Solving**
  Salient Words: "question," "advice," "work," "therapist," "lesson"

- **Topic 6: Coding and Learning**
  Salient Words: "code," "question," "language," "concept," "explain"

- **Topic 7: Children and Educational Activities**
  Salient Words: "kid," "tutor," "video," "test," "philosophy"

- **Topic 8: Ideas and Email Communication**
  Salient Words: "idea," "email," "image," "point," "message"

- **Topic 9: Stories and Characters**
  Salient Words: "character," "story," "idea," "scene," "history"

- **Topic 10: Reports and Writing Styles**
  Salient Words: "report," "letter," "project," "style," "cover"

- **Topic 11: Scripting and AI**
  Salient Words: "script," "python," "ai," "text," "query"

- **Topic 12: Questions and School Planning**
  Salient Words: "question," "plan," "school," "solution," "meal"

- **Topic 13: Business and Life Studies**
  Salient Words: "business," "life," "case," "study," "home"

- **Topic 14: Work and School Knowledge**
  Salient Words: "work," "school," "knowledge," "issue," "fact"

- **Topic 15: Data and Content Creation**
  Salient Words: "data," "article," "tool," "blog," "content"

- **Topic 16: SEO and Team Contracts**
  Salient Words: "seo," "page," "contract," "team," "programming"

- **Topic 17: Research and Jobs**
  Salient Words: "research," "job," "source," "tech," "minute"

- **Topic 18: Software and Documentation**
  Salient Words: "software," "documentation," "check," "project," "week"

- **Topic 19: Recipes and Design**
  Salient Words: "recipe," "design," "coworker," "writing," "type"

A.3 ChatGPT's LDA model topics

- **Topic 1: Creative Projects and Content Creation**
  Salient Words: idea, job, story, word, game, post, image, work, description, interview

- **Topic 2: Business and Professional Communication**
  Salient Words: business, point, create, way, description, letter, recommendation, year, plan, product

- **Topic 3: Research and Information Gathering**
  Salient Words: google, search, time, answer, task, grammar, check, topic, engine, information

- **Topic 4: Planning and Suggestions**
  Salient Words: plan, tool, suggestion, movie, book, study, day, meal, work, list

- **Topic 5: Coding and Technical Assistance**
  Salient Words: code, time, research, work, word, job, issue, bit, program, assistant

- **Topic 6: Language Learning and Practice**
  Salient Words: language, practice, example, kid, student, voice, conversation, generate, response, therapy

- **Topic 7: Workplace Communication**
  Salient Words: email, work, project, idea, fun, report, life, day, step, problem

- **Topic 8: Text and Code Management**
  Salient Words: work, school, code, text, message, paste, advice, copy, line, example

- **Topic 9: Data Analysis and Development**
  Salient Words: work, day, data, time, world, video, python, story, hour, example

A.4 ChatGPT Prompts Hub

The following categories are used on ChatGPT Prompts Hub:

- Act as for ChatGPT

- All ChatGPT Plugins

- Amazing Prompts

- Analytics

- Art and Design

- Business Startups

- Career Development

- ChatGPT for Coding

- ChatGPT Plugins

- Customer Service

- Cooking

- E-commerce

- Education

- Environment and Sustainability

- Fashion

- Financial Services

- Gaming

- Health and Fitness

- Home Improvement

- Innovation

- Legal Advice

- Movies and Entertainment

- Music

- Parenting

- Personal Development

- Politics

- Relationships

- Sports

- Teaching

- Technology

- Travel Planning

- Web Content

A.5   The Prompt Index

The following filters are used on The Prompt Index:

- All

- Act as

- Misc

- Business

- Education

- Fun

- Personal

- Marketing

- AI

- Image

- Coding