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ChatGPT (Chat Generative Pre-trained Transformer)

INTRODUCTION

ChatGPT is a chatbot platform that enables businesses to create and deploy chatbots for customer service and marketing purposes developed by San Francisco-based artificial intelligence company OpenAI and launched in November 2022.

It is built on top of OpenAI's GPT-3 family of large language models and has been fine-tuned (an approach to transfer learning) using both supervised and reinforcement learning techniques.

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> *ChatGPT can generate articles, fictional stories, poems and even computer code. ChatGPT also can answer questions, engage in conversations and, in some cases, deliver detailed responses to highly specific questions and queries.*

Example:
Let's say you're a marketer for a major retailer. You've been tasked with increasing online sales and you've decided to use a chatbot to help you do it. You create a chatbot that asks customers a few questions about what they're looking for and then recommends products based on their

Amazon, Google, Microsoft, Baidu, GitHub, Meta, Apple, IBM, Nvidia, Baidu and others have also constructed natural language processing frameworks that deliver different features and capabilities. These include digital assistants, predictive coding tools and chatbots. However, OpenAI's ChatGPT is currently considered by many to be the most advanced NLP chatbot engine. It typically delivers remarkably accurate and engaging responses to wide-ranging questions and queries about technology, science, business, history, sports, literature, culture, art and much more.

What is the difference between ChatGPT and a search engine?

ChatGPT is a language model created with the purpose of holding a conversation with the end user. A search engine indexes web pages on the internet to help the user find the information they asked for. ChatGPT does not have the ability to search the internet for information.

Capabilities of ChatGPT

ChatGPT has extensive capabilities that will likely change the landscape of many industries. The artificial intelligence program can complete tasks like:

1. **Text generation.**

   ChatGPT is nothing without its text generation, as that is how it communicates with its human users. The program uses its pre-trained database to intake inputs and prompts and generates the appropriate response in a natural, human-like text structure.

2. **Text completion.**

   ChatGPT can finish your inputted sentence based on content and meaning if you supply the beginning.

3. **Question-answering.**

   ChatGPT can answer every question that is part of its pre-trained knowledge. This will include world knowledge and general facts. The program can also answer questions in the format that you like.

4. **Summarization.**

   If you input a long text into ChatGPT and command it to summarize the information, it will do so. You should not expect ChatGPT to summarize full-length novels, but a few pages of text is possible as it can handle up to 4095 tokens.

5. **Text translation.**

   Just like Google Translate, ChatGPT can translate from one language to another

6. **Conversational AI.**

   One of ChatGPT's biggest highlights is that it can respond in human-like, conversational language. This is a helpful way to receive and digest the output. It can also be useful for companies with ecommerce sites that want to integrate conversational interfaces for chatbots, virtual assistants and other applications.

7. **Sentiment analysis.**

   ChatGPT can actually determine sentiment or human feeling when analyzing text. For example, when a customer leaves a review on an ecommerce site, ChatGPT can analyze the text and determine if it is positive, negative or neutral.

8. **Named entity recognition.**

   ChatGPT can identify the names of people, organizations and locations.

9. **Part-of-speech tagging.**

   If you need a refresher on nouns, verbs, adjectives and sentence structures, ChatGPT is a great resource.

How does ChatGPT work?

ChatGPT uses a vast neural network to produce the human-like language through which it communicates. But how does that process happen?

Take a look below for a step-by-step breakdown of the process:

1. Input processing: The human user types commands or questions into ChatGPT's text bar.
2. Tokenization: The text inputted is tokenized, meaning the program divides it into individual words to be analyzed.
3. Input embedding: The tokenized text is put into the neural network's transformer portion.
4. Encoder-decoder attention: The transformer encodes the text input and generates a probability distribution for all possible outputs. Then that distribution generates the output.
5. Text generation and output: ChatGPT generates its output answer, and the human user receives a text response.

How to use ChatGPT library?

This is an example of how to use the chatGPT library.

```
#include <chatGPT.h>
int main()
{
chatGPT gpt;

gpt.init("username", "password");

gpt.login();
```

> *You can access ChatGPT simply byvisiting chat.openai.com and creating an OpenAI account.   Once you sign in, you are able to start chatting away with ChatGPT. Get your conversation started by asking a question.*

To use chatGPT in your program, you first need to include the chatGPT library file.

```
#include "chatGPT.h"
```
Then, you need to create an instance of the chatGPT class.

```
chatGPT chat;
```

To send a message, you use the sendMessage() function.

```
chat.sendMessage("Hello, world!");
```

To receive messages, you use the receiveMessage() function.

```
void receiveMessage(char* message) {
printf("%s", message);
}
chat.receiveMessage(receiveMessage);
```

ChatGPT Limitations

There are a few limitations to using chatGPT:
– You cannot use chatGPT to send messages to people who are not members of your chatGPT group.
– You cannot use chatGPT to send messages to people who are not online.
– You cannot use chatGPT to send messages to people who have blocked you.

Future of ChatGPT

It's highly likely that within a few years the ChatGPT platform and other AI-based NLP tools will play a major role in the business world—and in everyday life. They could enhance and perhaps supplant today's search engines, redefine customer service and technical support functions, and introduce more advanced ways to generate written content. They will also lead to advances in digital assistants such as Siri and Alexa.

Conclusion

ChatGPT is a state-of-the-art natural language processing (NLP) model developed by OpenAI. It uses a neural network architecture and unsupervised learning to generate human-like responses to a given input. ChatGPT is capable of understanding the context of a conversation and generating responses that fit naturally with what has been said previously. This makes it a valuable tool for a wide range of conversational tasks, such as customer service, language translation, text summarisation, and sentiment analysis.

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What Is Edge Computing: Definition, Characteristics, and Use Cases

Edge computing is a distributed IT architecture which moves computing resources from clouds and data centers as close as possible to the originating source. The main goal of edge computing is to reduce latency requirements while processing data and saving network costs.

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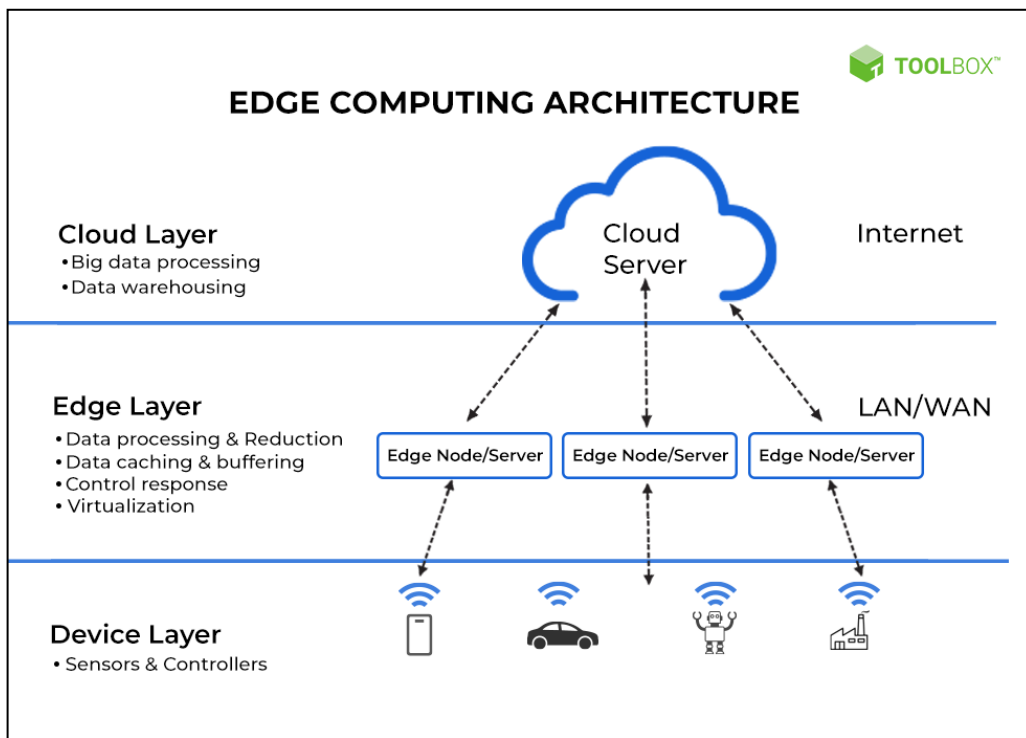Department of
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Fig: The "edge" is where the device communicates with the Internet

Data is at the core of any functioning business. Over the years, the unprecedented volume of computing power and connected devices have accumulated vast amounts of data, causing a massive strain on the already congested internet. This massive accumulation of data leads to bandwidth and latency issues. Unlike traditional enterprise computing, where data is produced at the client's end or the user's computer, edge computing offers a better alternative to move away from managing complex data to close proximity of the original data source.

From reduced load on the internet to fewer latency issues, faster response times, lesser security risks, better-performing applications, deeper insights, and critical data analysis to improved customer experiences, edge computing is the logical solution that every modern business needs.

An effective way to understand the concept of edge computing is through the help of this relatable example and explanation by Michael Clegg, vice president and general manager of IoT and embedded at Supermicro. He says, "By processing incoming data at the edge, less information needs to be sent to the cloud and back. This also significantly reduces processing latency. A good analogy would be a popular pizza restaurant that opens smaller branches in more neighborhoods since a pie baked at the main location would get cold on its way to a distant customer".

How Does Edge Computing Work

In a traditional setting, data is produced on a user's computer or any other client application. It is then moved to the server through channels like the internet, intranet, LAN, etc., where the data is stored and worked upon. This remains a classic and proven approach to client-server computing.

However, the exponential growth in the volume of data produced and the number of devices connected to the internet has made it difficult for traditional data center infrastructures to accommodate them. According to a study by Gartner, 75 percent of enterprise generated data will be created outside of centralized data centers by 2025. This amount of data puts an incredible strain on the internet, which in turn causes congestion and disruption.

The concept of edge computing is simple - instead of getting the data close to the data center, the data center is brought close to the data. The storage and computing resources from the data center are deployed as close as possible (ideally in the same location) to where the data is generated.

Early computing	Applications run only on one isolated computer
Personal computing	Applications run locally either on the user's device on in a data center
Cloud computing	Applications run in data centers and processed via the cloud
Edge computing	Applications run close to the user; either on the user's device or on the network edge

Benefits of Edge Computing

Edge computing has emerged as one of the most effective solutions to network problems associated with moving huge volumes of data generated in today's world. Here are some of the most important benefits of edge computing:

1. Eliminates Latency

Latency refers to the time required to transfer data between two points on a network. Large physical distances between these two points coupled with network congestion can cause delays. As edge computing brings the points closer to each other, latency issues are virtually nonexistent.

2. Saves Bandwidth

Bandwidth refers to the rate at which data is transferred on a network. As all networks have a limited bandwidth, the volume of data that can be transferred and the number of devices that can process this is limited as well. By deploying the data servers at the points where data is generated, edge computing allows many devices to operate over a much smaller and more efficient bandwidth.

3. Reduces Congestion

Although the Internet has evolved over the years, the <u>volume of data</u> being produced everyday across billions of devices can cause high levels of congestion. In edge computing, there is a local storage and local servers can perform essential edge analytics in the event of a network outage.

Drawbacks of Edge Computing

Although edge computing offers a number of benefits, it is still a fairly new technology and far from being foolproof. Here are some of the most significant drawbacks of edge computing:

1. Implementation Costs

The costs of implementing an edge infrastructure in an organization can be both complex and expensive. It requires a clear scope and purpose before deployment as well as additional equipment and resources to function.

2. Incomplete Data

Edge computing can only process partial sets of information which should be clearly defined during implementation. Due to this, companies may end up losing valuable data and information.

3. Security

Since edge computing is a distributed system, ensuring adequate security can be challenging. There are risks involved in processing data outside the edge of the network. The addition of new IoT devices can also increase the opportunity for the attackers to infiltrate the device.

Examples and Use Cases

One of the best ways to implement edge computing is in smart home devices. In smart homes, a number of IoT devices collect data from around the house. The data is then sent to a remote server where it is stored and processed. This architecture can cause a number of problems in the event of a network outage. Edge computing can bring the data storage and processing centers close to the smart home and reduce backhaul costs and latency.

Another use case of edge computing is in the cloud gaming industry. Cloud gaming companies are looking to deploy their servers as close to the gamers as possible. This will reduce lags and provide a fully immersive gaming experience.

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AI for protein folding

By the end of 2020, DeepMind, the UK-based artificial-intelligence lab, had already produced many impressive achievements in AI. Still, when the group's program for predicting protein folding was released in November of that year, biologists were shocked by how well it worked.

Nearly everything your body does, it does with proteins. Understanding what individual proteins do is therefore crucial for most drug development and for understanding many diseases. And what a protein does is determined by its three-dimensional shape.

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A protein is made up of a ribbon of amino acids, which folds up into a knot of complex twists and twirls. Determining that shape—and thus the protein's function—can take months in a lab. For years, scientists have tried computerized prediction methods to make the process easier. But no technique ever came close to matching the accuracy achieved by humans.

That changed with DeepMind's AlphaFold2. The software, which uses an AI technique called deep learning, can predict the shape of proteins to the nearest atom, the first time a computer has matched the slow but accurate techniques used in the lab.

Scientific teams around the world have started using it for research on cancer, antibiotic resistance, and covid-19. DeepMind has also set up a public database that it's filling with protein structures as AlphaFold2 predicts them. It currently has around 800,000 entries, and DeepMind says it will add more than 100 million—nearly every protein known to science—in the next year.

DeepMind has spun off this work into a company called Isomorphic Labs, which it says will collaborate with existing biotech and pharma companies. The true impact of AlphaFold2 may take a year or two to be clear, but its potential is rapidly unfolding in labs around the world.