Putting AI to Work

The magic wand for digital transformation

Agenda

History of AI

Transformers

Navigating Prompting

Kenneth Thomas

- Background – Ten years of working within various levels of cybersecurity starting with the appliance team at Alert Logic . Promoted to Network Security Analyst, and eventually Corporate Security.
- Currently working within NOV IT Security.
- AI Journey:
  - 2000's - Creative software (opencv, processing, OpenFrameworks) sparks curiosity in creative code
  - 2018 – Explored the world of creative generative AI via runwayml.exe
  - 2020 – OpenAI's CLIP, VQ-GAN provided fertile ground for exploration
  - 2022 – Diffusion based models, intimate understanding of vector space, implemented recommendation system via OpenAI api

https://linkedin.com/in/itsken

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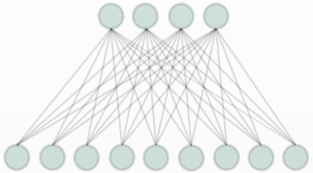
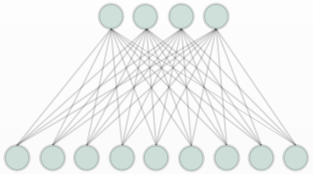


AI: Then and Now



1950

Alan Turing publishes “Computing Machinery and Intelligence”

The terms “Artificial Intelligence” and “Machine Learning” coined

1960

Early AI chatbot program “ELIZA” developed. The first neural networks are created

1970 - 1990

Several periods of little to no interest in AI, also known as “AI Winter”

2000

1997: Deep Blue defeats world chess champion Garry Kasparov.

1998: ImageNet

2001: Google Books dataset containing 100 billion words released

2010 - 2017

Siri released 2010

IBM’s Watson defeats two Jeopardy champions

“Attention is all you need” research paper proposes state-of-the-art Transformer model architecture

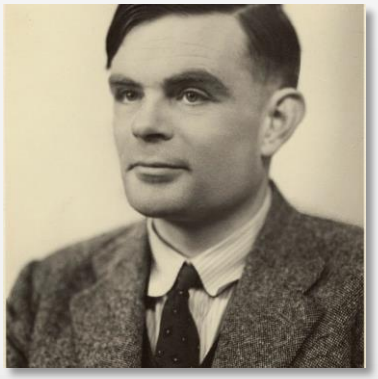
2022

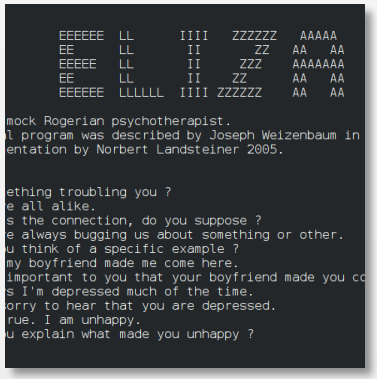
Google releases & implements BERT into all web searches

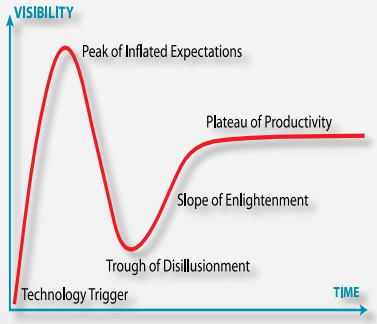
MetaAI unveils PyTorch

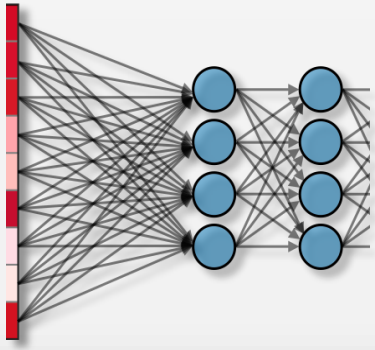
Generative AI models Dall-E, Stable Diffusion, and Mid Journey take the creative world by storm

OpenAI democratizes access to large language models via GPT3, chatgpt and Whisper





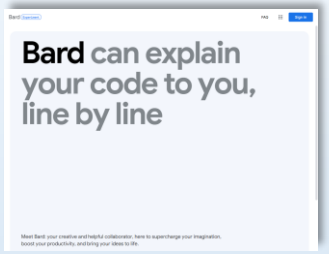




TensorFlow

OpenAI

How to access



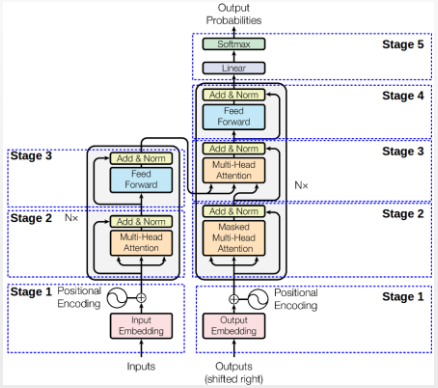
- Company: Google
- Foundation Model: BERT
- Cost : Free
- Pros: Can access information from the real world
- Cons: Is still learning, prone to hallucination or getting confused

- Company: Microsoft
- Foundation Model: GPT-4
- Cost : Free
- Pros: Powerful chat assistant with vast interoperability via Microsoft Edge
- Cons: No chat history, model can be fussy at times

- Company: OpenAI
- Foundation Model: GPT
- Cost : Free / Premium access via API.
- Pros: Powerful state of the art versatile large language model. API access, fine tuning capabilities
- Cons: Opaque training process, models can generate data which looks correct but is meaningless

- Company: Anthropic
- Foundation Model: Claude
- Cost : Free / Premium
- Pros: 100K context window, allows for file uploads
- Cons: Free model may become limited over time

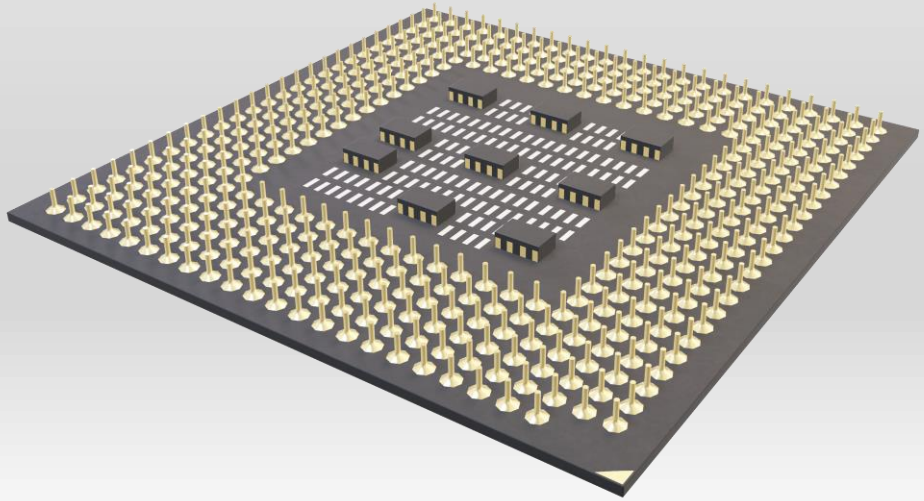
The Rise of Transformers



Google AI

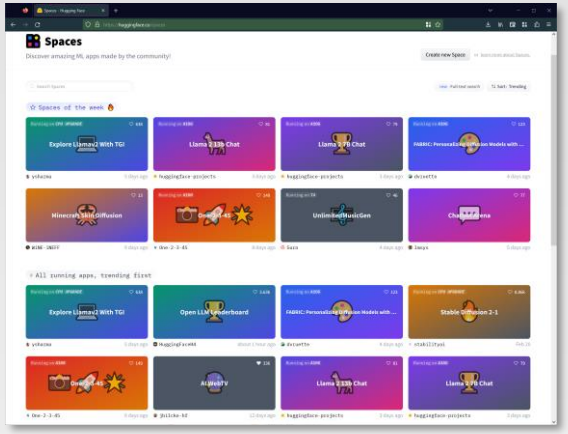
Model	Description	Task	Dataset Used	Commercial Licensing?
GPT	Large language model from openai based off of Transformer architecture	Text generation, text completion, summarization, fine tuning	Common Crawl, Books, Web comments	Yes
BERT	A model from google that uses a bidirectional training process	Named Entity Recognition, Sentiment analysis, Text Classification, fine tuning	Wikipedia, BooksCorpus	Yes (Apache 2.0)
Whisper	Automatic speech recognition system developed by OpenAI	Speech recognition, audio-to-text transcription, multilingual translation	680,000 hours of multilingual multitask labeled audio	Yes

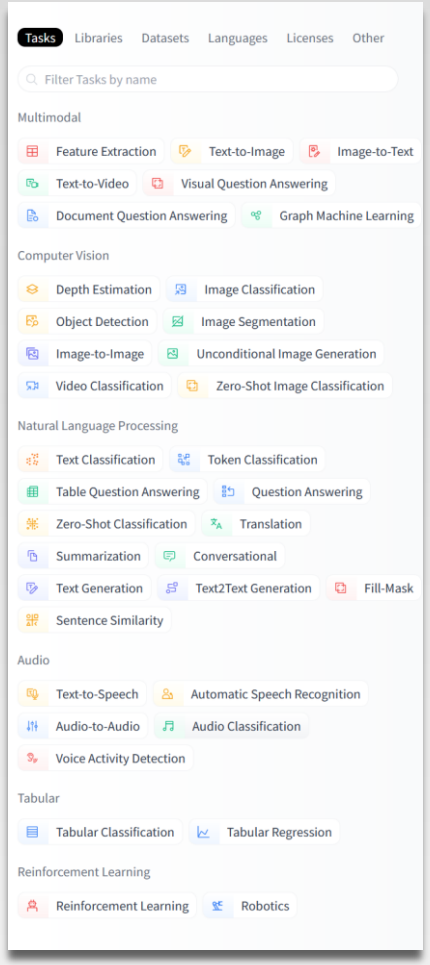
- Originally proposed for Natural Language Processing (NLP), Transformers have now found broad adoption in numerous fields including vision, sound, and speech processing
- Allows for representation of meaning via numbers
- GPT: Generative Pretrained Transformer
- BERT: Bidirectional Encoder Representations from Transformers
- Training: Weeks to months of GPU & expert time.
- Fine tuning: Customizing the model for your application
- Licensing: Not all opensource models licensed for commercial usage…



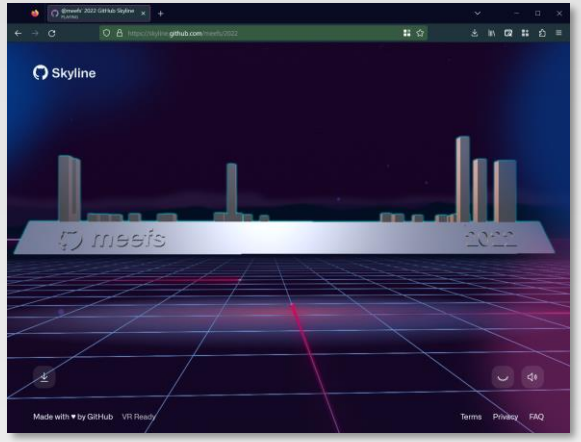
Git your hands dirty

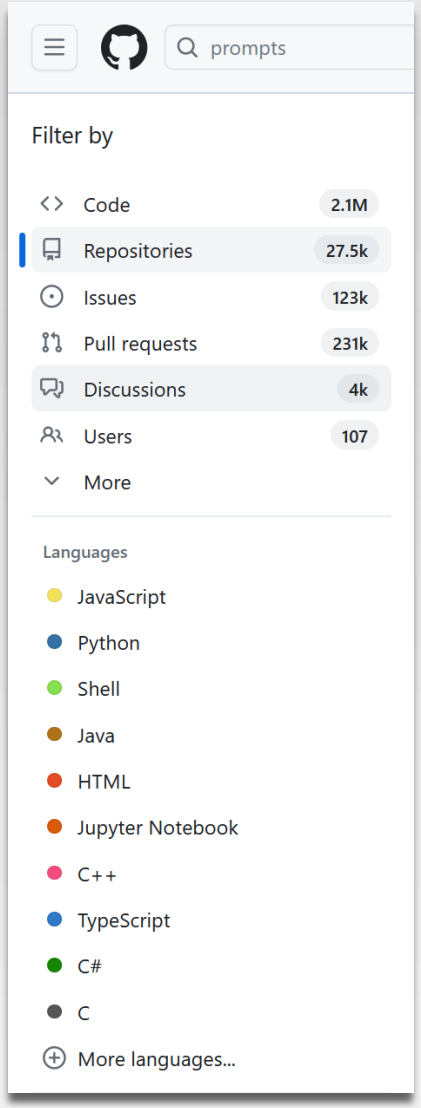
- Home of Transformers **pip install transformers**
- The AI community building the future
- Simplifies the process of downloading and using models
- Interoperability with github for sharing models, and code



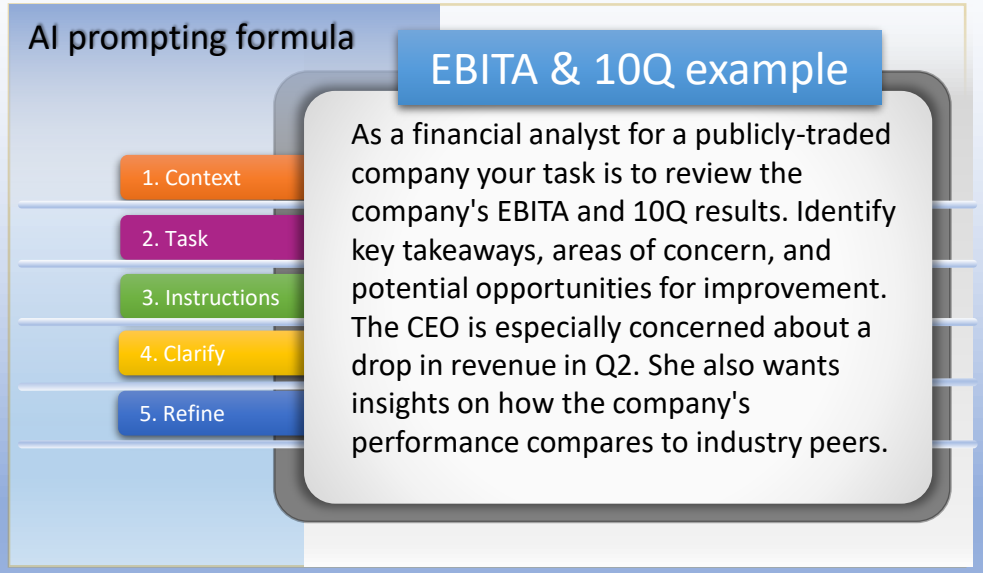


- The world's most productive social network
- Supports millions of open source projects
- Enables collaboration between developers, open source contributors, and individuals from all around the globe





Prompting Guidelines



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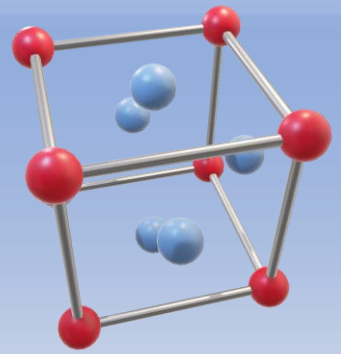

Friendly reminder: Always say “please” and “thank you”! 😊

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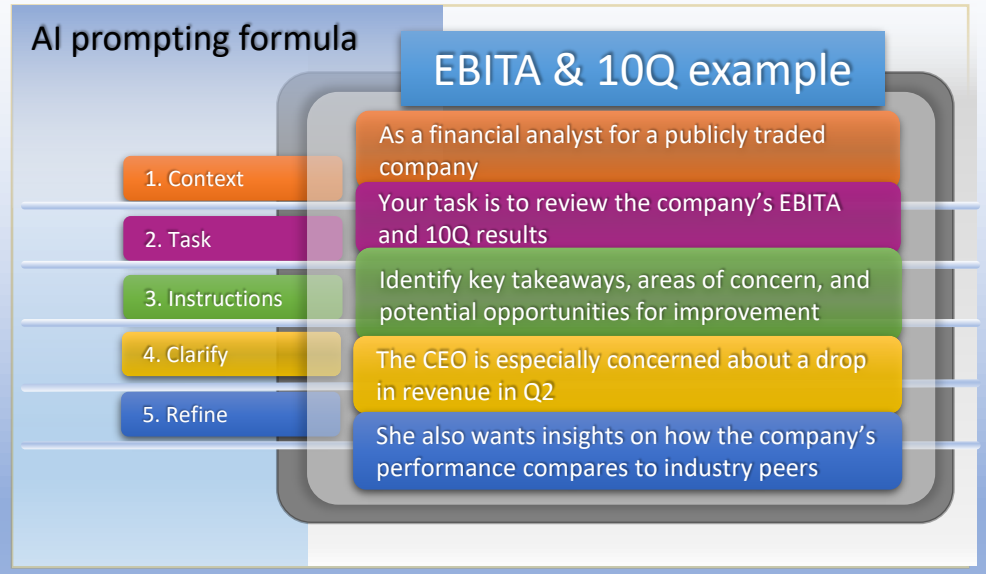

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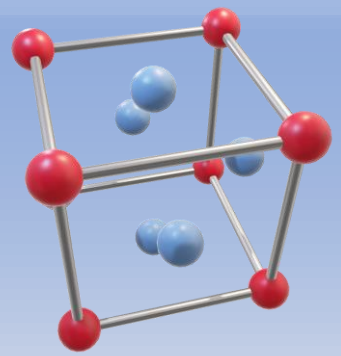

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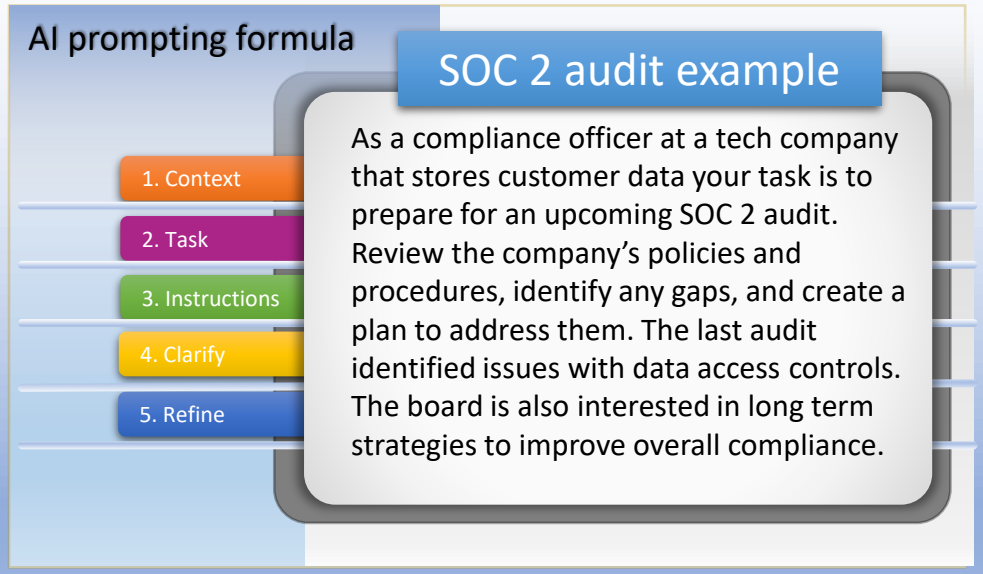

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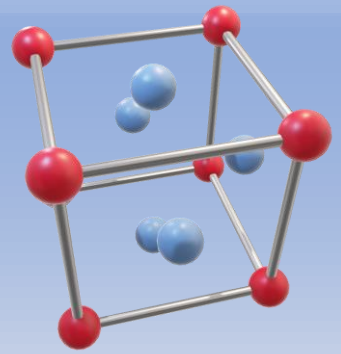

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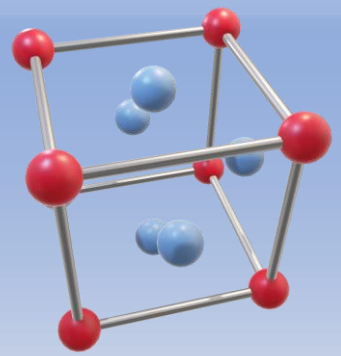

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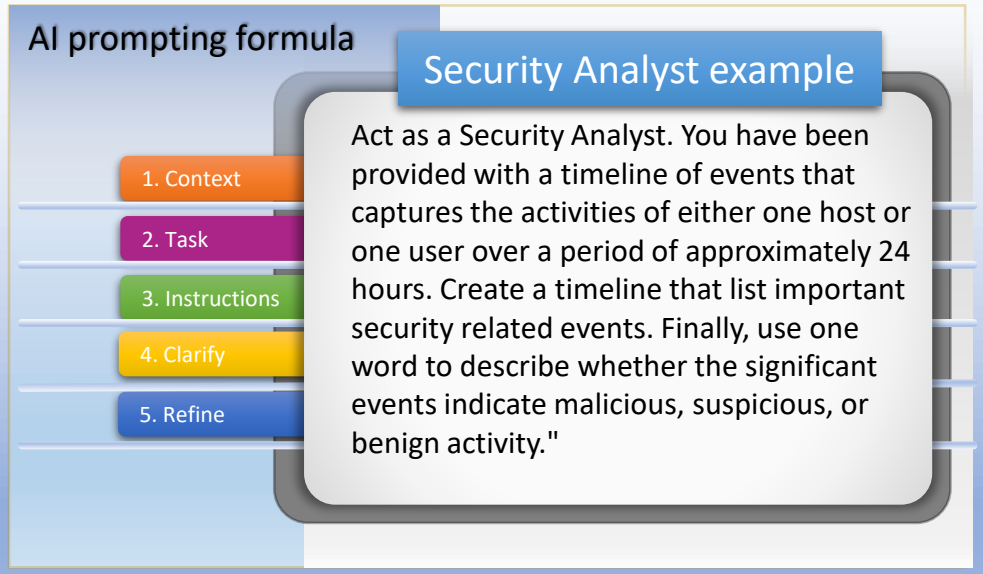

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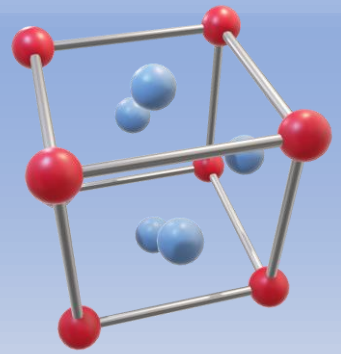

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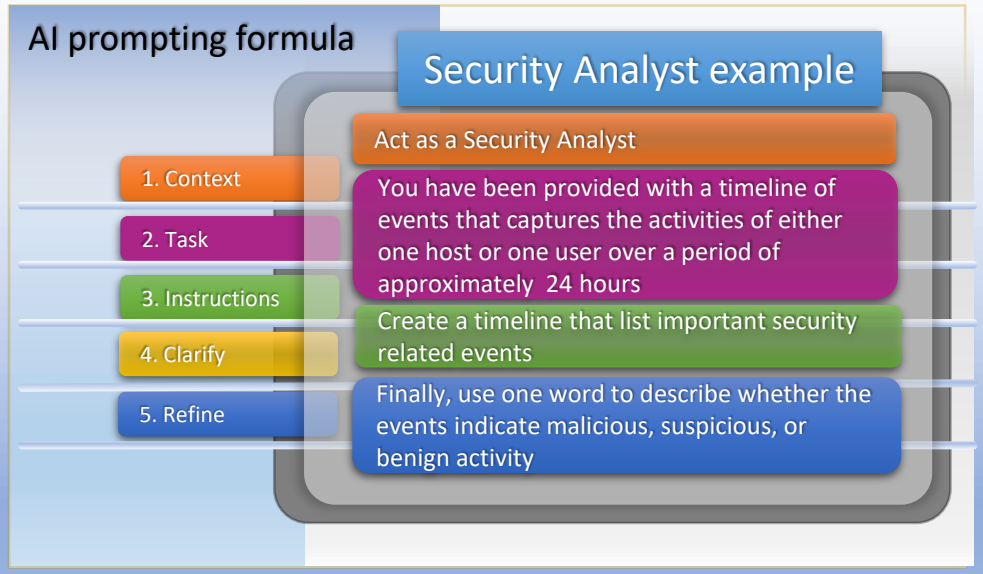

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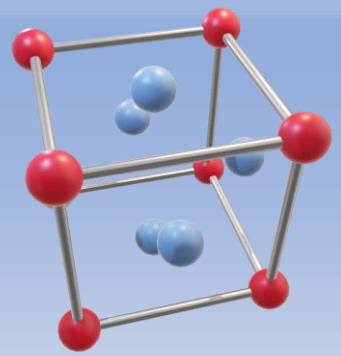

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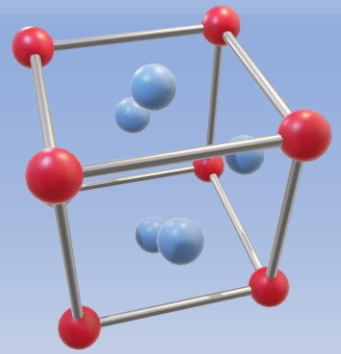

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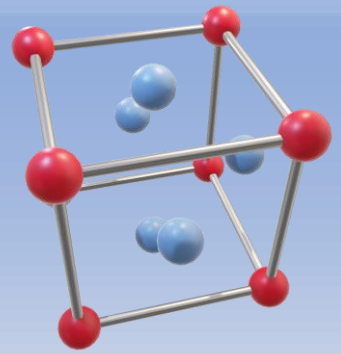

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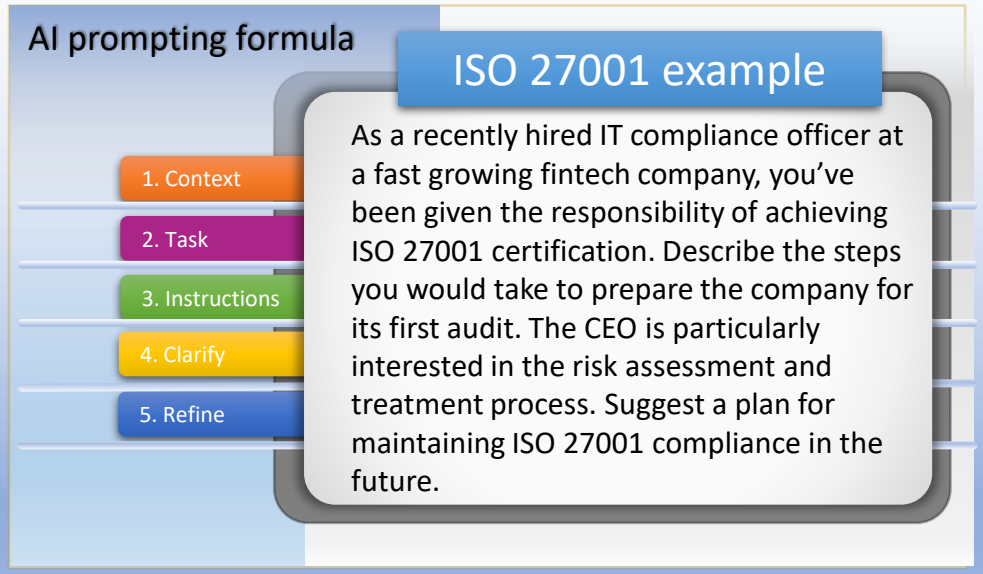

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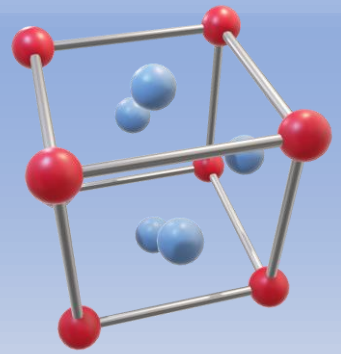

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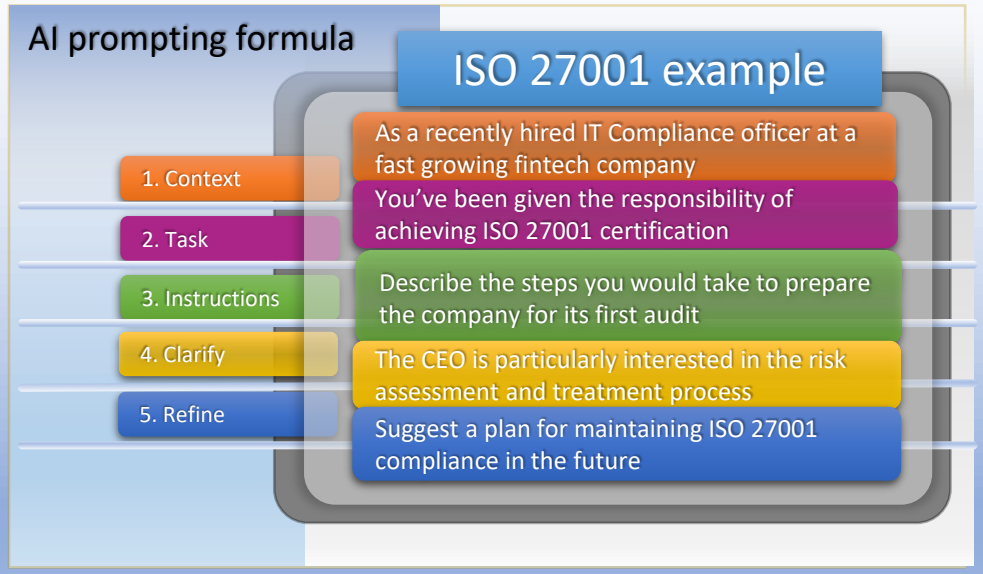

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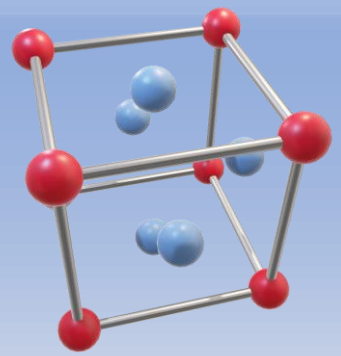

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Conclusion

What's next?

Local models with commercial rights

- Falcon 7B
- Llama 2

Personal assistants

- iOS 17
- gpt4all
- OpenAssistant

AI Security

- OWASP

IP Rights

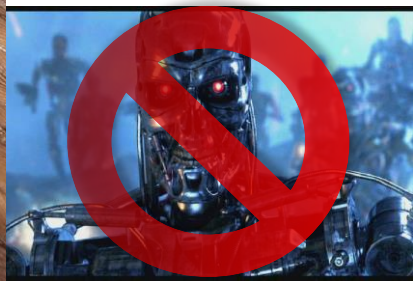
- AP strikes news-sharing and tech deal with OpenAI

iOS

Apache

Meta

Google AI



Glossary

- **10Q Results**: A form 10-Q is a quarterly report mandated by the United States federal Securities and Exchange Commission, to be filled by publicly traded corporations. It includes unaudited financial statements and provides a continuing view of the company's financial position. Source: Investopedia
- **AI Chatbot**: A computer program that simulates and processes human conversation, allowing humans to interact with digital devices as if they were communicating with a real person. Source: Techopedia
- **AI Winter**: A period of reduced funding and interest in artificial intelligence research. The term was coined after a series of hype cycles followed by disappointment and criticism. Source: Wikipedia
- **Alert Logic**: A company that provides 24/7 security services to address a range of IT security needs, including threat detection and response. Source: Alert Logic
- **BERT (Bidirectional Encoder Representations from Transformers)**: A transformer-based machine learning technique for natural language processing. It is designed to pre-train deep bidirectional representations by jointly conditioning on both left and right context in all layers. Source: BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding
- **Bidirectional Encoder Representations from Transformers (BERT)**: BERT is a transformer-based machine learning technique for natural language processing (NLP) developed by Google. BERT is designed to pre-train deep bidirectional representations from unlabeled text by jointly conditioning on both left and right context in all layers. Source: Google AI Blog
- **ChatGPT**: A variant of the GPT AI model developed by OpenAI, specifically tailored for generating conversational responses. Source: OpenAI
- **Clarify**: In the context of AI, to clarify is to provide additional information or instructions to an AI system in order to reduce ambiguity and improve the system's understanding of a task. Source: Presentation
- **Commercial Usage**: In the context of software or AI models, commercial usage refers to the use of the software or model for business or profit-making purposes. Some open-source licenses restrict commercial usage. Source: Techopedia
- **Compliance Officer**: A compliance officer is a professional who ensures that a company complies with its outside regulatory and legal requirements as well as internal policies and bylaws. In the context of a tech company, a compliance officer might focus on areas like data privacy and security standards. Source: Investopedia

Glossary

- **Creative Code**: A field that intersects art and technology, it involves writing computer programs to create aesthetic and engaging experiences through visuals, sound, and interactive content. Source: Creative Coding
- **Customer Satisfaction**: A measure of how products and services supplied by a company meet or surpass customer expectation. It is seen as a key performance indicator within business. Source: Investopedia
- **DALL-E**: A version of GPT-3, a large language model developed by OpenAI, that has been trained to generate images from textual descriptions. Source: OpenAI
- **Data Access Controls**: Methods of ensuring that only authorized individuals have access to certain information. In the context of cybersecurity, data access controls may involve the use of passwords, encryption, and two-factor authentication, among other measures. Source: TechTarget
- **Deep Blue**: A chess-playing computer developed by IBM. It is known for being the first artificial intelligence to win a chess game against a reigning world champion under regular time controls. Source: Deep Blue (Chess Computer) - Wikipedia
- **Diffusion Based Models**: A type of generative model used in machine learning that generates new sample data from random noise through a process similar to diffusion (gradual mixing of particles). Source: Diffusion Models Beat GANs on Image Synthesis
- **EBITA**: Stands for Earnings Before Interest, Taxes, and Amortization. It is a measure of a company's profitability that excludes interest, taxes, and amortization expenses. Source: Investopedia
- **ELIZA**: An early AI program developed at the MIT Artificial Intelligence Laboratory, acting as a Rogerian psychotherapist, which seemed to understand and respond to the statements made to it. Source: Wikipedia
- **Embeddings**: In the context of machine learning, embeddings are a type of vector that represents categorical data as a dense vector of real numbers. The position of a word within the vector space is learned from text and is based on the words that surround the word when it is used. Source: Google Developers Machine Learning Crash Course
- **Expert Time**: This refers to the time spent by experienced professionals or experts to accomplish a task. In AI, expert time often refers to the time needed by machine learning researchers or engineers to develop, train, and fine-tune models. Source: ChatGPT
- **Falcon 7b(AI Model)**: Falcon is the latest open-source large language model released by Technology Innovation Institute. It is an autoregressive decoder-only model with two variants: a 7 billion parameter model and a 40 billion parameter model. The 40B model variant was trained on 384 GPUs on AWS for 2 months. Source: Lightning.ai

Glossary

- **GAN (Generative Adversarial Networks)**: A type of machine learning model architecture that was developed by Ian Goodfellow and his colleagues in 2014. It consists of two neural networks: a Generator and a Discriminator. The Generator creates synthetic data samples, while the Discriminator evaluates them for authenticity. GANs are commonly used to generate realistic images, sounds, and other types of data. More information on the development and uses of GANs can be found in this. Source: MIT Technology Review
- **Generative AI Models**: A type of AI model that is capable of creating novel data that resembles the distribution of the training data. Examples include GANs, VAEs, and transformer-based models when used for generation tasks. Source: Generative Models - OpenAI
- **Generative Pretrained Transformer (GPT)**: A type of transformer-based language model developed by OpenAI. GPT is trained to predict the next word in a sequence of words, learning from a large corpus of internet text. There are several versions of GPT, the latest being GPT-3. Source: OpenAI
- **Google Books Dataset**: A dataset released by Google as part of their Google Books project, containing n-grams from a very large corpus of books. Source: Google Books Ngram Viewer
- **GPT3**: The third version of the Generative Pretrained Transformer (GPT) developed by OpenAI. It's a large language model trained to predict the next word in a sentence and can generate human-like text. Source: OpenAI
- **GPU**: Stands for Graphics Processing Unit, it's a type of processor designed to handle multiple calculations simultaneously. GPUs are particularly useful for machine learning because of their ability to process large amounts of data quickly. Source: NVIDIA
- **IBM Watson**: A suite of artificial intelligence services, applications, and tooling provided by IBM. Notably, it's known for winning a Jeopardy game against two of the show's greatest champions. Source: IBM Watson
- **ImageNet**: A large visual database designed for use in visual object recognition software research, containing more than 14 million images. Source: ImageNet
- **Instruction**: In the context of AI, an instruction is a directive or order given to an AI system to carry out a specific task or function. Source: Presentation
- **ISO 27001**: An international standard on how to manage information security. The standard was originally published jointly by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). It details requirements for establishing, implementing, maintaining and continually improving an information security management system (ISMS). Source: ISO

Glossary

- **JIRA Service Desk**: A software application developed by Atlassian that provides IT service management (ITSM) and service desk functionality. It offers features for managing projects, issues, and service requests, among other things. Source: Atlassian
- **JQL**: Jira Query Language, a flexible, advanced search mechanism to filter specific issues in Jira. It allows users to define a search query based on the properties of the issues. Source: Atlassian
- **Licensing**: A legal agreement that grants certain rights and permissions for the use of a piece of software, technology, or intellectual property. In the context of AI, licensing often pertains to the conditions under which an AI model or tool can be used. Source: TechTarget
- **Llama 2(AI Model)**: Llama 2 is a large language model released by MetaAI trained on a variety of 7 billion to 65 billion parameters. Can be used to develop applications with commercial uses. Source: MetaAI
- **Machine Learning**: A subfield of artificial intelligence that uses statistical techniques to give computers the ability to "learn" from data, without being explicitly programmed. Source: Wikipedia
- **Mid Journey**: Midjourney is an independent research lab exploring new mediums of thought and expanding the imaginative powers of the human species. Source: Midjourney
- **Natural Language Processing (NLP)**: A field of artificial intelligence that focuses on the interaction between computers and humans through natural language. The ultimate objective of NLP is to read, decipher, understand, and make sense of the human language in a valuable way. Source: SAS
- **Neural Networks**: A series of algorithms that endeavors to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates. Source: Investopedia
- **OpenAI API**: An interface provided by OpenAI that allows developers to access and use OpenAI models like GPT-3 for a variety of tasks, including translation, question-answering, and content generation. Source: OpenAI
- **OpenAI CLIP**: A model developed by OpenAI that connects vision and language in a unique way, allowing you to ask it what is contained within an image, or generate an image from a description. Source: OpenAI
- **OpenCV (Open Source Computer Vision Library)**: An open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception. Source: OpenCV

Glossary

- **OpenFrameworks**: An open-source C++ toolkit designed to assist the creative process by providing a simple and intuitive framework for experimentation. It's particularly suitable for artists, designers, and researchers. Source: OpenFrameworks
- **Opensource Models**: These are AI models whose source code is made publicly available, often under licenses that permit modification and distribution of the model. Open-source models facilitate transparency, collaboration, and community contributions. Source: Github
- **OWASP**: Stands for Open Web Application Security Project, an online community that produces freely available articles, methodologies, documentation, tools, and technologies in the field of web application security. Source: OWASP
- **Processing**: A flexible software sketchbook and a language for learning how to code within the context of the visual arts. It's used by students, artists, designers, researchers, and hobbyists for learning, prototyping, and production. Source: Processing
- **PyTorch**: An open-source machine learning library based on the Torch library, used for applications such as computer vision and natural language processing, primarily developed by Facebook's AI Research lab. Source: PyTorch
- **Recommendation System**: A subclass of information filtering system that seeks to predict the "rating" or "preference" a user would give to an item. They are primarily used in commercial applications for personalized suggestions, such as products on e-commerce websites, or content on media streaming platforms. Source: Wikipedia
- **Refine**: In the context of AI, to refine is to make improvements or adjustments to an AI system's performance or to the instructions given to the system, in order to achieve a more precise or desired output. Source: MIT Sloan Review
- **Runwayml.exe**: Runway ML is a platform that enables creators of all kinds to use artificial intelligence in an intuitive way. It provides a user-friendly interface to interact with machine learning models and tools. Source: Runway ML
- **Security Analyst**: A security analyst is responsible for ensuring that a company's digital assets are protected from unauthorized access. This includes securing both online and on-premise infrastructures, weaving protocols into production processes, and designing and implementing security strategies. Source: Investopedia
- **Siri**: A virtual assistant that is part of Apple Inc.'s iOS, iPadOS, watchOS, and tvOS operating systems. Siri uses voice recognition and natural language processing to interpret and respond to user requests. Source: Siri - Apple
- **SOC 2 Audit**: A type of audit designed to ensure that service providers securely manage data to protect the interests of the organization and the privacy of its clients. SOC 2 audits focus on five trust principles: security, availability, processing integrity, confidentiality, and privacy. Source: AICPA

Glossary

- **Sound Processing**: Also known as audio signal processing, it involves the interpretation and manipulation of sound signals by a computer. In AI, this can involve tasks like speech recognition, music synthesis, noise reduction, and more. Source: MIT OpenCourseWare
- **Speech Processing**: A subfield of signal processing and linguistics that focuses on the recognition and interpretation of spoken language by machines. It involves technologies like speech recognition, text-to-speech, and voice conversion. Source: IEEE Signal Processing Society
- **Stable Diffusion** is a deep learning, text-to-image model released in 2022 based on diffusion techniques. It is primarily used to generate detailed images conditioned on text descriptions, though it can also be applied to other tasks such as inpainting, outpainting, and generating image-to-image translations guided by a text prompt. Source: Wikipedia
- **Task**: In the context of AI, a task is a specific function or operation that an AI system is trained to perform. This could include tasks such as image recognition, speech recognition, natural language understanding, etc. Source: Presentation
- **Training (in AI context)**: The process of teaching an AI model how to perform a task by providing it with a large amount of data and allowing it to adjust its internal parameters to improve its performance on that task. Source: IBM
- **Transformer Model Architecture**: A type of model architecture used in machine learning and specifically for tasks involving natural language processing. The transformer model introduces the concept of self-attention, which allows the model to weigh the importance of words in an input sequence when making predictions. Source: Attention is All You Need
- **Turing Test**: A test of a machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human. Proposed by Alan Turing in 1950 as a practical way to conceptualize machine intelligence. Source: Stanford Encyclopedia of Philosophy
- **Vision Processing**: Often referred to as computer vision, it is a field of artificial intelligence that trains computers to interpret and understand the visual world. It enables computers to identify and process objects in images and videos in the same way that humans do. Source: IBM
- **VQ-GAN (Vector Quantized Generative Adversarial Network)**: A specific type of GAN that uses a discrete latent space and a transformer-based generator. It's used to generate high quality images and has been used in projects such as DALL-E by OpenAI. Source: Taming Transformers for High-Resolution Image Synthesis
- **Whisper**: An automatic speech recognition (ASR) system developed by OpenAI. It's used to convert spoken language into written text. Source: OpenAI

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