

Revolutionizing Search: Artificial Intelligence and Machine Learning's Impact on Information Retrieval

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“Artificial Intelligence is the tool of making opinions that would require perception if done by human. “

Abstract

In today's world the field of artificial intelligence and machine learning is expanding day by day. The amount of data that is made by humans and machines is difficult to absorb, analysis and make a complex decision from the data which can be implemented through artificial intelligence and machine learning algorithms. A chatbot is a good example of implementation of AI search engine and machine learning in real world. It can respond to various queries and respond to it accordingly. So, it can be a vital tool for both industrial professionals and regulatory authorities. Such a chatbot can provide quick and accurate information, improving compliance and reducing the time spent on searching for relevant topic.

Keywords: Artificial Intelligence, Chatbots, Natural language processing, Algorithms, Technologies, knowledge based system.

Introduction

Searching an information/data can be mostly challenging due to the vast amount of data available. Such a problem can be easily solved using advanced AI search techniques and algorithms. These techniques and algorithms are implemented by AI search engine like 'Chatgpt and Google Bard'. They can understand natural language queries, interpret user intent, and offer personalized recommendations based on user behavior and preferences. Chatbots are generally AI based Search engine software applications that is made to stimulate human like interactions. They implement various Natural language processing (NLP) and machine learning methods to understand user queries to provide suitable responses.

Phrases of AI search engines

- *Information retrieval engine:* Appeared in 1990s and early 2000s companies like alta-vista ad yahoo implemented informational retrieval search in their search engine. They provided the list of links that is based on keyword provided by user.
- *Answer engine:* Google and Bing were the first companies to implement the answer engine in their search engine that emerged in late 2000s and early 2010s. They used Ai techniques to provide direct answer to user’s query without requiring them to visit external website.
- *Action engines:* Powered by advanced AI techniques search engines like Chatgpt (chatbot) and DALL-E can generate new content based on user’s queries using conversational interfaces. They offer personalized results based on current trends.

Steps to create a chatbot :



Step 1 : Define Objectives and Scope

The first step to create a chatbot is defining objectives and scope on which a chatbot will be working. It is important to decide what a user can expect from a chatbot or on which factors a chatbot can answer the queries.

Step 2 : Data Collection & structuring

After deciding the objectives and scope on which a chatbot is going to work the next step is to collect various data and structure it accordingly on which a chatbot is going to work.

Step 3 : Natural Language Processing (NLP) & Algorithms.

A chatbot typically works on Natural processing language (NLP) & various algorithms which provide the decision making ability to the chatbot.

Step 4 : Bot Development & User Interface.

The NLP and algorithms are the internal component of the chatbot But the front end is developed by the user. A good designed chatbot provides a better user experiece.

Step 5 : Data Retrieval and Response Generation

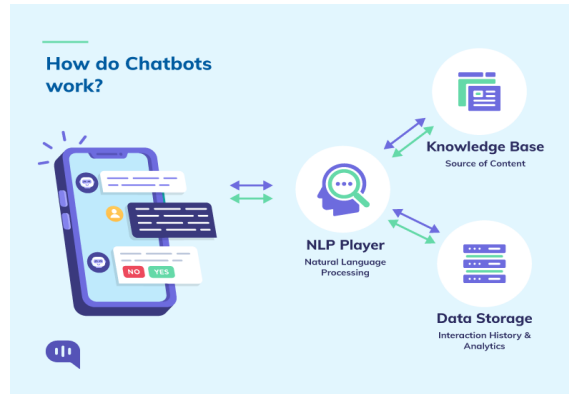
The next process is the data retrival and response generation in which the data that is needed by the user is retived and the suitable response is generated through algorithms in the banckend.

Step 6 :Testing and Training & Deployment

A well designed chatbot should be tested properly before deploying in the market that is done by testing and training team.

Working of a Chatbot :

A chatbot typically works on three parameters.



- **Pattern Matching :**
Chatbot create a suitable response by identifying text using pattern matching technique.
- **Algorithms**
Algorithms are used to reduce the number of classifiers & create more manageable structure.
- **Artificial Neural Networks**
Neural Networks helps the processor to operate data that is similar to human brain.

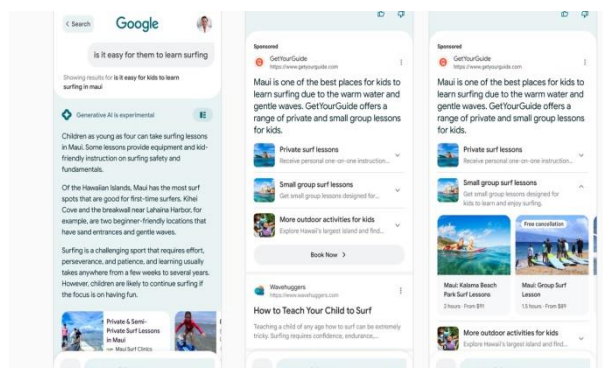
Google’s Generative AI search technique : A revolutionized way of searching

In 2023 Google has been implementing generative AI search technique. With the increasing popularity of AI chatbot people have started seeking answers from them instead of google. So google decided to incorporate new AI search techniques in its search engine. Generative AI is the technique to create new content from scratch data based on existing data. With generative AI google is trying to enhance its search experience and provide us with more interactive, engaging and creating results. So, they call this as ‘ *Search Generative Experience (SGE)*’

SGE is a collection of AI driven features that aim to make a search more conversational, contextual and creative.

Features of SGE.

- ❖ **Conversational :** this means that now you can use natural language to interact with google and get answers.



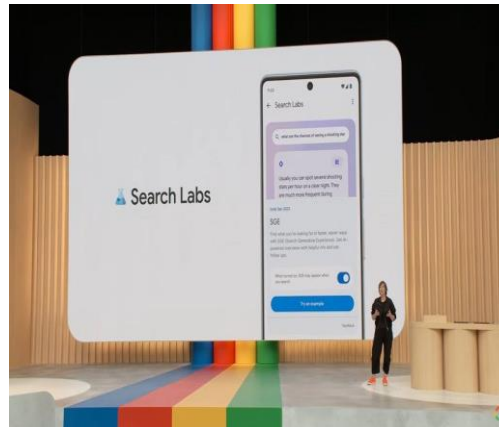
- ❖ **Contextual :** that means that now google can understand the context of your query will provide more contextual and relevant information on your search.

- ❖ Creative : With Generative AI google can create new content or data for your query. For example, if you search for new shoes google will show you some shoes that doesn't even exists.

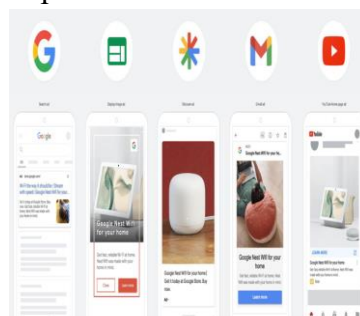
How can we use this techniques?

There are two ways google is providing to access generative AI search technique.

- Search labs : A new program where we can try out new features before available in public. With signing in google.com/labs and experiments like chatmode or image generation



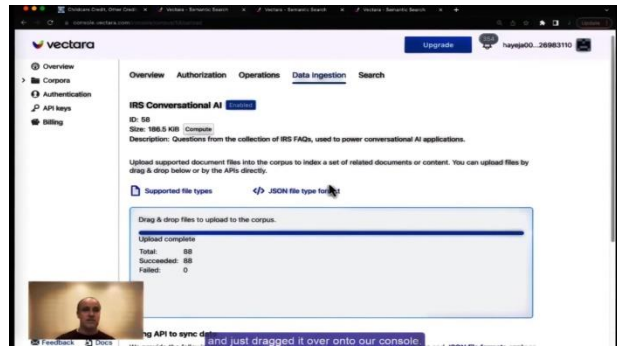
- Performance max : it is a campaign in google ads for advertisers. It helps them to reach customers across google's platform through AI. It optimises ads and shows them to relevant customer's.



Not only google many multinational tech giants use generative search technique in their search engine like Microsoft's Bing AI (Bing Answer and Image Generator) and Elastic Search (EGS).

Vectara's Hybrid search technique

Founded in 2022, Vectara is a new start up which has claimed that it uses hybrid search technique, which combines semantic search technique (based on large learning models) and boolean exact match (based on keywords) to find the most relevant results from millions of documents. It also uses 'Grounded generation' which means that its generative system only relies on facts and data that is provided by developers and does not train models on user's data. It also claims that its platform is language-agnostic platform that supports queries and data in any language and offers cross-language search results. It prioritises user privacy by not sharing user's personal data.



Applications/use of a Chatbot

- Answering frequently asked questions : In day to day life most of the customer queries are made of just few rules and acts that can be handle by chatbot.
- Resolving user queries & Understanding your user : A chatbot can clarify the rules and regulations of mining industries, and help them to understand it.
- Assigning user to support team : If the acts & rules are too complex to understand, our chatbot can issue and directly connect to human agent.
- Marketing(Recommending new rules) : Our chatbot can update the user with new policies and rules that is implemented by Government of India.
- Verification of Acts & Rules in Mining industry : Our chatbot can verify the correct rules and acts that is adopted by Government Of India.
- Customer Feedback : It can collect various data request from the user and provide data set to the industry.
- Deliver multilingual Support : As India is a multilingual Country so the chatbot can support user queries in multiple languages.

Some Features & benefits of a chatbot :

- 24/7 Accessibility: Chatbots can be accessed in anytime i.e. 24/7 accessible & in any device for the uses.
- Instant Responses: A user requires immediate response for the query that can be provided by our chatbot thus reducing the time spent on searching and analyzing.
- Consistent and Accurate Information: The Information that is delivered to the user should be correct and accurate without human errors that can be provided with the help of chatbot.
- Scalability: A chatbot can handle multiple users and different queries simentaneously at same time, making it highly scalable for the industrial use.
- Cost-Efficiency: Chatbot can economical way to provide best information and support to the user as it is cheaper to implement as compared to human.
- Data Collection: It can help to collect precious data on user requests and inquiries that can be examine later with the help of different tools to identify the areas where the user requires more support or clarification.

Current Technologies used by Chatbots:

✓ **Python**

It is a programming language that is mostly used in the field of artificial intelligence & machine learning.

✓ **Java**

It is a software programming language that is used for various purposes like app development and software development.

✓ **Html/Css**

It is used for web development and designing, that can be used to develop for various web environment.

✓ **Algorithms**

The chatbot works on various algorithms and structures on the backend to produce suitable output.

✓ **SQL (used for handling databases)**

Structured Query Language is used to handle various databases of the Chatbots. A Chatbots has various database which needs to be handled by the user using the SQL language.

Some algorithms used to make Chatbot

- ❖ **Naïve Bayes Algorithm:** It is used for text classification by the chatbot. To analyze and understand the query it important to classify the text and understand it.
- ❖ **Support Vector Machine:** This algorithm is used for detection tasks that will be performed by the chatbot. It helps to detect the domain in which task is allotted to the chatbot.
- ❖ **Natural Language processing:** This algorithm gives the ability of understanding to the chatbot because to respond any query the first thing is to understand what is needed by the user.
- ❖ **Recurrent neural networks (RNN):** It is used for speech Recognition. Every time the query is not in the form of text so it is important for a chatbot to recognize speech which is done with RNN.
- ❖ **Long short-term memory (LSTM):** It helps to handle sequential data which needs to be handle by the system. Sometimes the data can be confidential which needs to be handle carefully by the system.
- ❖ **Machine learning Algorithms (eg. Supervised, Unsupervised and reinforcement learning):** Sometimes the query is repeated which can be answered easily by the chatbot with the help of various machine learning algorithms.

Conclusion

In conclusion a chatbot is a typically an AI search engine which is used to respond various text queries that is provided by the user. The queries can be in the form of text, speech or data. The chatbot uses various machine learning algorithms and Natural processing language to respond and understand the user queries. It can be a vital tool for both industrial professionals and regulatory authorities because it provides various features like 24/7 available, instant response and many more. Therefore,

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