Enjoy this brain teaser ☺

You are offered a part-time job as a pizza delivery person, working only weekends. Your boss gives you a choice of the following two salary options: (1) $4,000 for your first year of work, and a raise of $800 for each year after the first, or (2) $2,000 for your first six months of work, and a raise of $200 every six months thereafter. Which is the better offer?

Why IPv6
[Abraham John, Asst VP, AITS]

Like most of my fluff articles this too will be an arcane thing that may have you rolling in laughter or drive you to boredom! The thought for this article came about as a result of explaining networking to the class I teach. While most of us know the term networks and networking as it relates to technology, not everyone may be aware of the current addressing standards that exist on the network most of us know of and use – the internet. The dominant protocol in use in networking today in terms of addressing schemes is Internet Protocol Version 4 or IPv4. IPv4 got its start as a Request for Comments (RFC) 760 in January 1980, it was deployed at SATNET in 1982 (most likely well before most of our current readership was born ☺) and at ARPANET in 1983. The addressing scheme devised for Ipv4 is now about 40+ old and its limitations were recognized as early as the 1990's.

IPv4 is a 32-bit address scheme. Anytime you deal with a bit i.e. binary digit, you only have 2 possibilities 1 or 0 and all the possible states will be a powers of 2 calculation. The 32-bit address space means we can have a maximum of 2^{32} addresses or 4,294,967,296 unique addresses. 40+ years ago the ~4.3 billion addresses was a very large pool but with the internet and with the global interconnectedness post Y2K (for the younger readers this was when we ancients thought the world would end ☺), the ~4.3 billion addresses seems woefully small in hindsight.

Added to this is the original distribution of addresses based on classes of address i.e. class A, class B, class C along with private, loopback, experimental/test, and reserved ranges was also a hinderance. Depending upon the class of address you purchased or were given, the number of addresses could be in the millions – all possibly stuck in a single organization. This led to a tremendous waste of addresses. For example, the loop back range (127.0.0.0 – 127.255.255.255) has 16 million addresses. Others may have used other addresses in the loopback range but to date, the only address in the loopback range I have used is 127.0.0.1.

Without getting into an explanation of IPv4 addressing and subnetting schemes, on November 25th, 2019, the last /22 IPv4 address allocation was made from the available pool and there are officially no more new IPv4 addresses. Only Africa has public IPv4 addresses left but will run out of that pool soon.

The architects of IPv4 saw the limitations of the address pool as early as the 1990's and IPv4's successor, IPv6 was created.

The IPv4 classful scheme for addresses was deployed as follows:

A	1.0.0.0 – 126.255.255.255	2^24 – 2 = 16,777,214
B	128.0.0.0 – 191.255.255.255	2^16 – 2 = 65,534
C	192.0.0.0 – 223.255.255.255	2^8–2=254

The classful scheme was wasteful since millions of addresses were assigned to single companies with extremely large networks that were unwieldy – remember subnetting was not a thing yet 😉

The reserved IPv4 address ranges are as follows:

0.0.0.0/8	0.0.0.0 – 0.255.255.255	16,777,216	Reserved
10.0.0.0/8	10.0.0.0 – 10.255.255.255	16,777,216	Class A Private
127.0.0.0/8	127.0.0.0 – 127.255.255.255	16,777,216	Loopback
169.254.0.0/16	169.254.0.0 – 169.254.255.255	65,5636	Link local addresses
172.16.0.0/12	172.16.0.0 – 172.31.255.255	1,048,576	Class B private
192.160.0.0/16	192.168.0.0 – 192.168.255.255	65,536	Class C private

Subnetting at a non-classful range of IP address level did not happen until 1933 and this took the form of the Internet Engineering Task Force (IETF) introducing CIDR or Classless Interdomain Routing to fix address wastefulness, router entry proliferation, and other issues with classful addressing. CIDR also applied subnetting principles to the entire IPv4 range i.e., you could now subnet at any part within the 32 bits.

But CIDR was a band-aid, nothing more. Classful or classless, we were still held captive to the 32-bit address length. The small address pool was still with us and workarounds like NAT's were kludges.

Enter IPv6.

IPv6 was designed from the beginning to take into account a global network that also included addresses for devices providing services of all types leading to what we have today with the IoT's (Internet of Things). This meant that IPv6 could not be a 32-bit address scheme. Instead IPv6 addresses are 128 bits in length.

IPv4 address are 32-bits or 4 bytes in length, IPv6 addresses are 128-bits or 16 bytes long. IPv6 addresses as a result are significantly longer than IPv4 addresses. This also means we can have 2^{128} addresses or roughly 340 trillion trillion trillion addresses – so a lot of unique addresses 😊.

To throw another geeky look at the address space and this is from a TCP/IP textbook (TCP/IP Guide): if we blanketed the Earth's surface (510 trillion square meters) with computers and stacked them 10 billion high with a unique IPv6 address assigned to each, we would only consume a trillionth of the IPv6 address space. Another little geeky way of looking at the size of the Ipv6 address space that may get you tossed from gatherings if you are foolish enough to bring it up 😊: We can assign an IPv6 address to every atom on the surface of the Earth, and still have addresses left over to handle another 100+ earths – so from a point of connectivity we should be ok on addresses! But the caution here is, we are human beings after all and one of the things we excel at is, finding crazy ways to use things up 😉. But that is a problem for many thousands of generations hence.

Needless to say, IPv6 is a large enough public address space to account for every person alive today but also the trillions who are to follow and all the devices that are on the network today and in the foreseeable future. In this case having plenty is a good thing!

Why have we not moved to IPv6 yet? Remember the old adage, "if it ain't broke don't fix it" – well for organizations and companies there is no financial advantage in moving to IPv6 but if we are to preserve the Internet then the movement to IPv6 is necessary. The movement, while slow, has begun.

With IPv4 addresses the representation was done in what is referred to as a dotted decimal notation. As human beings we don't take as easily to reading binary representations. An example of a IPv4 address is: 192.168.0.1 – something you may encounter within your home network. This was possible given the relatively small address size of an IPv4 address.

With IPv6, since it is significantly longer than an IPv4 address, the representation is done using hexadecimal or base 16 numbers. An example IPv6 address: 2002:0000:9b45:6fc7:2bc4:3a1c:b95a:b1c2. Each hex digit occupies 4 bits. Each address part before a colon has 4 hex digits and occupies 16 bits. Eight 16-bit portions yield an address that is 128 bits in length.

The IPv6 address is generally divided into 2 parts.

Network 64 bits	Node 64 bits

48 bits Global Unicast Address	16 bits Subnet ID	64 bits Interface ID

Some of the benefits of moving to IPv6:
- Extended Address space
- Stateless autoconfiguration
- No more need for NAT or PAT
- No need for broadcasts
- Availability of tools that help with the transition
- Support a 1280-byte packet size without fragmentation

There are challenges in moving to IPv6 as well. A couple of them are listed below.
- Understanding IPv6 subnetting can be difficult – but IPv4 subnetting also puts people teeth on edge 😊
- Making the switch from IPv4 to IPv6 is slow and tedious since there is no business or financial reason to do so for companies that already have an IPv4 address space

I will delve deeper into IPv6 to provide more detailed treatment of this "new" protocol that will be the successor to IPv4 along with what subnetting (gasp!) looks like with this successor of IPv4.

The advantages outweigh the challenges and it is simply a matter of time before IPv6 supplants IPv4 as the dominant Internet protocol. Imagine all your appliances at home having their own unique IP address so *they* can keep track of you 😊 😊

It would be remiss of me to not mention the minds that created IPv4. Vint Cerf and Bob Kahn are credited with the invention of TCP/IP in the 1970's. The IP portion of TCP/IP is where IPv6 and IPv6 do their addressing and routing work – both essential for the modern internet the way we have today. IPv6 was created by the Internet Engineering Task Force and the group working on IPv6 was led by Robert Hinden. There were others involved in both efforts, but it is remarkable that a protocol created in the 1970's is still dominant and is only now getting to a place where it will be supplanted by its successor IPv6.

The move to IPv6 is well on its way with cell phone carriers and Internet Service Providers (ISP's) leading the way. As a matter of fact, if you disconnect from your

🐚 **2700 BC – The Sumerians use an earlu form of abacus built to a base 60 counting system.**

WiFi connection on your cell phone and browse to your favorite site, there is a high likelihood that your phone is using an IPv6 address and not IPv4.

I hope you found this fairly straight forward "fluff" article about IPv4 and its successor IPv6, interesting. Who knows, you will dig deeper into IPv6 subnetting! Something for me to write about for our next issue.

As you read the articles included in this issue of our newsletter, maybe get misty eyed or are rolling in laughter by pieces like this one 😉, and take a swing at the brainteaser, we in Administrative Information Technology Services (AITS) are privileged to serve the needs of our university and wish each of you a wonderful summer.

900 BC – Evidnece of usage of Roman numerals dates to this period.

Mutual Combat
[Alexandra Martinez]

Did you know that in the State of Texas there is a mutual combat law?

According to Section 22.06 of the Texas Penal Code, consent can be used as a defense in an assault case, but only applies to fist fights.

However, the physical altercation should not have resulted in serious bodily injury. The consent also does not have to be explicit under the penal code, but there must be a reasonable belief that both parties consented to the fight based on words and deeds. A defendant will also need to prove that consent was reached.

Moreover, mutual combat is not permissible in all contexts. For instance, if one of the parties involved is a minor or if the fight takes place in a public space, it can still result in criminal charges for both parties. Additionally, if the fight is intended to intimidate or harass another person, it could lead to charges of assault, battery, or disorderly conduct.

Texas Penal Code for Mutual Combat

Sec. 22.06. CONSENT AS DEFENSE TO ASSAULTIVE CONDUCT. (a) The victim's effective consent or the actor's reasonable belief that the victim consented to the actor's conduct is a defense to prosecution under Section 22.01 (Assault), 22.02 (Aggravated Assault), or 22.05 (Deadly Conduct) if:

> *(1) the conduct did not threaten or inflict serious bodily injury; or*
>
> *(2) the victim knew the conduct was a risk of:*
>
> > *(A) his occupation;*
> >
> > *(B) recognized medical treatment; or*
> >
> > *(C) a scientific experiment conducted by recognized methods.*

(b) The defense to prosecution provided by Subsection (a) is not available to a defendant who commits an offense described by Subsection (a) as a condition of the defendant's or the victim's initiation or continued membership in a criminal street gang, as defined by Section 71.01.

Sec. 22.06 CONSENT AS DEFENSE TO ASSULTIVE CONDUCT

Mutual Combat Examples

Let's apply the law to some factual scenarios to better understand it. Consider the following:

- After getting into a shouting match in a sports bar, you put down your glass of beer and stand up. The man you are arguing with also stands up, so you make a motion to go outside. The man follows you outside where you both roll up your shirtsleeves and make fists. You then begin to box each other, and you punch the other man a couple times before you both pass out.

Here, you can claim that you engaged in mutual combat as a defense to an assault charge. The person you are fighting has implicitly agreed to fight by following outside and making motions that you reasonably believe suggest he wants to fight. Also, you did not cause serious bodily injury during the fight, so it looks like the defense applies.

500 AD – Indian mathematicians devised a system where the numbers 1 to 10 were represented in symbols – a forerunner to today's decimal counting system.

Here is another example:

- You and a friend decide to start an amateur fight club. Each week, a group of people gather in your backyard to box each other. One night, you start pummeling your friend, breaking bones in his face and causing other serious injuries. A neighbor calls the police, who arrive on the scene and arrest you.

Here, you do not have a mutual combat defense. Though your friend explicitly agreed to fight, you ended up causing serious bodily injuries. Also, fighting is not part of your "profession," since the fight club is an amateur operation. If you were part of a boxing league or mixed martial arts league, by contrast, you might be able to raise the mutual combat defense, but here you cannot.

So even though mutual combat is legal in Texas under certain circumstances, it is not a free pass for individuals to engage in violent activity. Any form of violence that leads to serious injuries or death can still result in criminal charges, and the parties involved must take precautions to ensure their safety and limit harm. While mutual combat may be a viable option for some to resolve disputes, it is essential to remember that there are legal and ethical boundaries to consider.

620 AD – Zero was defined as a number by the Indian scholar Brahmagupta.

Uninterruptable Power Supply

Protect your electronics from power surges and power outages with an
Uninterruptable Power Supply unit.
[Richard Sanzone]

The Spring season is coming soon and it will bring all the joys of gardening, cookouts, baseball, and bright days of warm sunshine. Unfortunately, Spring is a time of potential severe weather including lightning storms. Lightning strikes can wreak havoc on electronic devices such as PCs but an Uninterruptable Power Supply can help keep electronics operating safely during severe weather and power outages.

Most PC users have experienced that dreaded feeling of hearing all the usual white noise of the office suddenly go silent and then realizing that there is an electrical power outage. An uninterruptable power supply (UPS) is a battery backup that can keep your PC running for a short time during a power outage to hopefully avoid that thought of "Oh no, when was the last time I clicked 'Save' on that document?"

UPS Battery Backup Units

Uninterruptible Power Supply units (or UPS units) can protect devices from power surges and can keep essential equipment powered during short power outages. The typical UPS battery backups for PCs are intended to provide enough time to save open files and allow the graceful shutdown of the PC. Expect 5 to 15 minutes of PC operation while on UPS power, depending on the capacity of the UPS unit and the power draw of the connected electronics. UPS battery backups are not intended to provide the long-term operation of a PC during an extended electrical outage. Generators are the typical solution for long-term electrical power backup but these systems are relatively expensive and much more complicated to implement.

UPS battery backup units are available through most electronic merchants and typical prices range from $60 to several hundreds of dollars depending on the power capacity and features. An entry-level $75 UPS is adequate for the typical home PC and would provide protection for short power blips. Look for a UPS rated with at least 500VA capacity for basic home PCs. High-performance PCs with a high-end gaming video card could consume much more wattage than the typical PC and would require a stronger UPS system. A 1500VA UPS unit is a good estimate for a high-performance gaming PC.

Power Surges and Brown Outs

UPS battery backup units also provide protection from power surges and "brown outs". Power surges are events when a sudden, short burst of strong electricity is delivered through the power lines and can permanently damage electronic devices that are plugged in to those circuits. These events are usually associated with lightning striking a nearby power line. It is important to also connect network cables through the UPS as those wires can also deliver power surges which can destroy networking equipment and PCs.

Brown outs are almost the opposite of power surges – a brown out is a temporary drop in electrical strength coming through the power line which can cause computer equipment to crash if the available power falls too low to maintain normal operation.

Recommendations

Consider the hardware components of connected devices when choosing a UPS to make sure the capacity and output is strong enough to provide adequate operation in the event of a power outage. Graphics card models can make a huge difference in the power draw of a PC so be sure to check those specifics before choosing a UPS model.

Popular UPS manufacturers provide online calculators to help determine the capacity of a UPS unit needed for given PC hardware configurations. Check out the APC calculator at https://www.apc.com/shop/us/en/tools/ups_selector

- Recommendation for a typical home PC with integrated graphics:
  APC BE550G
  https://www.apc.com/us/en/product/BE550G/

- Recommendation for a high-performance PC with discrete graphics card: APC BX1500M
  https://www.apc.com/us/en/product/BX1500M

Tips!

1. Be sure to use the network cable passthrough of a UPS to protect your networked components from power surges on the network cable.
2. Only connect essential components to the battery backup outlets on the UPS, such as the PC and the primary monitor. Use the "surge only" outlets for secondary devices and peripherals such as additional monitors, speakers, etc. This approach will maximize the duration of battery power provided by the UPS.
3. Test UPS units every few months!
4. Most UPS units have a standard battery pack that can be replaced if the existing battery no longer holds a charge. Replacement batteries are usually far less expensive than replacing the entire UPS unit.

Backup Your Data: The Importance of Using OneDrive and Local Backups
[Sharukh Mithani]

In today's digital world, backing up your data is more important than ever before. Important financial documents, priceless family photos, or even important notes could easily be lost if you lose access to your computer or phone. When it comes to backing up your data, it is important to have a comprehensive plan in place. This means considering not only the tools you will use to back up your data, but also how frequently you will perform backups and where you will store them.

Cloud Storage is obviously the most convenient option, and OneDrive is UNT's preferred solution for cloud storage. All UNT Students, Faculty, and Staff get 1 TB (or 1000 gigabytes) of cloud storage on OneDrive. You can also get a OneDrive personal account for free, that will include 5gb of storage and the option to upgrade to up to 2TB of storage.

OneDrive is a great option for everyday use and collaboration, particularly when it comes to the data you use for work every day. One of the biggest benefits of using OneDrive is syncing between devices, as you can access your files from any device with an internet connection. This means that you can easily work on a document on your laptop, then pick up right where you left off on your phone or tablet.

In addition to its syncing features, OneDrive also offers several other features that make it a great choice for storing and backing up important data. For example, OneDrive has built-in version control that can be especially helpful if you accidentally delete or make changes to a file. With version control, you can easily roll back to a previous version of a file if needed. (Source: https://support.microsoft.com/en-us/office/restore-a-previous-version-of-a-file-stored-in-onedrive-159cad6d-d76e-4981-88ef-de6e96c93893)

Another useful feature of OneDrive is its integration with other Microsoft apps, such as Word, Excel, and PowerPoint. If you are working on a document in one of these apps, you can save it directly to OneDrive, which makes it easy to collaborate with others and ensures that your work is always backed up. OneDrive also has a great mobile app, available on iOS and Android, that allows you to access your data from anywhere.

OneDrive also offers several security features to help protect your data. For example, your UNT OneDrive is protected by Duo Multi-Factor Authentication. And if you use a personal OneDrive account for personal files, you can also set up Multi-Factor Authentication there as well. You can also set permissions on your files to control who can access them, and OneDrive encrypts your data so it cannot be easily stolen.

However, it is important to remember that relying solely on OneDrive for your backups may not be enough. Cloud-based storage solutions can be vulnerable to cyber-attacks and data breaches, and there is always the possibility of a service outage or other technical issue that could prevent you from accessing your data. That is why it is important to also have a local backup of your most important or sensitive data, stored in a separate location from your computer or device. By using both OneDrive and local backups together, you can ensure that your data is protected from a variety of risks.

By storing a copy of your data on an external hard drive or other physical storage device, you have an extra layer of protection in case something happens to your computer or internet connection. You have a couple options when it comes to storage devices:

- Flash drives: Small, portable storage devices that are good for backing up a small amount of data. They are inexpensive and easy to use and are more durable than external hard drives due to their lack of moving parts.

However, they may have a lower storage capacity than other types of storage devices.

- External hard drives: Larger, more robust storage devices that offer more storage space than flash drives. They are more vulnerable to physical damage than flash drives due to their spinning disks but are still relatively durable and reliable. They are a good option if you need to back up large amounts of data or if you want a storage device that can be used for long-term data storage. They are also relatively inexpensive and widely available.
- External SSDs: Like external hard drives, but they use flash memory instead of spinning disks to store data. They are faster and more reliable than traditional hard drives, but also more expensive. They are a good option if you need fast access to your data or if you are backing up large files like video footage.
- NAS (Network Attached Storage) devices: Specialized storage devices that are connected to your home or office network. They can be accessed by multiple devices on the network, making them a good option for backing up data from multiple computers. They can be expensive but offer a lot of storage space and advanced features like RAID for increased data protection.

You can also use backup software to automatically backup your data on a regular basis, ensuring that your backups are always up to date. Windows Backup and Restore/File History (https://support.microsoft.com/en-us/windows/backup-and-restore-in-windows-352091d2-bb9d-3ea3-ed18-52ef2b88cbef.) and Apple Time Machine (https://support.apple.com/en-us/HT201250) are great built-in options to consider.

It is also a good idea to consider where you will store your external drives. Storing your backups in the same location as your computer or device is risky, as a fire, flood, or theft could result in the loss of both your computer and your backup. Instead, consider storing your external drives in a separate location when not in use, such as a safe deposit box or fire-proof safe, or keeping a duplicate backup with a trusted family member or friend. If you are using a NAS, you can even set it up in a secondary location to decrease the chances of data loss at a primary location.

In summary, by using both cloud storage like OneDrive and local backups, you can make sure that your data is protected from a variety of risks, including cyber-attacks, technical issues, and physical disasters. By backing up your data regularly and storing your backups in a safe location, you can have peace of mind knowing that your important files are always within reach.

Learn more about OneDrive at **https://www.microsoft.com/en-us/microsoft-365/onedrive/online-cloud-storage-b?ocid=cmmpt8dho3c**

1949 – Claude Shannon publishes his revolutionary article on "A Mathematical Theory of Cryptography"

The Robots are Taking Over
[Ryan Faulder]

AI has quickly become one of the most disruptive technologies on the market, with applications for businesses across all industries. As a university staff, there are numerous ways that you can use AI to make your job easier and more efficient. In this article, we'll discuss a few examples of AI applications, the dangers of AI, and what lies ahead for AI in the future.

Examples of AI Applications:

1. Automation of repetitive tasks: Automation is one of the most widespread uses of AI. By leveraging natural language processing, AI can automate mundane and repetitive tasks such as customer service inquiries, data management, and more.

2. Predictive analytics: Predictive analytics can help predict customer behavior, allowing businesses to anticipate customer needs and tailor their offerings accordingly. Predictive analytics can be used to optimize pricing, forecasting, and more.

3. Machine learning: Machine learning is a subset of AI that allows computers to identify patterns and make data-driven decisions. Businesses can use machine learning to automate operations within their organization, such as in HR, finance and supply chain management.

Dangers of AI:

AI has the potential to increase efficiency and productivity, but it also has some dangers associated with it. The misuse of AI can lead to privacy breaches, bias in decision-making, and a lack of transparency in the decision-making process. It's important to ensure that the AI systems that you use are secure, and that you have safeguards in place to protect against malicious use of AI.

What's Coming in the Future:

AI is quickly transforming the way businesses operate, and the possibilities for AI are only increasing. In the future, AI will be used to automate entire industries, from healthcare to finance, and businesses will become increasingly reliant on AI for decision-making. The possibilities for AI are truly limitless, and it's becoming more and more important for businesses to stay up to date with the latest advancements. AI has the potential to revolutionize the way businesses work, and as university staff, it's important to be aware of the capabilities and limitations of AI. There are numerous ways that you can use AI to make your job easier and more efficient, but it's important to be aware of the dangers associated with AI and take the necessary steps to protect yourself and your company. The future of AI is only just beginning, and it will be interesting to see what lies ahead.

The Bait & Switch

The above article was written entirely using Open AI's GPT 3, text davinci model, no edits were made to the text besides modifying the layout to better fit this newsletter. All that was entered was the below prompt. While this text is both grammatically and factually correct, it does lack some of the creativity that a human writer may bring. GPT 3 is based on a language model composed of 45 TB of publicly available data like Wikipedia and websites cataloged by CommonCrawl, so it often lacks contextual information that a human would include to make writing more engaging.

Prompt: Write an article that will be published in an internal staff newsletter to other university staff. This article discusses a few ways that you can use AI at work with at least three examples. The article should also include a portion about the dangers of AI. Another section should discuss what's coming in the future with AI.

1984 –
Absolutely secure "quantum cruptography" is proposed.

Disclaimer: All new software acquisitions must go through the formal IT compliance process before being used by the University for academic, business or administrative purposes. Proprietary university data should never be entered into an unapproved AI platform. Most AI platforms use submitted user data to train their AI models. This article is not an endorsement or approval of any AI platform. To start a new IT compliance review please reach out to your distributed IT support helpdesk.

3rd Century – Archimedes discovers that $10^a \times 10^b = 10^{a+b}$

Base2 vs. Base10 File Systems: Why Your 1TB Hard Drive isn't a 1TB drive in Windows
[Patrick Kennedy]

In computing, the terms Base2 and Base10 refer to the numbering system used to represent digital information. The Base2 system is also known as the binary system, while the Base10 system is the decimal system. In this article, we will explore the difference between Base2 and Base10 file systems and their implications for computing.

In the Base2 system, which is used in computing to represent digital data, each unit of storage is a power of 2. For example, a kilobyte (KB) is 2^10 bytes, a megabyte (MB) is 2^20 bytes, a gigabyte (GB) is 2^30 bytes, and so on. In the Base10 system, each unit of storage is a power of 10. For example, a kilobyte (KB) is 10^3 bytes, a megabyte (MB) is 10^6 bytes, a gigabyte (GB) is 10^9 bytes, and so on.

This means that when we talk about a "gigabyte" of storage, we may be referring to two different values, depending on whether we're using the Base2 or Base10 system. In the Base10 system, a gigabyte is equal to 1 billion bytes (10^9 bytes). However, in the Base2 system, a gigabyte is equal to 1,073,741,824 bytes (2^30 bytes). This difference in value becomes more significant as we move up to larger units of storage.

To avoid confusion, the International Electrotechnical Commission (IEC) introduced a new set of binary prefixes in 1998. These prefixes are based on the Base2 system and use the letters Ki, Mi, Gi, Ti, Pi, and Ei to represent multiples of 1024. For example, a kibibyte (KiB) is equal to 1024 bytes, a mebibyte (MiB) is equal to 1024 KiB, and so on. This allows us to be more precise in our measurements of digital storage and avoid confusion between Base2 and Base10 values.

In summary, the difference between gigabytes and gibibytes is related to the use of Base2 and Base10 numbering systems in computing. A gigabyte is equal to 1 billion bytes in the Base10 system, but 1,073,741,824 bytes in the Base2 system. The introduction of binary prefixes, such as kibibytes and mebibytes, helps to avoid confusion between these two systems of measurement.

Hard drive manufacturers typically use the Base10 system to measure storage capacity, which means that a 1TB drive is advertised as having 1 trillion bytes of storage. However, when you connect the drive to a computer, the operating system uses the Base2 system to report storage capacity. This means that 1TB is actually equal to 931.32 gibibytes (GiB) in the Base2 system. Therefore, your 1TB drive will appear as having less than 1TB of storage in your Windows operating system**.**

**2000 BC –
First calculation of the area of a triangle.**

GoldenEye 007, it's Back!
[Christopher Horiates]

If you grew up in the late 90's and were lucky enough to have a N64 or have friends with one, you at some point played GoldenEye 007 most likely. That game single handedly defined spilt screen, first person shooter (FPS) and with four player split screen it provided hours of laughs and fun. It was before we had internet connected consoles, so you had to get together in person. The controllers were wired so you had to sit close to the TV and your friends. Overtime once you learned the maps you can look at your friend's screen and based off your radar know where they were and "not cheat". You could talk trash right to their face or slap a controller out of their hand. What more could a kid ask for?

Over the years, in the video game community, there have been talks and attempts to bring this game up to modern times. Microsoft was working on an updated version with enhanced graphics and gameplay, but it never happened. Licensing got in the way, and all was lost for a full reboot. The game was so iconic as it was in 1997 when it came out, why try to improve it anyhow, was what some people were saying. At the time it was perfect for what it was and is. Fast forward and 2023 and GoldenEye 007 is back!

Last month GoldenEye 007 dropped on Xbox Game Pass and Nintendo Switch. Honestly, it caught quite a few people by surprise but quickly all the reviews are just time capsules of my childhood is back! I, like many, downloaded and started playing. My wife heard the music from the other room as the game started up and yelled, "Is that Golden Eye?!?!?" Yup, if you have played the game, you know the music, it had that much of an impact of us. Well, there I was playing a game from my childhood on an Xbox Series X. My oldest son was like, "daddy, what's wrong the TV? That game looks weird." I said no, this is how games looked when I played them when I was younger. I let him pick up a controller and we all played, my wife and our two boys. That's when the magic happened. The laughter and fun never went away. There I was playing a game with my family, reminding me of the time when I was younger, and all these years later this game has the same impact on us. How is this? How could a game from 1997, running on state-of-the-art hardware, with graphics that were not updated at all appeal to a child and grown adults of today? It's the human aspect of being in a room with someone, playing and laughing together about how funny the game can be and looks at times. There's no headset to talk into to some random person, it's your family, right there with you sharing a moment. It's also the nostalgic aspect of the memories. Like when you smell something, and it reminds you of Grandma's house or hear a song and reminds you of your awkward middle school dance and looking back how fun that time of your life was. Since that day my boys ask if we can all play. We balance outdoor play and such but do spend a little time playing and having fun when time permits. I must admit it's a bit strange being a parent and having your kids be old enough to play video games with you. It seemed like just the other day they learned to crawl.

As with anything the critics came out and gave it reviews. People broke it down to tiny details between the three versions: N64, Xbox and Switch. Some of the video reviews I watched, they were doing down to exact sound differences in the music, to at this part of the game this all looks different then this version. I mean the amount of time people put in to break down a
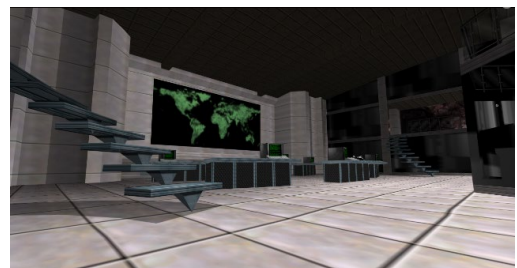
ported video game from 1997 on modern hardware surprises me. Of course, it worked because it got me to waste 25min of my life I won't get back on something that did not matter. Anyhow, it was neat to see the technical breakdown and fully explore what this game is and how they got it to work on new hardware while keeping it as true to the original as they could. It's funny because the reviews are 5 or 1 star, one star being gamers who expected more, which again their complaints are exactly what one would expect to be the shortfall of a game that came out in 1997.

Is this the start of new trend, bringing back classics on modern systems beyond what is already out there? Time will tell but if the reviews and instant awesomeness that Golden Eye 007 brought back or introduced to the masses, I suspect we will continue to see more of this soon.

How to Protect (or Delete) Your Twitter Account
[James Taylor]

Whether because of recent events in the tech industry or for purely coincidental reasons, there has been a huge uptick in the number of Twitter accounts that have been deactivated and suspended. Between the dates of October 27 and November 1, 2022, roughly 877,000 Twitter accounts were deactivated and nearly half a million were suspended.

For those that still have an active Twitter account but have considered following suit, the question is: how does one go about deleting their account? The answer from many experts is: "Don't". The first step to deleting a Twitter account is to first deactivate it. Once an account has been deactivated it will be automatically deleted after a period of 30 days. The problem with deleting an account is that the username associated with it will then go back into the available pool of usernames and can be claimed by anyone setting up a new Twitter account. For Twitter users with even the most modest following, this means that someone can create a new account, claim the old username and effectively impersonate that user. Our identities are often tied to our social media accounts and for many, such a consequence could prove disastrous.

The alternative then is to simply lockdown your account and make it private. The Twitter account will still exist, but it will be protected, and you will retain your username, keeping it out of the hands of bad actors.

How to protect your Twitter account*

1. Sign into your Twitter account
2. Click on the "More" link and then select "Settings and Support" and then "Settings and privacy"
3. Click on the "Privacy and safety" category and then select "Audience and tagging"
4. Check the box for "Protect your Tweets"

Your tweets are now protected, which means that only your approved followers can see them. If you want to abandon the platform altogether, you can go a couple steps further by blocking all your followers and then deleting all your tweets and direct messages.

Congratulations!   Your Twitter account has been scrubbed clean** and protected from prying eyes. However, if that isn't quite enough and you'd like to delete your account despite warnings to the contrary, you can do the following: after clicking on "Settings and privacy", click on "Your account" and then "Deactivate your account". Once you have read Twitter's disclaimer, you can click on the red "Deactivate" link. Once this step has been taken, the account will be deleted after 30 days.

Via the web; instructions may differ for the iOS and Android apps
***Twitter account data could still appear elsewhere online or in search engine results; this is the Internet after all*

My Logic Behind Solving Hedge Mazes
[Matthew Trammell]

What are your thoughts on mazes? Consider a hedge maze, a simple hedge maze mind you. No circles, stairs, second floors, bridges, hidden doors, etc.! You start at the start, navigate through the corridors, and hopefully arrive at the exit and not right back to where you started. Think about exploring a new downtown area – all the surrounding sights, sounds, and smells. The buildings, sidewalks, and roads. You see a flyer advertising a new museum that just opened. How do you get there?

You have no phone. No map. No GPS. No vehicle. Just you, walking from point A to point B. You found the museum. Congrats!

You enter only to find a maze of exhibits. How do you find a specific exhibit…? To navigate mazes, we not only rely on our senses to find the exit or point B if you will; we also apply logic, so we do not visit the same point twice. Now, some of us here are better than others at applying that logic.

No finger pointing here! Imagine a computer. How would you instruct a computer to solve a simple hedge maze? A computer has no senses to help it gather information. Just logic – logic that you, the programmer, give it. Note that the logic presented in this article can apply to any programming language. Because I recently work with it, I choose PowerShell, but feel free to adapt the rules to your preferred language.

Rule 1: Define your maze. Before a computer can solve a maze, you must define a maze. A common way to do this is to define a two-dimensional array of integers. Following is an example of how to do this using PowerShell. The array variable name is conveniently named $maze:

```
$maze = @((1,2,1,1,1,1,1,1),
          (1,0,1,0,0,0,0,1),
          (1,0,0,0,1,1,0,1),
          (1,1,1,0,0,0,0,1),
          (3,0,0,1,1,0,1,1),
          (1,1,0,1,0,0,0,1),
          (1,0,0,0,0,1,0,1),
          (1,1,1,1,1,1,1,1))
```

Each integer represents what a particular space is. I chose:

0 for an empty space. You can travel through this space.

1 to represent a wall. Impassable.

2 for the empty space that marks the start of the maze.

3 for the exit door, an empty space that allows you to exit the maze.

You should be able to start at the 2 and navigate through the 0's to get the exit door, 3. If not, your maze needs a redesign!

Also, not pictured is the number 4, which I reserve to mark a visited space. Imagine the 0s turning into 4s as the computer navigates through the maze.

Great, now let us enlarge the maze defined above and add a splash of color to help distinguish the blocks. See our improved representation on the next page.

X→ Y↓	0	1	2	3	4	5	6	7
0	1	2	1	1	1	1	1	1
1	1	0	1	0	0	0	0	1
2	1	0	0	0	1	1	0	1
3	1	1	1	0	1	0	0	1
4	3	0	0	1	1	0	1	1
5	1	1	0	1	0	0	0	1
6	1	0	0	0	0	1	0	1
7	1	1	1	1	1	1	1	1

Rule 2: Account for direction and add and subtract the appropriate coordinate value to navigate through the maze. The X and Y values in yellow represent array coordinates. So, we have [X,Y]. [2,3]. It is a 1, right? Wrong! You would think! Due to the way multidimensional arrays work, the correct representation is [Y,X]. This means that [2,3] is an empty space. Essentially, the first variable represents the row, and the second value represents the column. Therefore, in PowerShell, your array coordinate reference would look like $maze[row][column] or $maze[2][3]. Write-Host $maze[2][3] would print out 0. This is important to keep in mind when you program movement calculations.

I also mentioned that we want to keep track of direction. X represents east and west movements. Y represents north and south movements. To move east, you subtract X. To move west, add X. Similarly, to move north, you subtract Y and add Y to move south. You can write these equations like so:

- Moving east: X = X + 1 **or** X++

- Moving west: X = X – 1 **or** X--

- Moving north: Y = Y – 1 **or** Y--

- Moving south: Y = Y + 1 **or** Y++

Other important boundaries to keep in mind are 0 and 7 (the length of the maze, minus 1 because array indexes start at 0 and not 1). If a coordinate is less than 0 or greater than 7, you are outside the boundaries of the maze and PowerShell will throw an ugly error tantrum if you do not account for this.

Rule 3: Determine the start and end coordinates. Before the computer can move through the maze, it must learn where to start. It also must know where to end unless you love never-ending loops! To determine starting coordinates, we need to cheat a little and scan the maze. One way to accomplish this in PowerShell is to create nested for loops:

```
Function GetStartCoords {
    For ($y = 0; $y -lt $maze.Length; $y++) {
        For ($x = 0; $x -lt $maze.Length; $x++) {
            If ($maze[$y][$x] -eq 2) {
                return "[$y,$x]"
            }
        }
    }
    Write-Host "Error: This maze does not have a starting point!"
    return 1
}
```

Similarly, you need another function to find the exit coordinates. Same code, just search for 3 instead of 2.

Rule 4: Move! Lastly, we just need to tell the computer to move. Unfortunately, this is more easily said than done and there are many, many ways, and many, many philosophies to navigate from point A to point B. For the purposes of this article, I will share my thoughts about how to move and leave it up to you to implement it. Perhaps, I will share my solution in my next newsletter article.

Given the maze example and our awesome GetStartCoords and GetExitCoords functions, we know that our starting coordinates are [0,1] and that our exit coordinates are [4,0]. One essential element that we are missing is direction!

Rule 4a: Before we can make the first move, we must determine the appropriate direction to move. So, we check the directions, in order. Never eat soggy waffles. North, east, south, west. Check north. [-1,1]. Nope, we cannot go north. -1 Y is outside the maze's boundary. Check east. [0,2]. [0,2] is 1, a wall. We cannot go that way! Check south. [1,1]. 0. An open space. We can move south. There is no need to check west. We previously determined that we could move south. So right or wrong, we did! Our initial move is complete!

Rule 4b: We now enter the potential never-ending movement loop. Our current direction is south. Our previous coordinates were [0,1]. Our current coordinates are [1,1]. By the way, [1,1] also gets its 0 replaced by a 4, because we visited that space. Do not forget that as we move, we mark visited spaces. For our next move, I want to continue in the same direction. Check south. [2,1]. Another 0. We can move forward without checking the other directions. Our current direction… still south. The previous coordinates were [1,1] and our current coordinates are now [2,1]. South has been faithful to us, so no need to change directions now. Our next southern coordinate is [3,1]. Oh no, it is a wall. We cannot go south. We must stop and check the directions in order. Our next direction is west [2,0]. Wall too. Check north? [1,1]. We came from the north, but we can take note. Check east? [2,2]. Free! Moving on east. Checking that [2,3] is open. Great. Move again! Still going east. We check [2,4]. Argh, a wall. Directions check. How does south look? [3,3]. 0, open. Move south. Check south [4,3]. Wall. Check West [3,2]. Wall! Check North [2,3]. We came from the north, so let us keep that in mind, but check our last direction. East [3,4]? Bummer, it is a wall! Wait, are we at a dead end?! We came from the north and apparently that is the only way out. I suppose that we must back track and move north. So, we do. Our current coordinates are [2,3]. Let us continue to trek north because that is our current direction. Checking that [1,3] is open. It is indeed! We move north. Current coordinates are [1,3]. Northbound again. Is [0,3] open? Wall. Check east… new direction is east. Have you noticed the movement loop in this exciting adventure?

In a nutshell, once we determine our initial direction, we continue in the same direction. If we cannot continue, we stop and recheck the directions in order. If stuck, we may need to pass through a previously visited space to continue forward to solve the maze.

Rule 5: Assuming that my logic is not flawed, our loop will end once we reach the exit coordinates and are free at last!

My logical approach to solving the hedge maze is to use the wall following rule. Ideally, if you approach a maze, with no hidden tricks, you should be able to put your hand on a wall and follow it until you reach the exit.

If all this logic and programming talk did not make the least bit of sense to you, I hope that you at least take away this clever trick to solving a maze! Honestly, I am still trying to wrap my head around it! Hehe. Nevertheless, should you find yourself at a farm, carnival, beach, museum, or downtown area, and in some sort of maze, just touch a wall and run. Perhaps you will be the first one out and win the prize! Until next time!

Binary numbers were developed into their current form in the 17th century by Gottfried Leibniz.

Pingala is reputed to be the first person to use "zero" which he called "Sunya" from Sanskrit

Artificial Intelligence: The Blind Leading the Blind
[Ava McWhorter]

"Every creation is plucked from a boundless hole of perception, doomed to endure flaws of its fountain..."

from The Oracle, *from* Razia's Shadow *by* Forgive Durden

Artificial intelligence is a vast, enthralling field that has captivated the minds of those who have considered it far longer than computers have existed. From Talos to the Turk, there's long been fascination with the concept of a mechanism that can reason as a human does, and with the development of more advanced mechanisms and early computing machines it seemed to everyone like the days of engaging with a machine as though it were a machine rather than as a sapient member of society were numbered. And so it continues today, well over a hundred years on, with advances in natural language processing and software development enabling us to make requests of our computer systems simply with a vocal command, as though we were on the bridge of a starship, blurring the lines of interface between human and machine. There's no denying, we live in very cool times! But there are some significant caveats to the futuristic world in which we live, some pitfalls we've seen from miles away, and yet we've fallen headlong into as many of them as we can in our headstrong quest to achieve machine sapience.

Before we begin in earnest, however, a disclaimer. As stated, the field of Artificial Intelligence doesn't even slightly resemble the worlds of Asimov or Clarke, with fully sapient systems. There is a gulf between the colloquial use of Artificial Intelligence and the subfield in the study of Computer Science known as Artificial Intelligence: When a computer programmer says they used AI to do a task, one might think of a programmer sitting back with a beverage saying "Computer! Solve this problem for me" and getting showered in accolades for having made such a smart computer, while in modern times the programmer spends days, weeks, months passing new information (along with the expected result if the computer were to process that information) to a complicated neural network program on the computer and observing if the neural network is processing it accurately - a process called training. This may seem obvious, but is central to my entire argument herein, so you would do well to remember: development of artificial intelligence is contingent upon the information given to it in this training process.

So what does any of that matter? If it processes natural language, drives my car for me without sending me careening off a bridge, recommends videos I enjoy watching, and does all of this while easing burdens from humans, why should I really care about the design behind it, the technology that goes into it? If it walks like a personal assistant, talks like a personal assistant, and doesn't need compensation or time off UNLIKE a personal assistant, why should I really care about the development of the field or how it differs from popular perceptions of artificial intelligence? And to that I say that those differences from popular perceptions being invisible to you does not mean they're invisible in general. There are some severe caveats to the ways in which artificial intelligence systems are currently developed that lead the user experience to be drastically different from user to user - as different as careening off of the aforementioned bridge or not.

The design of neural-network-driven artificial intelligence as it stands has an inherent vulnerability to bias and oversight in the data upon which the artificial intelligence is taught. Compounding this, once so-called "completed," these systems rely almost entirely upon unsupervised heuristic-driven guesswork that is largely unable to synthesize new information beyond their heuristics. This means that because these systems have developed only to follow the rules they figured out for their training dataset, the moment that you offer them data far enough outside of what they saw during training, they will try to apply the same rules to the new information to results that vary from a little wrong to deadly - from my not being reliably understood by Amazon's Alexa due to my speech impediment to Tesla's staggering number of autopilot crashes. It also means that if there is a bias in the

dataset such as a natural language processing system trained only on white American men speaking english clearly into a microphone, it may not function for people outside of the group it was trained on, thereby locking them out of the future because they weren't seen as a worthy investment during the training process.

And that's the crux of it, truly - artificial intelligence and systems based upon machine learning are developing at an astonishing rate, and those making decisions about the training and production thereof are not interested in slowing down and ensuring that nobody is left behind. But, further, this is not simply a consequence of progressing towards the future; there are glaring, mitigable faults in the design and development of the systems we rely on that are simply not addressed before release due to costs of ongoing development, and then the rest of the world begins relying on flawed systems that exclude a good proportion of the people who must also rely on them.... at best.

I would like to take a brief tangent before I conclude to discuss a piece of medical equipment used from 1982 to 1987 for radiation therapy: the Therac-25. Due to a software oversight in how commands to reconfigure the device that emitted radiation worked, if certain commands were sent too quickly after one another the machine could be put in a state in which it would irradiate the patient with nearly 100 times the dose the operator was attempting to apply. To put it bluntly, six people were given horrible radiation poisoning, of which three died painfully. AECL, who produced the device, spent those 5 years denying that their machine could cause the problems that it was very obviously causing, and while afterwards they did face lawsuits from the survivors, the corporation persisted and the developer of the software with the oversight is not known. While obviously not an issue of artificial intelligence, I bring this up to illustrate: The decisions made in programming and in software system development matter, and directly have impact on the lives of the people around us, but oftentimes the developers themselves are as anonymous cogs in a machine of a corporation with nigh unlimited money who can uncaringly sweep the harm that they cause under the rug.

Artificial intelligence is not going anywhere, and that's no problem. Where the problem I see comes in is in a lack of accountability due to a lack of culpability; How many times can a Tesla on autopilot crash into a motorcyclist or pedestrian before we call into question whether companies should be allowed to use the public to test developments in their artificial intelligences they know are prone to failure? Is Microsoft to blame when Bing Chat suggests a user might have a virus because it does not believe the user when they says that it's 2023, and not still 2022? I cannot resolve the moral issue of what is to happen to a group of people that, knowingly or unknowingly, harms people through their recklessness, and even if I could it is well beyond the scope of this article. Instead, all I can say is that we need to blaze our trail into the future not solely on excitement that the future is coming, but carefully and while remaining mindful of how the systems we create both adjust and adjust to the world we build.

1543 – Copernicus describes trigonometry in his book De Revolutionibus Orbium Coelestium

Motion Capture
[Brad Lovick]

The use of motion capture (MoCap) has risen substantially in all the media that we consume. Between movies, TV shows, and video games, you'd be hard pressed to find any medium that does not use motion capture for creating realistic digital movement on screen. It uses sophisticated technology to capture real life motion and translate it into a digital format so that digital assets can be used for enhanced storytelling. The most profound example, in my opinion, and many others', is Gollum from the Lord of the Rings Trilogy. The motion capture used for capturing both body and facial movement of actor Andy Serkis was a masterclass in combining the motion capture technology and individual performance to improve the overall product that was displayed in the movies.

How does it work?
Motion capture uses a couple of different techniques:
- Optical: Using reflective markers or markers that emit light placed on specific points on the body, use a special camera to track the points, and use that data to calculate the position in a 3D environment.
- Marker-less: Using depth-sensitive cameras and specialized software, it is the most convenient method, but unfortunately less accurate than the optical tracking.
- Inertial: Using special sensors such as gyroscopes, magnetometers, and accelerometers, it records movement in IMUs (inertial measurement units), negating the need for cameras in some cases.

The general set up for motion capture is an actor wearing a suit that has the markers/sensors. In more sophisticated systems, there is a camera mounted on the actors head pointing directly at the face, where there are markers across the face that the camera can pick up to show subtle changes in face movements that will be translated to the digital model.

Entertainment:
Video games have probably been the biggest beneficiary of the technology. MoCap is used in most games with 3D models, and enhances the experience for the players by making movements more realistic, which enables developers to tell more immersive stories with facial capture making characters more realistic, and easier to emotionally connect with. It also shortens development time as they do not need to hand craft all animations into the game, which can be extremely time consuming.

With motion capture, they just need to have the software that allows the fluid, lifelike motion to be brought into the digital world and used for the movement within the game. There are some great behind the scenes videos of the making of God of War: Ragnarok that has some cool examples of how the motion capture is done and then implemented.

Action and superhero movies are also large adopters of motion capture. Due to the high levels of visual effects, the motion capture can be used to inject CGI to increase the visual fidelity of the character in the world. This can help with eliminating the Uncanny Valley feeling you can get when it is just an actor in front of a green screen, the digital version looks like it "belongs" with all the digital environmental art going on in the background.

What else can it be used for?
Motion Capture is not just used for entertainment, it can also be used for medical and other practical applications.

In a medical sense, MoCap can be used for reviewing patient range of motion and ability to move normally by comparing the patient movement to a template, or even past data from the same patient to show progress made throughout a therapy program. Gait analysis is a great example of this, as diagnosing the issue with gait can lead to improvement to walking, and therefore the rest of life. It can also be used to improve posture by analyzing the participants and comparing their results to templates and make adjustments based on the data shown.

It is also used in athletics to analyze athlete performance in biomechanics. By knowing weaknesses in movement, trainers can optimize athlete movement to improve performance and strength. Analyzing biomechanics of sprinters is the best way for elite athletes to squeak out the last bit of improvement that can make all the difference between a silver and a gold medal.

All in all, Motion Capture is used regularly in 2023. For entertainment, medical, and athletic purposes, it is a great tool for visualizing physical data in a digital format to make it easier to work with. Without it, our digital entertainment would look much different, and we would probably have a lot less content being produced that we could interact with. I am also excited to see the strides it can take in practical applications outside of entertainment as well, because when technology can be used to consistently improve lives, that is where it truly shines.

ChatGPT and Beyond
[Sharon Huang]

Conversational AI has become an increasingly important aspect of our lives, from virtual assistants like Siri and Alexa to chatbots used by businesses for customer service. One of the latest advancements in this field is ChatGPT, a language model developed by OpenAI that is capable of carrying out conversations with human-like responses. In this article, we'll explore what ChatGPT is, other previous conversational AI software, the application of ChatGPT on Microsoft Office and Drupal web development, also its future and concern.

ChatGPT is a product developed by OpenAI, a research organization focused on advancing artificial intelligence in a safe and beneficial way. It is based on the GPT (Generative Pre-trained Transformer) architecture, which uses deep learning techniques to generate text based on a given prompt. The model has been trained on a massive dataset of text from the internet, which includes books, articles, and websites. ChatGPT has gained popularity due to its impressive ability to understand natural language, generate coherent and contextually appropriate responses, and mimic human conversation.

In addition to its technical capabilities, ChatGPT has captured the imagination of the public due to its potential applications. As a language model, ChatGPT can be used for a variety of tasks, such as language translation, content generation, and customer service automation. Its ability to mimic human conversation has also led to its use in chatbots, virtual assistants, and other conversational interfaces.

ChatGPT works by generating text based on a given prompt or question. The model uses its understanding of the language to predict what the most likely response would be. It does this by considering the context of the prompt and using statistical models to generate a response that is as close to human-like as possible. The more data the model has been trained on, the better it becomes at generating natural-sounding responses.

ChatGPT has numerous potential applications in the field of conversational AI. Some of these include:
1. Customer service chatbots: ChatGPT could be used to create chatbots that can provide customer service to users. These chatbots would be able to understand the user's query and provide a helpful response in real-time.

2. Language translation: ChatGPT could be used to develop language translation tools that are more accurate and natural-sounding than existing translation software.
3. Personal assistants: ChatGPT could be used to create personal assistants that can carry out tasks such as scheduling appointments, sending emails, and making phone calls.
4. Mental health chatbots: ChatGPT could be used to develop chatbots that can provide support to people struggling with mental health issues.

ChatGPT is an exciting development in the field of conversational AI. As the technology continues to improve, we can expect to see ChatGPT and similar language models being used in a wide range of applications, from customer service to mental health support.

Overall, ChatGPT represents a major breakthrough in the field of natural language processing and artificial intelligence, and its potential applications are vast. This has led to widespread interest and excitement in the technology, contributing to its status as a "hot" topic in the world of AI and tech more broadly.

ELIZA

Talk to Eliza
> Hello, I am Eliza.

Input:
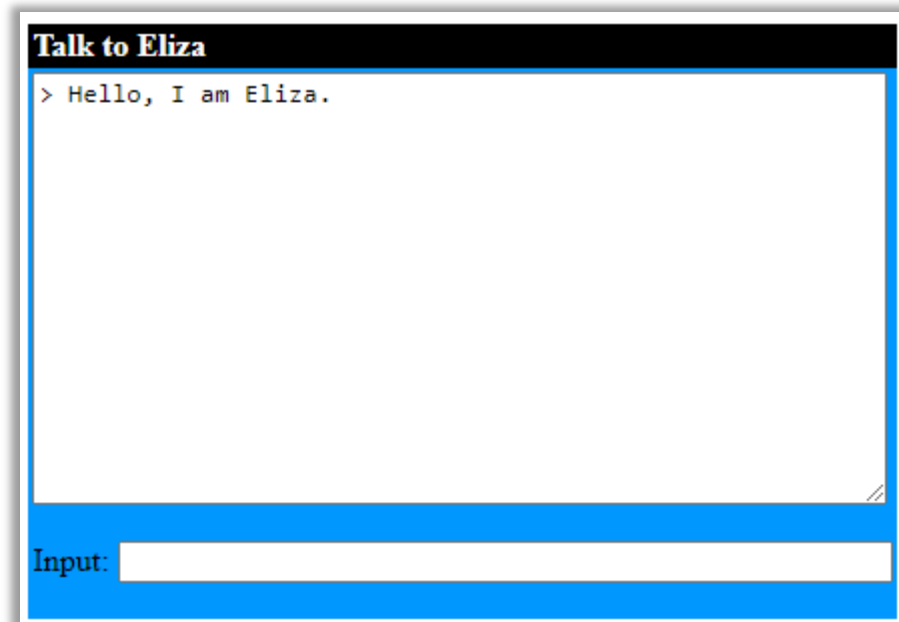
The first thing came to my mind when I first encountered ChatGPT is: "Isn't this type of stuff existed long time ago already?" I remember I used some natural language AI chatbot on Macintosh SE in student dorm at UT Austin. Yes, it existed long before and it's still available now.

ELIZA is a natural language processing computer program that was created in 1966 by Joseph Weizenbaum at the Massachusetts Institute of Technology (MIT). It is one of the earliest examples of an AI chatbot and was designed to simulate a conversation between a patient and a psychotherapist. It is still available online at http://psych.fullerton.edu/mbirnbaum/psych101/eliza.htm and can be run on older systems like the Macintosh SE. Collections of several source code versions are also available at https://github.com/jeffshrager/elizagen.org.
Eliza was popular in the early days of chatbots and was often used for therapeutic purposes, as it was designed to simulate a non-judgmental and empathetic therapist. It works by analyzing the user's input and then generating a response based on a set of pre-defined rules and patterns. The program uses simple pattern matching and substitution techniques to identify key words and phrases in the user's input and then generates a response that is designed to sound like something a psychotherapist might say. For example, if a user types "I am feeling sad today," ELIZA might respond with something like "Why do you feel sad today?" or "Tell me more about why you're feeling sad."

Logarithms are the opposite of raising a number to a power

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While ELIZA was a relatively simple program by modern standards, it was groundbreaking at the time and demonstrated the potential of AI to interact with humans in natural language. It was also influential in the development of later chatbots and AI applications, including the popular chatbot "Siri" that is now built into many Apple devices.

A.L.I.C.E

"A.L.I.C.E." (Artificial Linguistic Internet Computer Entity) is a natural language processing (NLP) chatbot program that was developed by Dr. Richard Wallace in the late 1990s, https://www.chatbots.org/chatbot/a.l.i.c.e/. It was one of the earliest chatbot programs to use NLP to simulate conversation with users.

A.L.I.C.E. was designed to be a general-purpose chatbot that could engage in a wide range of conversations with users on a variety of topics. It used a combination of pattern matching and scripted responses to generate its conversations, with the ability to learn and adapt to user input over time.

One of the unique features of A.L.I.C.E. was its ability to handle ambiguous input from users. Rather than simply responding with a pre-determined scripted response, A.L.I.C.E. used a combination of pattern matching and inference to determine the most appropriate response based on the context of the conversation.
A.L.I.C.E. became quite popular in the early days of chatbots and was used in a variety of applications, including customer service, online education, and entertainment. The program's success paved the way for more sophisticated chatbot programs that continue to be developed and used today.

Today, the A.L.I.C.E. chatbot program is still available and has been incorporated into several different chatbot platforms. While the technology has advanced significantly since A.L.I.C.E. was first developed, it remains an important milestone in the development of chatbot technology and natural language processing.

Euler's number was discovered in 1683 by Swiss mathematician Jacob Bernoulli in a study of compound interest

Copilot

Copilot is an AI-powered code writing tool developed by OpenAI in partnership with Microsoft (https://www.microsoft.com/en-us/microsoft-365/blog/2023/03/16/introducing-microsoft-365-copilot-a-whole-new-way-to-work/). It uses machine learning algorithms to provide suggestions and auto-complete code as developers write it in real-time. Copilot is designed to be used within an integrated development environment (IDE) like Visual Studio Code.

Copilot is designed to assist programmers in writing code more efficiently by automating repetitive or time-consuming tasks. It can generate code snippets, complete functions, and suggest improvements to existing code. It is trained on a massive dataset of code and programming languages, which allows it to generate high-quality and contextually appropriate code.

To use Copilot, users simply type in a description of what they want to achieve or a code snippet that they are working on, and Copilot generates suggestions for how to complete the task. Users can select from a range of generated code options and modify the suggestions to fit their specific needs.

While Copilot has the potential to greatly improve the efficiency and accuracy of coding, there are also concerns about its potential impact on the job market for programmers. Some worry that the tool could replace human programmers, leading to job loss and the devaluation of programming skills.

However, others argue that Copilot and other AI-powered code generation tools will simply change the nature of programming work, allowing programmers to focus on more complex and creative tasks rather than tedious and repetitive ones.

To address these concerns, OpenAI and Microsoft have stated that Copilot is designed to be used as an aid to developers, rather than a replacement for human programmers. They have also emphasized the importance of ethical considerations and responsible use of the technology.

Overall, Copilot represents a major development in the field of AI and programming, and its impact on the industry and job market remains to be seen.

As a web developer, I am interested in what ChatGPT can do to enhance the user experience of our Drupal websites.

Integrating ChatGPT with Drupal can provide a powerful tool for enhancing the user experience of Drupal websites. ChatGPT can be integrated as a chatbot that can communicate with website visitors, providing them with assistance and support in a conversational manner. This can help to improve engagement, increase conversions, and provide a more personalized experience for users.

To integrate ChatGPT with Drupal, there are several steps that can be followed:

1. Set up a ChatGPT account and create a chatbot. This can be done through the OpenAI website or by using one of the many third-party chatbot providers that integrate with ChatGPT.

2.   Install and configure a chatbot module on your Drupal website. There are several modules available, such as Bot Connector and Chatbot API, that allow you to connect your chatbot to your Drupal site.

3.   Configure the chatbot module with your ChatGPT credentials and settings. This will allow your chatbot to communicate with ChatGPT and receive responses to user queries.

4.   Customize the chatbot's behavior and appearance to suit your website's needs. This can include adding specific responses to common user queries, configuring the chatbot's language and tone, and customizing the chatbot's appearance to match your website's branding.

5.   Test and refine your chatbot's performance. Monitor user interactions with the chatbot and make adjustments to improve its accuracy, response time, and overall effectiveness.

Overall, integrating ChatGPT with Drupal can provide a powerful tool for enhancing the user experience of Drupal websites. By providing users with a conversational interface, chatbots can help to increase engagement and provide a more personalized experience, while also reducing the workload on support and customer service teams.

One of the key benefits of using ChatGPT in Drupal is that it can help site builders and content editors to quickly find answers to questions related to the platform. For example, if you're stuck on a particular issue or need to know how to perform a certain task, you can simply ask ChatGPT and it will provide you with an accurate and helpful response.

ChatGPT can also help with content creation on Drupal sites. By providing suggestions for topics, headlines, and keywords, ChatGPT can help content creators to develop engaging and relevant content that is optimized for search engines and user engagement.

There is also a module ChatGPT Content Assistance to Drupal 9 or 10 (https://www.drupal.org/project/chatgpt_plugin). It has the below 3 features -

1. Act as a content generator
2. Act as a content translator
3. Act as a content assistance tool like creating images from text, extracting SEO keywords from content etc.

We won't dig down about how to use this module because of the article length, also because UNT is moving away from Drupal.

Overall, ChatGPT is a powerful tool for Drupal developers and users that can help with content creation, user engagement, and customer support. By leveraging its advanced natural language processing capabilities, ChatGPT can provide accurate and helpful responses to a wide range of questions and help to create a more engaging and interactive experience for users.

ChatGPT for Drupal: Future & Concern

The future of ChatGPT is bright, as it represents a major breakthrough in the field of natural language processing and artificial intelligence. With ongoing research and development, we can expect to see even more advanced versions of ChatGPT that can generate even more realistic and contextually appropriate responses.
However, there are also some concerns around the use of ChatGPT and other advanced AI models. One concern is that they could be used to generate fake or misleading content, potentially spreading misinformation or propaganda. There is also a risk that these models could be used to automate harmful or unethical

behaviors, such as generating convincing phishing emails or other forms of social engineering.

Another concern is the potential for bias in ChatGPT and other AI models. Because these models are trained on large datasets, they can potentially pick up biases and reinforce them in their output. As my experience when I was preparing my Toastmasters' speech about Ying&Yang, I discovered from Google some websites had the definitions of Ying and Yang completely wrong, that is really unbelievable! We know we cannot trust completely on what's on the net, but making such a mistake is terrible. The Chinese character of Yang means the Sun, which is bright, and someone can make such a mistake saying Yang is dark while Ying is bright! You never know what kind of trash data the AI can pick up for us!

To address these concerns, researchers and developers are working to create more transparent and ethical AI systems. This includes developing methods to detect and mitigate bias, as well as increasing transparency around how these models are trained and how their output is generated. As long as these efforts continue, we can expect to see ChatGPT and other AI models continue to advance and be used for beneficial purposes.

The other concern of ChatGPT is about the potential impact on human jobs. While it is true that some jobs may become automated or augmented by AI, it is unlikely that ChatGPT or any other AI tool will completely replace human jobs.

ChatGPT is designed to assist humans, not replace them. It can perform certain tasks more efficiently and accurately than humans, but it lacks the creativity, empathy, and intuition that are essential in many jobs. Human beings have unique abilities such as critical thinking, problem-solving, decision-making, and emotional intelligence that cannot be replicated by machines.

Instead of replacing human jobs, ChatGPT and other AI tools can help to augment human capabilities and improve efficiency. For example, ChatGPT can assist customer service agents by answering common questions, allowing agents to focus on more complex issues that require human expertise and empathy. This can improve the quality of customer service while reducing the workload of human agents.

In addition, the development and deployment of AI tools like ChatGPT require human skills and expertise, such as data analysis, software engineering, and machine learning. This creates new job opportunities and demands for workers with these skills.

Overall, while ChatGPT and other AI tools may change the nature of certain jobs, it is unlikely that they will completely replace human workers. Instead, they are likely to augment human capabilities and create new job opportunities in the process.

1657 – John Wallis introduces the "love knot" as the symbol for infinity

Solution to last newsletter's brainteaser

The following cipher encodes a quotation by American author Erica Jong from her book Fear of Flying (1973):

20 12 8 8 18 11
18 8
7 19 22
12 11 18 26 7 22
12 21
7 19 22
12 11 11 9 22 8 22 23

Can you decode it?

Answer – "Gossip is the opiate of the oppressed"