



Research Article

# Generative Models in Natural Language Processing: A Comparative Study of ChatGPT and Gemini

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## ABSTRACT

Generative models in natural language processing (NLP) have transformed machine interactions with human language. This research offers a comparative examination of ChatGPT and Gemini, two cutting-edge NLP models. This research elucidates the distinct strengths and shortcomings of each model by analyzing conversational fluency, diversity, and contextual accuracy. ChatGPT has exceptional originality in word production, but Gemini excels in contextual variety and sophisticated learning methodologies. The results highlight the revolutionary capability of generative models in fields such as education, customer service, and content production. Anticipated future improvements in this field are projected to enhance these capabilities, promoting wider societal and industrial advantages.



## 1. INTRODUCTION

The swift and exponential progress in artificial intelligence, particularly in natural language processing, has significantly increased its complexity and practical applicability in educational and industrial sectors. In response to the increasing needs in these sectors, generative models have become a crucial and essential element of natural language processing approaches. Our study seeks to do a detailed comparative analysis of two notable generative models [1]. Utilizing these generative models has resulted in a significant improvement in the conversational capabilities of natural language processing systems. Through comprehensive training on vast and varied datasets, these models have exhibited an exceptional capacity to attain conversational proficiency comparable to human interaction. Indeed, in some contexts, these generative models have demonstrated superior skill relative to human counterparts [2]. The ramifications of these findings are significant and extensive, as the enhanced capabilities of generative models could transform numerous sectors that depend on natural language processing. Educational institutions can utilize these models to create intelligent tutoring systems that engage and support students in a personalized and adaptive way. In the industrial sector, generative models can significantly improve customer service by delivering extremely responsive and efficient chatbot systems [3]. The extensive utilization of generative models may result in progress in areas such as virtual assistants, voice recognition, and automatic translation systems. As these models advance and improve, the likelihood of attaining human-like conversational abilities that can significantly benefit society increases [4].

Generative models are founded on the principle of training artificial intelligence to produce material that resembles human writing. Currently, numerous research studies and academic articles have been published on this issue, and it is rapidly emerging as a compelling and essential subfield in artificial intelligence. The main aim of this comprehensive study is to

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determine and identify the optimal models for training purposes [5]. One approach specifically emphasizes refining the capacity to converse in real human language, while another model prioritizes the application of extensive frameworks like the coding model. This study is crucial for understanding and interpreting contemporary conversational models and the methods used to refine them. It offers a comprehensive and detailed examination of the training process of these models [6]. Our objective is to thoroughly analyze the various capacities of these models based on the current literature and to reference specific dialogue lines examined during this research. To accomplish this, we had thorough discussions with both bots and rigorously assessed their current capabilities. No explicit investigation of this sort has been documented in the current literature, underscoring the uniqueness and importance of our findings [7].

## 2. NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) denotes the automated analysis of human language by computers. NLP allows computers to comprehend, assess, manipulate, and react to natural language similarly to humans. The procedure entails reading, comprehending the significance thoroughly, and subsequently generating human-like replies. Based on transdisciplinary science, NLP is related to computer science, artificial intelligence, and linguistics [8]. Traditionally, NLP relied on grammar and formal rules to adopt the syntax and semantics of a language, and limited datasets to train a model. However, this approach further increased the complexity of NLP because assertive rules, semantics, and machine learning models need to be combined. As a result, it shifted the focus to machine learning, which uses blocks of certain techniques anchored to specific features of NLP [9].

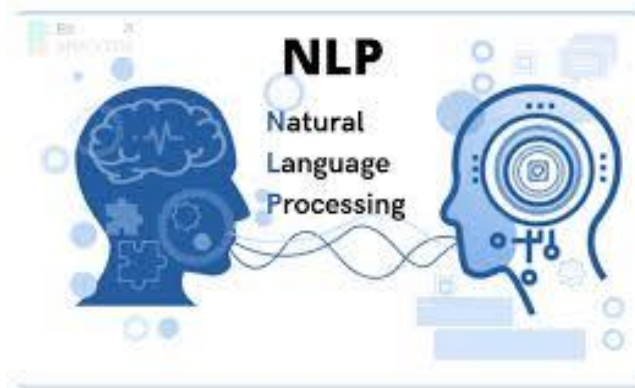


Fig. 1. Natural Language Processing (NLP)

NLP techniques usually include tokenization, parsing, semantic analysis, pragmatics, and speech recognition. It is used for multiple web applications, including content classification, machine translation, sentiment analysis, question answering, recognizing search intent, summarizing, and identifying abusive language in social media, chatbots, and automatic replies [10]. NLP holds prime importance in modern web search engines for processing ambiguous keywords using semantic searches by analyzing the user's intent and meaning. Sometimes, a specific arrangement of words in a sentence may change the meaning completely, which is known as a word or lingual play, another challenge of NLP. This makes NLP trickier to adapt language fluency; therefore, researchers are still in search of tools and techniques to implement the conversational context in web applications [11].

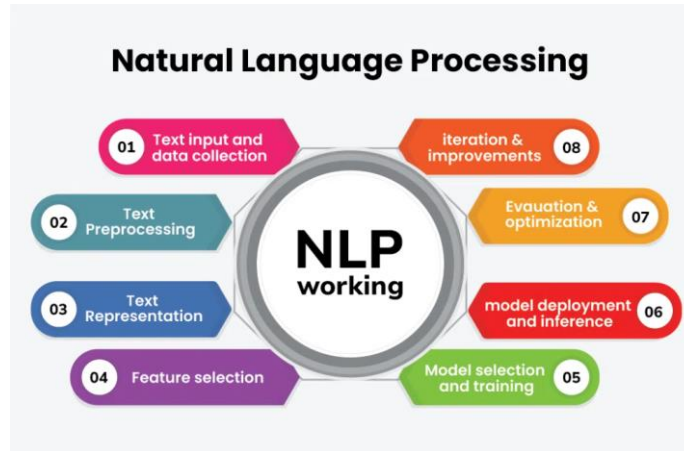


Fig. 2. NLP Steps

In this study, we have designed an experience of models of GPT by examining two popular state-of-the-art NLP models and comparing their performance on cognitive evaluations with the sole purpose of resolving all claims mentioned regarding their efficiency in the Chat Dialogue System.

### 3. GENERATIVE MODELS IN NLP

Generative models are fast making an impact on applications under natural language processing. At the heart of generative models are the principles of utilizing a large amount of data that is rich in content, and modeling them through deep learning models to then mimic human-like correspondences in terms of generation. These models have shown to have the potential for applications of text style transfer, abstractive summarization, question answering, language translations, and conversational agents [1]. In this project, we seek to do a deep dive study into two generative models, ChatGPT and Gemini. Generative models help in rewriting, summarization, and translations using a model that is trained using alphanumeric characters. These models are built by leveraging a large amount of data, using variations of the transformer model [12].

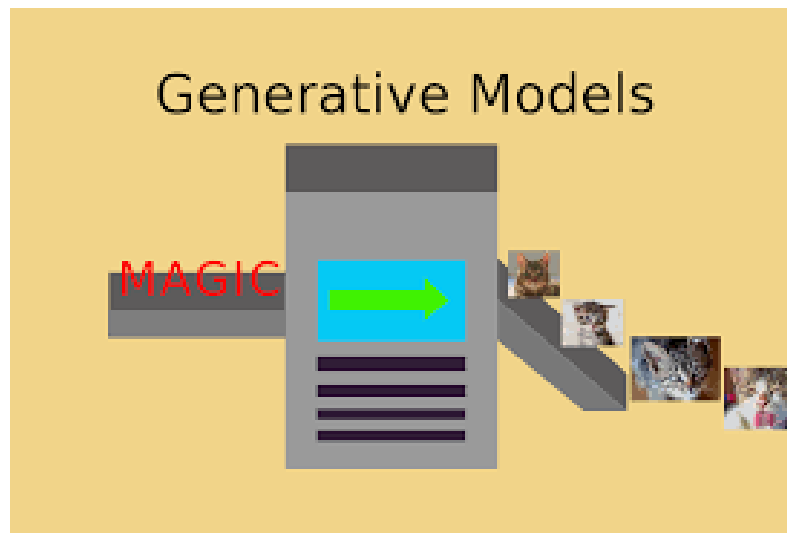


Fig. 3. Generative models

Generative models in NLP have shown to transform multiple fields such as text generation, making user interaction much more engaging, abstractive summarization, travel booking chatbots, and story generation, creating a dramatic and meaningful conversation between more than two persons. This is possible because of the vast amount of content developed out of popular usage of the internet, including books and novels. Some of the efficient models that have been developed leveraging the generative model in the NLP domain are BERT model using attention mechanism, generative pre-trained transformer, and variants of GPT-2 and GPT-3 called ChatGPT and Gemini [13].

In this paper, we are to take a deeper look into the phenomenon by doing an exploratory analysis and deeper studies on two generative conversational models, ChatGPT and Gemini. In this analysis, we are interested in studying the conversation patterns and responses either by chats or by images in the conversation. The results will provide us with the strengths and weaknesses of each of ChatGPT and Gemini, considering the fluency and relevancy of the conversation generated.

### 3.1. ChatGPT

Generative models are widely appreciated in natural language processing (NLP) to support a rich class of conversational systems. While many of these models have been developed for specialized uses, one of the most notable generative models is ChatGPT. In this section, we present an overview of ChatGPT, its architectural design, training strategy, and several concerns before discussing the results obtained. Lastly, we provide some real-world examples of using ChatGPT-based conversational agents [14].

ChatGPT is one of the most recent generative conversational models developed for constructing dialog systems that support human-like conversational interactions. It is implemented based on the Generative Pre-trained Transformer (GPT) architecture, which is optimized for language modeling tasks through a multimodal architecture and a large number of parameters. ChatGPT is trained with simple training strategies: it is trained using reinforcement learning strategies to directly optimize for human-style feedback, such as feeling creative, amused, happy, curious, and polite, among others, for the generated responses [15]. Specifically, ChatGPT is trained with a large and diverse dataset from human dialog examples. The dataset of ChatGPT contains human responses to one of the dialog systems developed called Mechanical Turk. This demonstrates its ability to handle the diversity of dialog data efficiently. Additionally, ChatGPT is trained with a diverse range of tasks in dialog systems. This makes it effective in understanding multiple conversation styles and tasks in a single conversational agent [16]. In general, it is evident that there is substantial research progress in conversation generation systems, and some of these capabilities are highlighted in the results of the Chat models provided and further discussed in different application areas. Nonetheless, we argue that more systematic research is needed to compare these capabilities of ChatGPT with prior work before determining their relative performance and differentiation from other conversation models [17].

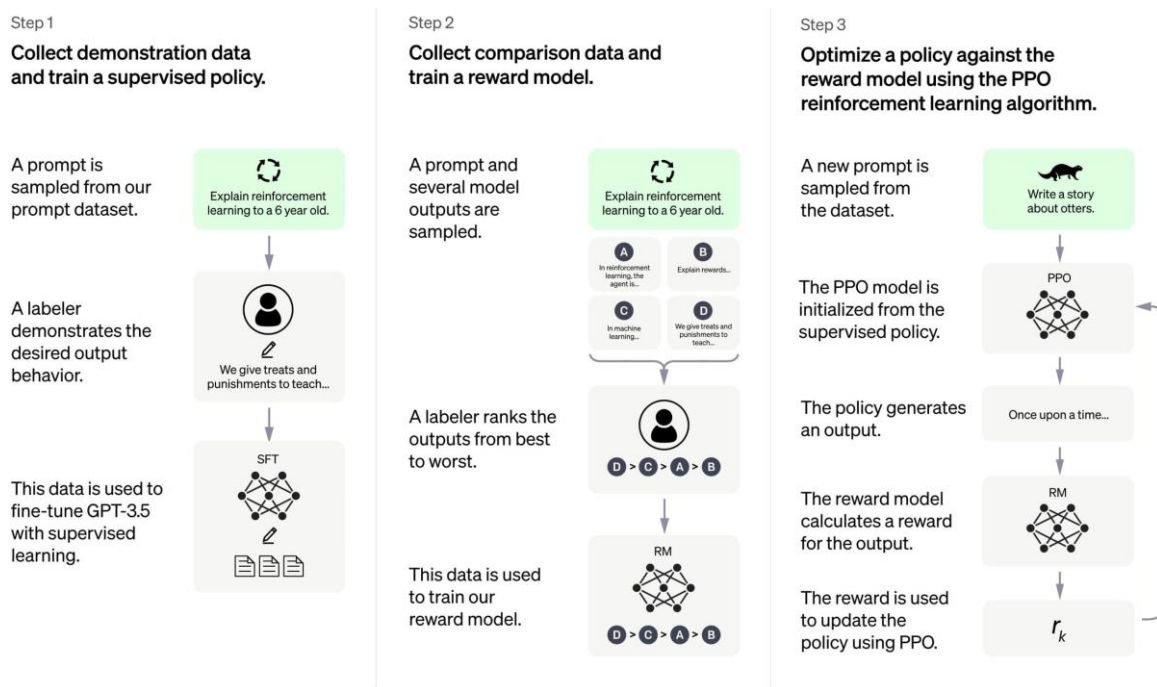


Fig. 4. ChatGpt works

### 3.2. Gemini

Gemini, also an influential generative model, has its unique features compared to ChatGPT. Gemini is designed with the properties of NLP in mind. Firstly, to handle the data diversity problem, we should have a model trained with diverse data, covering multiple types of texts for versatile general NLP tasks, while models focus on one specific area [18]. Secondly, Gemini research is working on more learning algorithms, differing from the traditional algorithm. Thirdly, the conventional model can only process one paragraph and cannot be used to form a two-topic dialogue. However, Gemini is trained in two

ways: one is by combining all the paragraphs of every topic, and the other method is training paragraph by paragraph. In real-world scenarios, an agent should allocate different IDs to track open issues. Gemini learns from all available data, then reads past discussions and generates the subsequent paragraph, where agents usually refer back to the available data. Based on this comparison, we can present a more detailed analysis [19].

Gemini does not generate coherent dialogues like ChatGPT, but it analyzes the contexts and the probabilities of responses in several tasks of Natural Language Processing. It introduces a specific approach to using Gemini, such as spotting and constructing the reasoning of entailment, sorting and selecting by file content, and applying a model on a large scale with human labeling. Gemini is an upgraded version of several existing systems. Gemini effectively simulates and evaluates system quality [20]. The greatest innovative value of Gemini lies in the fact that it integrates a large variety of typical NLP tasks into one system. Gemini emulates and simulates system size and constraints with beam search. It combines sparsity, beam search, ensemble, and community deletion to improve computational efficiency and select optimal responses from a diversified pool. Gemini integrates a renormalization technique to adapt to new data rather than retraining the whole system for every new data increase. Gemini utilizes an incremental training strategy and divides pre-training and fine-tuning [21]. Gemini has been tested in a business scenario and received positive reviews. In real-world scenarios, Gemini may analyze richer text contexts to generate responses, resulting in better performance due to more abundant learning data in the application task. This subsection introduces the chat architecture of Gemini. It can be seen from the experiment that one of the two chat modes has a more complete text context at the expense of a deduplication operation, while the other mode has a larger model size at a different cost. Therefore, it is possible to further adjust the response ranking [22]. Gemini is a language model and can be applied to various NLP tasks. Another language model also exists, but Gemini has a general evaluation for all costs. Gemini uses training data twice and generates responses. Gemini demonstrates its characteristics in NLP tasks by evaluating the responses of the chores from two different starting points. Gemini is tested and measured by performance indicators. The Gemini task can generate tasks centered on real work and show better results in a series of NLP task evaluations than others [23].

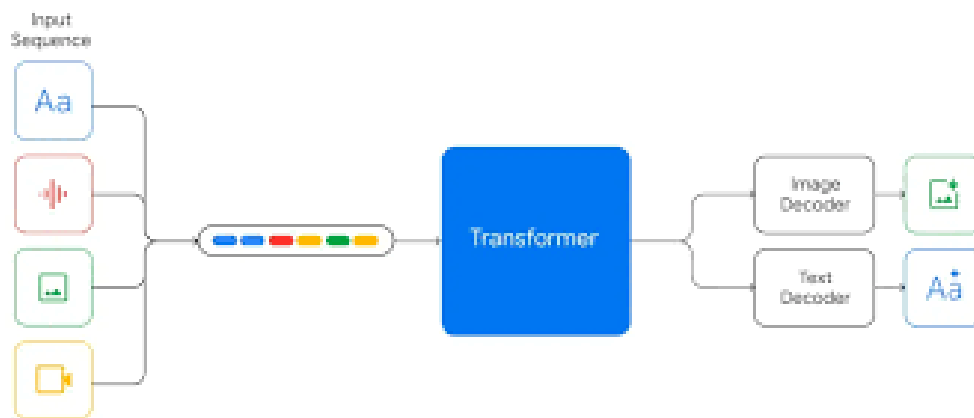


Fig. 5. Gemini Works

## 4. METHODOLOGY

We made a point to ensure our data collection, preparation, and analysis processes aligned with good meta-comparative practice. We are committed to maintaining the trustworthiness of our processes and the conclusions we ultimately draw from this study. Consequently, those who would like to reproduce or verify the outcomes of our study can refer to this methodology section. We discuss ethical considerations surrounding both the data used in this study—which has been vetted for public use by previous studies and selectively managed for privacy reasons—and the models assessed throughout its duration.

### 4.1. Dataset

The data set used is 20 questions in different fields that are used in both models and the questions are as follows:

1. What are the benefits of daily reading?
2. Explain the concept of artificial intelligence in simple language.
3. What is the difference between machine learning and deep learning?
4. Describe the importance of personal goals in professional success.
5. What are the most prominent challenges in preserving the environment?
6. Explain how neural networks work.

7. What is the role of encryption in protecting data?
8. How does solar energy contribute to reducing carbon emissions?
9. Mention practical applications of Internet of Things technology.
10. What are the uses of reinforcement learning in games?
11. Write a short story about a fictional adventure in space.
12. Imagine that you are a journalist, and write a report about a future city.
13. How can a person learn a new language quickly?
14. If you could travel through time, where would you go and why?
15. Write a description of a fictional character who lives in an underwater world.
16. What are the pros and cons of using self-driving cars?
17. How does artificial intelligence affect the labor market?
18. Discuss the ethical challenges associated with the use of robots in warfare.
19. Explain the role of social media in spreading misleading news.
20. What are the social implications of people's reliance on smart technology?

## 4.2. Metrics

The measures used to compare the two models are the Self-BLEU and Distinct scores for each model based on the results of the 20 questions.

Self-BLEU is a measure used in evaluating text generation models (such as language models) to determine how diverse the texts they generate are. It is calculated using the traditional BLEU formula, but instead of comparing the generated texts to reference texts, the generated texts are compared to each other.

Usage: If Self-BLEU is high, it indicates that the generated texts are very similar to each other (low diversity). If Self-BLEU is low, it indicates that the texts are diverse and different.

Distinct is another metric used to evaluate the diversity of generated texts. It is the percentage of unique n-grams (i.e. words or short phrases) in the generated texts.

Common versions:

Distinct-1: Percentage of unique words (uni-grams).

Distinct-2: Percentage of unique word pairs (bi-grams).

Usage: The higher the Distinct value, the more diversity the generated texts have.

For example:

If all texts are identical or contain very frequent words, the Distinct value will be low.

If texts contain many unique words or phrases, the value will be high.

## 5. Results and Comparison of ChatGPT and Gemini

The results generated from the answers we obtained in both models are shown in Table 1:

TABLE I. Results FOR BOTH MODELS CHATGPT AND GEMINI.

No	question	ChatGpt	Gemini
1	What are the benefits of daily reading?	<ul style="list-style-type: none"> <li>• Improves vocabulary and language skills.</li> <li>• Enhances focus and concentration.</li> <li>• Reduces stress and provides relaxation.</li> <li>• Stimulates creativity and imagination.</li> <li>• Expands knowledge and understanding of the world.</li> <li>• Promotes mental health by keeping the brain active.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Enhances cognitive function:</b> Improves memory, concentration, and critical thinking.</li> <li>• <b>Expands vocabulary:</b> Introduces new words and phrases.</li> <li>• <b>Boosts creativity:</b> Stimulates imagination and problem-solving skills.</li> <li>• <b>Reduces stress:</b> Provides relaxation and mental escape.</li> <li>• <b>Increases empathy:</b> Develops understanding of different perspectives.</li> </ul>
2	Explain the concept of artificial intelligence in simple language.	Artificial Intelligence refers to the ability of machines and computers to mimic human thinking and perform tasks such as problem-solving, decision-making, and	AI is the science of making intelligent machines, especially intelligent computer programs. It involves creating systems that



		learning from experience. For example, virtual assistants like Siri or Alexa use AI to understand and respond to commands.	can learn, reason, and make decisions like humans.
3	What is the difference between machine learning and deep learning?	<ul style="list-style-type: none"> <li>• <b>Machine Learning (ML):</b> A subset of AI where algorithms learn patterns from data to make decisions. For example, spam email filters.</li> <li>• <b>Deep Learning (DL):</b> A subset of ML that uses neural networks with many layers to analyze large datasets. It powers technologies like facial recognition and autonomous vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Machine Learning:</b> A subset of AI that involves training algorithms on data to make predictions or decisions.</li> <li>• <b>Deep Learning:</b> A specific type of machine learning that uses artificial neural networks to learn complex patterns in large datasets.</li> </ul>
4	Describe the importance of personal goals in professional success.	Personal goals provide direction and motivation, helping individuals stay focused. They act as a roadmap, allowing people to measure progress and stay committed to achieving milestones in their careers, leading to growth and satisfaction.	Personal goals provide direction, motivation, and a sense of purpose. They help you stay focused, make better decisions, and achieve long-term success.
5	What are the most prominent challenges in preserving the environment?	<ul style="list-style-type: none"> <li>• Climate change and global warming.</li> <li>• Deforestation and habitat destruction.</li> <li>• Plastic pollution in oceans and ecosystems.</li> <li>• Over-reliance on fossil fuels.</li> <li>• Balancing industrial growth with ecological conservation.</li> </ul>	<ul style="list-style-type: none"> <li>• Climate change</li> <li>• Pollution</li> <li>• Deforestation</li> <li>• Loss of biodiversity</li> <li>• Overexploitation of resources</li> </ul>
6	Explain how neural networks work.	Neural networks are computational models inspired by the human brain. They consist of interconnected layers of nodes (neurons) that process data by passing it through weights and biases. Neural networks are used in tasks like image recognition, speech processing, and language translation.	Neural networks are inspired by the human brain. They consist of interconnected nodes (neurons) that process information. By adjusting the connections between neurons, the network learns to recognize patterns and make predictions.
7	What is the role of encryption in protecting data?	Encryption transforms data into a coded format that can only be accessed by authorized parties with a decryption key. It ensures data confidentiality, integrity, and security, protecting sensitive information like financial transactions or personal communications.	Encryption is the process of converting information or data into a code, preventing unauthorized access. It ensures the confidentiality, integrity, and availability of data.
8	How does solar energy contribute to reducing carbon emissions?	Solar energy reduces carbon emissions by replacing fossil fuels with a clean, renewable energy source. Solar panels harness sunlight to generate electricity, reducing reliance on coal, oil, and gas, which emit greenhouse gases.	Solar energy is a clean and renewable source of energy that doesn't produce greenhouse gases like carbon dioxide. By harnessing solar power, we can reduce our reliance on fossil fuels and lower carbon emissions.
9	Mention practical applications of Internet of Things technology.	<ul style="list-style-type: none"> <li>• Smart home devices like thermostats and lights.</li> <li>• Wearable health monitors like fitness trackers.</li> <li>• Connected cars for navigation and diagnostics.</li> <li>• Smart agriculture tools for precision farming.</li> <li>• Industrial IoT for predictive maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Smart homes</li> <li>• Wearable technology</li> <li>• Industrial automation</li> <li>• Healthcare monitoring</li> <li>• Agriculture</li> </ul>
10	What are the uses of reinforcement learning in games?	Reinforcement learning trains agents to make decisions by rewarding positive actions and penalizing negative ones. It is used in developing AI for video games, allowing characters to adapt and respond dynamically to player actions.	Reinforcement learning is used to train AI agents to play games by rewarding them for making correct moves and penalizing them for incorrect ones. This allows AI agents to learn optimal strategies and improve their performance over time.

11	Write a short story about a fictional adventure in space.	On a distant planet, explorer Mira discovered an ancient alien city shimmering with bioluminescent colors. With her AI companion Zyx, she decoded a mysterious message warning of an intergalactic storm. Racing against time, Mira and Zyx activated an ancient shield, saving not only the planet but countless other worlds.	A lone astronaut, adrift in the vast expanse of space, their ship damaged and hope dwindling. As they drifted, they stumbled upon an ancient alien artifact, a gateway to a forgotten civilization. The artifact, pulsating with otherworldly energy, transported them to a lush, alien planet. There, they encountered beings of pure energy, who shared their knowledge and wisdom. The astronaut, forever changed by this experience, returned to Earth, determined to use their newfound understanding to benefit humanity.
12	Imagine that you are a journalist, and write a report about a future city.	In the year 2050, "Neon Nexus" has become the pinnacle of futuristic living. Powered entirely by renewable energy, its citizens commute using levitating pods. Vertical gardens supply food, while AI ensures public safety. The city stands as a testament to innovation and sustainability.	<i>Neotopia</i> , a city of the future, is a marvel of sustainable technology and harmonious living. Towering skyscrapers, powered by clean energy, pierce the sky. Autonomous vehicles glide silently through the streets, reducing traffic congestion and pollution. Advanced AI systems optimize resource allocation, ensuring a sustainable future. Citizens enjoy a high quality of life, with access to cutting-edge healthcare, education, and entertainment. However, challenges remain, such as addressing digital inequality and ensuring ethical AI development.
13	How can a person learn a new language quickly?	<ul style="list-style-type: none"> <li>• Immerse yourself in the language through media and conversations.</li> <li>• Practice daily, focusing on speaking and listening.</li> <li>• Use flashcards and apps for vocabulary building.</li> <li>• Join language groups or find a partner for regular practice.</li> <li>• Set realistic goals and reward progress.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Immersion:</b> Surround yourself with the language, watch movies, listen to music, and practice speaking with native speakers.</li> <li>• <b>Active Learning:</b> Use language learning apps, flashcards, and language exchange partners.</li> <li>• <b>Consistent Practice:</b> Dedicate time daily to practice reading, writing, speaking, and listening.</li> <li>• <b>Set Realistic Goals:</b> Break down your learning into smaller, achievable steps.</li> <li>• <b>Don't Be Afraid to Make Mistakes:</b> Mistakes are a natural part of the learning process.</li> </ul>
14	If you could travel through time, where would you go and why?	If I could travel through time, I would visit the Renaissance era to witness the flourishing of art and science firsthand, meet visionaries like Leonardo da Vinci, and experience the cultural rebirth that shaped the modern world.	I would travel to the Renaissance era, a time of great artistic, scientific, and cultural flourishing. I'd love to witness firsthand the works of Leonardo da Vinci, Michelangelo, and Shakespeare. I'd also be fascinated to learn about the world's transition from the medieval to the modern era.
15	Write a description of a fictional character who lives in an underwater world.	Lira, the bioluminescent mermaid, has scales that shimmer in shades of sapphire and emerald. She navigates the coral forests of Atlantis, her voice enchanting sea creatures as she guards the ancient secrets of her underwater realm.	<i>Marina, a graceful merfolk with scales shimmering like moonlight, roams the vibrant coral reefs. With her long, flowing hair and ethereal beauty, she is a guardian of the ocean's secrets. Marina possesses extraordinary abilities, such as telepathy and the power to control marine life. She is fiercely protective of her underwater kingdom and often clashes with human divers who threaten the delicate balance of the marine ecosystem.</i>
16	What are the pros and cons of using self-driving cars?	<b>Pros:</b>	<b>Pros:</b>



		<ul style="list-style-type: none"> <li>• Reduces accidents caused by human error.</li> <li>• Enhances mobility for people with disabilities.</li> <li>• Reduces traffic congestion with efficient navigation.</li> </ul> <p><b>Cons:</b></p> <ul style="list-style-type: none"> <li>• High initial costs and maintenance.</li> <li>• Concerns over hacking and data security.</li> <li>• Ethical dilemmas in unavoidable accident scenarios.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Increased safety:</b> Reduced accidents caused by human error.</li> <li>• <b>Improved traffic flow:</b> Optimized traffic patterns and reduced congestion.</li> <li>• <b>Accessibility:</b> Enhanced mobility for people with disabilities.</li> <li>• <b>Reduced environmental impact:</b> Potential for more efficient transportation and reduced emissions.</li> </ul> <p><b>Cons:</b></p> <ul style="list-style-type: none"> <li>• <b>Technological limitations:</b> Challenges in handling complex driving scenarios, especially in adverse weather conditions.</li> <li>• <b>Ethical dilemmas:</b> Difficult decisions in accident scenarios, such as choosing between pedestrians and passengers.</li> <li>• <b>Cybersecurity risks:</b> Vulnerability to hacking and other cyberattacks.</li> <li>• <b>Job displacement:</b> Potential job losses for truck drivers and taxi drivers.</li> </ul>
17	How does artificial intelligence affect the labor market?	AI transforms the labor market by automating repetitive tasks, creating new job opportunities in tech fields, and enhancing productivity. However, it also poses challenges, such as job displacement and the need for upskilling workers.	AI is automating many tasks, leading to job displacement in certain industries. However, it is also creating new job opportunities in AI development, data science, and other related fields. The future of work will likely involve a combination of human and AI labor, with humans focusing on creative, strategic, and social skills.
18	Discuss the ethical challenges associated with the use of robots in warfare.	<ul style="list-style-type: none"> <li>• Lack of accountability for autonomous decisions.</li> <li>• Potential for misuse in targeting civilians.</li> <li>• Escalation of conflicts due to reduced human involvement.</li> <li>• Moral concerns about delegating life-and-death decisions to machines.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Autonomous decision-making:</b> The ethical implications of machines making life-or-death decisions.</li> <li>• <b>Lack of accountability:</b> Difficulty in assigning blame for potential harm caused by robots.</li> <li>• <b>Potential for misuse:</b> The risk of robots being used for malicious purposes, such as targeted assassinations.</li> <li>• <b>Humanizing war:</b> The dehumanizing effect of using machines to fight wars.</li> </ul>
19	Explain the role of social media in spreading misleading news.	Social media amplifies misleading news through rapid sharing without verification. Algorithms prioritize engagement over accuracy, and echo chambers reinforce biases. Raising awareness and implementing fact-checking mechanisms are essential to mitigate this.	Social media platforms can amplify misinformation and disinformation, often through the spread of fake news, conspiracy theories, and misleading content. This can lead to polarization, social unrest, and erosion of trust in institutions.
20	What are the social implications of people's reliance on smart technology?	Smart technology simplifies daily life but increases dependence, reducing critical thinking and personal interaction. It raises concerns about privacy, data security, and social inequality, as not everyone has equal access to these advancements.	<ul style="list-style-type: none"> <li>• <b>Privacy concerns:</b> The collection and use of personal data by tech companies.</li> <li>• <b>Digital divide:</b> Unequal access to technology and its benefits.</li> </ul>

			<ul style="list-style-type: none"> <li>• <b>Addiction and mental health:</b> Excessive use of technology can lead to addiction, anxiety, and depression.</li> <li>• <b>Social isolation:</b> Overreliance on technology can hinder face-to-face interaction and social skills.</li> </ul>
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### 5.1. Comparison of ChatGPT and Gemini

The two models were compared by answering 20 questions in different fields. The Self-BLEU and Distinct were measured for the answers generated by each of the two models to the 20 questions. The results of the comparison were as shown in Table 2:

TABLE II. Comparison of ChatGPT and Gemini.

Model	Self-BLEU	Distinct	
		Distinct-1	Distinct-2
ChatGpt 4.0	0.0035	0.6316	0.9550
Gemini	0.0013	0.6234	0.9605

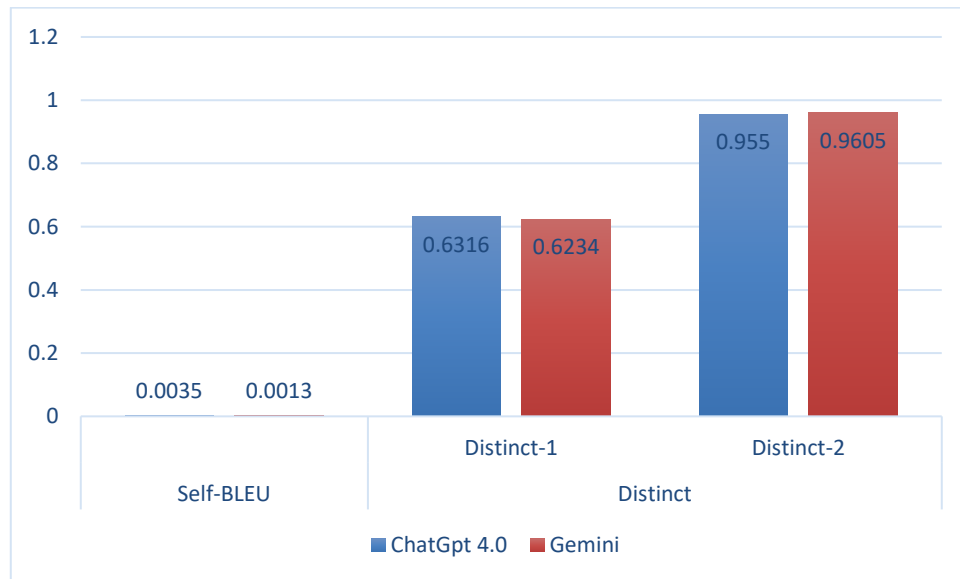


Fig. 6. Comparison of ChatGPT and Gemini.

According to the results of the criteria we obtained, the ChatGPT model has a Self-BLEU value = 0.0035, while the Gemini model has a Self-BLEU value = 0.0013, which indicates that the Gemini model has a higher diversity in the texts produced compared to ChatGPT.

For its part, the results of the second criterion were as follows: The ChatGPT model obtained a value = 0.6316 in the Distinct-1 criterion (unique words), while the Gemini model obtained a value = 0.6234, which shows that ChatGPT showed a more unique use of words compared to Gemini.

The other criterion is Distinct-2 (unique pairs), the result of ChatGPT = 0.9550, while Gemini = 0.9605, the result shows that Gemini showed slightly better diversity in pairs compared to ChatGPT.

In general:

ChatGPT is suitable if you are looking for texts that are distinguished by words and unique.

Gemini may be the best choice if diversity is a top priority, especially when dealing with binary pairs or aiming to avoid duplication.

Recommendation:

If you are looking for a balance between diversity and uniqueness, ChatGPT is a good choice. If the primary focus is pure diversity, Gemini is better.

## 6. CONCLUSION

This comparative analysis of ChatGPT and Gemini highlights notable progress in generative NLP models, demonstrating their strengths and weaknesses. ChatGPT demonstrates proficiency in generating original and human-like prose, rendering it appropriate for jobs necessitating fluency and creative composition. In contrast, Gemini exhibits greater variation and adaptability in intricate activities, highlighting its proficiency in contextual comprehension and problem-solving. Notwithstanding their accomplishments, both models necessitate additional development to tackle scalability, personalization, and dataset constraints. As generative NLP advances, these models underscore the necessity of equitable enhancements in variety, precision, and practical relevance. Subsequent research ought to investigate more extensive datasets, novel training approaches, and pragmatic implementation strategies to optimize the capabilities of these technologies.

### Conflicts Of Interest

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