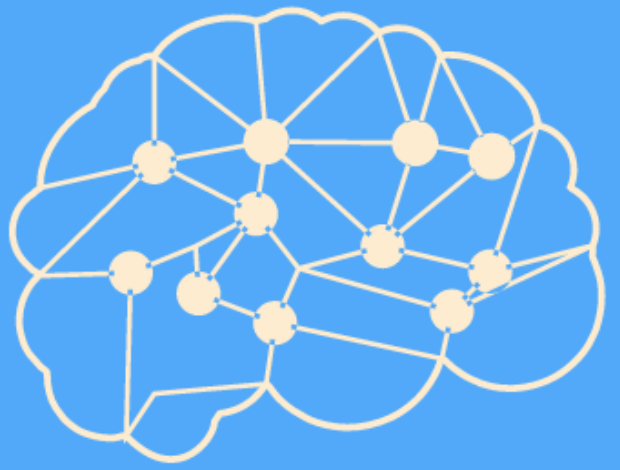
What is Generative AI?



Generative AI is a tool in service of humanity

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Generative AI is changing how we create.
For the first time, humans are supervising and machines are generating.
It's helping us lift the dirty, dull, dangerous and difficult tasks from humanity's shoulders so then we can simply focus on the very essence of our work,
the vision, the idea, and the purpose. It's a complete paradigm shift for the future of jobs.
I am Pinar Seyhan Demirdag and I'm the co-founder and the AI director of Seyhan Lee. During this LinkedIn Learning course, we will talk about how to use that tool to drive the creation of your intention.
Join me as we dive deep into this new creative revolution that I'm so excited about and let's discover together how each of us can have a place in this age of advanced technologies.

The importance of generative AI

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The advent of generative AI can be likened to the invention of photography and celluloid film, a true creative revolution. With photography, we no longer needed to rely on the interpretation of an artist to capture reality, and with generative AI, we no longer need artistic talent to draw or to sing. We can access now concise information in just a manner of seconds. We can also automatically generate text such as news articles or product descriptions. We can even design custom products like shoes or furniture. We can produce music, speech, visual effects, 3D assets and sound effects using algorithms trained on already existing data. I know you're like, it all sounds magic, doesn't it? Yeah, it does. But like Arthur C. Clark said, any sufficiently advanced technology is simply undistinguishable from magic. These machines are becoming 24 hours, seven assistants ready to perform a variety of tasks for us, resulting in the manifestation of our vision almost in real time. By training on large data sets, we can reduce the burden of repetitive tasks and complex computations, enabling us to focus on more creative and more strategic activities which is the very essence of what work is really about. The development of generative AI has a very rich and very fascinating history marked by significant breakthroughs, even though it gained widespread attention in 2022, its evolution was built on decades of mathematical research, starting with auto encoder neural networks in 2006 and continuing on through the mass adoption of generative AI models like DALL E, ChatGPT by Open ai, Kubrick, Journey and others today. Not only have the providers and services expanded but the quality of what is being produced has improved drastically as well. Like you can see in this chart by our world in data the exponential improvement in the quality of images generated between 2014 and 2022. While the pictures in 2014 are black and white and extremely pixelated. In 2022, we would simply type any word on the screen and generate coherent outcomes. Generative AI is not only changing almost every single profession, but it is also changing our understanding of what work is. Large parts of the production process that are repetitive or can be computational are now starting to be facilitated by AI models. All of this leads to the chance we are given to discover the essence of what it means to be a human and the true meaning of work. A beautiful new existence awaits us where we focus on what makes us unique as a species, our curiosity, our conscious awareness, our dreams, our emotional intelligence, and our vision while the algorithms we have created assist us in the production and the execution of our authentic vision.

How generative AI is different than other types of AI

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- Generative AI is a type of AI that, as this name suggests, generates new content. This is in contrast to other types of AI, like discriminative AI, which focuses on classifying or identifying content that is based on preexisting data. Generative AI is often used in applications such as image generation, video synthesis, language generation, and music composition, but to really understand this new tool, we need to know first where it fits in the broader AI landscape. The term AI, which is artificial intelligence, is an umbrella term that encompasses several different subcategories, including generative AI. These subcategories are used to perform different tasks. For example, reactive machines are used in self-driving cars. Limited memory AI forecasts the weather. Theory of mind powers virtual customer assistance. Narrow AI generates customized product suggestions for E-commerce sites. Supervised learning identifies objects from things like images and video. Unsupervised learning can detect fraudulent bank transactions, and reinforcement learning can teach a machine how to play a game. These are only a few of the subcategories, and generative AI models fall into a lot of these categories, and honestly, it's only growing. These other types of AI may still generate content, but they do it as a side effect of their primary function. Generative AI is specifically designed to generate new content as its primary output. Whether this is text, images, product suggestions, whatever, that's what generative AI is designed to do. So, now that we know where generative AI fits in the broader landscape, together, let's explore how it works.

How generative AI works

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To understand how generative AI works, we first have to understand how it comes to life. I know how you're feeling. You're looking at the news, and ChatGPT, and Midjourney, all this generative, what is generative, what is AI? It's so complicated. You have no idea how to make sense of it all, but you know you need to, because this is where the world is evolving towards. Okay, let's start with AI 101. Imagine you and me were having dinner and you asked me to pass you the salt. I look at the table and I can make a discernment between a salt shaker and the rest of the objects on the table. Why? Because my mind has been trained with thousands, or millions, or trillions of salt shakers earlier. AI works the same. You feed it with thousands, millions, trillions of content, and then you teach a certain algorithm to generate outputs and solutions as a result. Okay, now that we got AI 101 out of the way, let's get into generative AI 101. Let's use cars as an example. Just like a Porsche has a different engine than a Mazda, under the umbrella term of generative AI, there are a variety of different generative AI models. These AI models, or car engines, are written and manufactured by groups of highly advanced computer vision specialists, machine learning experts, and mathematicians. They're built on years of open source machine learning research and generally funded by companies and universities. Some of the big players in writing these generative AI models, engines, are Open AI, NVIDIA, Google, Meta, and universities like UC Berkeley and LMU Munich. They can either keep these models private, or they can make them public, what we call this, open source, for those to benefit from their research. All right, now that these complex generative models are written, meaning the engines are made, what are we going to do with them? Depending on your level of technical expertise, this can look a bit different. I'm going to paint a picture for you with three different end users of these models. The first person is a business leader who comes up with a product idea that involves a generative AI model, or several. For the development of their tool, this business leader either uses free open source generative AI models or enters into a partnership with a corporation to get rights to their generative AI model, then their team creates their vision. To continue the chronology, let's say this person owns the car factory. They direct where the engine and chassis go, but don't actually work on the floor. The second person is a creative person with an appetite for adventure. They might have some technical knowledge, but they aren't an AI engineer. I mean, they can be if they want. This person goes to a car engine showroom, where they pick a pre-made car engine or a generative AI model from a repository like GitHub and Hugging Face. After that, they go to a chassis manufacturer to pick their empty shell for their new engine, their precious new engine. These chassis are called AI notebooks. Their purpose is to hold and run the generative AI model code. The most widely used one is Google Colab, but there are others like Jupiter Notebooks. And the third person would be my mother, bless her heart. She has absolutely no technical pedigree, nor she's interested in acquiring one. But this doesn't mean she cannot benefit from generative AI. My mother would be buying her already made car. She will have way less control over the outcome of her car, but she will be able to drive, just like the business leader and the creative technologist. People with no technical knowledge can simply subscribe to an online service like OpenAI's ChatGPT or DALL-E, or download Discord and play with Midjourney, or download Lensa AI and Avatar Maker in their smartphone to play with the magic of generative AI. Well, this all depends what you want to do and what you want to build, and how much technical expertise you already have. Now that we have our car, our generative AI model, we can now start creating our own content and go for a drive.

Creating your own content

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- So now that we have our generative AI model and our chassis, we are ready to create our own content. If we're a beginner, we can use a paid service like Midjourney or Lensa. If we are more experienced, we can use a notebook and pick from available models. If you download a commercial app and upload only 10 pictures of yourself, like I did, the app suggests a variety of different avatars of yourself. It's super fun. If you are a more experienced generative AI user, a creative technologist, you can go to GitHub, choose your favorite generative AI model, and see if it is available in the form of a notebook. If it's not available, you can still inquire about it inside the generative AI community. They're super friendly people. And if you are a programmer, you can also create your own notebook by taking the model code from GitHub. For a demonstration, we will be running a Google Colab notebook named Deforum, that is based on stable diffusion, to generate a fantasy landscape. As you can see here, the notebook runs through the code, and depending on your settings, produces a personalized outcome. Google Colab requires a subscription. If you would like your generation time to be minimized you need to buy a paid subscription. These notebooks offer a lot of personalized options for the quality of your outcomes. You can always choose the default generation, but the beauty of working with a notebook is that you can tweak and personalize the outcomes. In summary, a model is a set of algorithms that have been trained on a specific dataset. A notebook is a tool for writing and running the code. A creative application is an example of how a model can be used, and the generated outcome is what the end user produces by using a generative AI service or a notebook that houses the model inside it.

The most famous tools for Generative AI

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During this part of the course, we will be getting more familiar with some of the most well-known types of generative AI models, and some of the applications they cover. Think of generative AI models, let's use the metaphor, food. Under the term food, you find salads, soups, caviar, stews, fresh vegetables, and just like food, under the umbrella term of generative AI, you find several options depending on what you are craving for. So this isn't meant to be an exhaustive list of all the applications and all the models, but think of it more like a guide to the generative AI landscape and how you can make use of it. But keep in mind that this landscape is changing dramatically every single day. And there's a very good chance that when you're watching this course, there will be lots and lots of new players, models, and applications already born. But that's what makes it so exciting. So let's start exploring some of the main models together.

Natural language models

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Natural language generation is perhaps the most well-known application of generative AI so far with ChatGPT in the headlines. Most of the hype around text-based generative AI is using a model called GPT. GPT stands for Generative Pre-trained Transformer. It's a language model developed by OpenAI, a research organization focused on developing and promoting friendly AI. The idea of pre-training a language model and finding it on a task-specific dataset isn't something new. This concept has been around for decades and has been used in several other models before GPT. However, GPT has become notable for its large scale use of transformer architecture and its ability to generate human-like texts, which had led to its widespread use and popularity in the field of natural language processing. Imagine you have a writing assistant that can help you write emails, articles, even a novel. GPT can take in a prompt, like a topic or a sentence, and can generate text based on that prompt. It can even continue a story or a conversation you started earlier. Here are a few industry applications. Let's start with GitHub. GitHub Copilot is a generative AI service provided by GitHub to its users. The service uses the OpenAI codex to suggest the code and entire functions in real time, right from the code editor. It allows the users to search less for outside solutions and it also helps them type less with smarter code completion. Another example would be Microsoft's Bing, which implemented ChatGPT into its search functionality, enabling it to reach concise information in a shorter amount of time. Since OpenAI made ChatGPT available to the public on November 30th in 2022, it reached 1 million user in less than a week, I said in less than a week. Now, let's compare that to other companies that hit 1 million users. It took Netflix 49 months to reach 1 million users. It took Twitter 24 months, it took Airbnb 30 months, Facebook, 10 months, and it took Instagram two-and-a half-months to reach 1 million users. Let's remember, it took ChatGPT only one week. These figures demonstrate how easily humans adopted their workflow for co-creating with generative AI-based tools and services. This is amazing. However, GPT has several limitations, such as the lack of common sense, creativity and understanding the text it generates. Also, bias data sets and the danger of normalization of mediocrity when we come up with creative writing. Natural language models synthetically mimic human capabilities, but, clearly, conscious contemplations are required before developing generative AI tools. ChatGPT is a wonderful tool for factual and computable information. However, I would advise us to approach it with caution when inquiring about creative and opinion-based writing.

Text to image applications

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In 2022, we have seen a rise in commercial image generation services. The technology behind these services is broadly referred as text to image. You simply type words on a screen and watch the algorithms create an image based on your queue, even if you description is not very specific. There are three main text to image generation services. Midjourney, DALL-E, and Stable Diffusion. If we were to compare these three text to image tools to operating systems, Midjourney would be macOS because they have a closed API and a very design and art-centric approach to the image generation process. DALL-E would be Windows but with an open API because the model is released by a corporation and it initially had the most superior machine-learning algorithm. Open AI values technical superiority over design and art sensitivities. And the third, the Stable Diffusion would be Linux because it is open source and is improving each day with the contribution of the generative AI community. The quality of the generated images from text to image models can depend both on the quality of the algorithm and the datasets they use to train it. So now that we know the main services, let's look at three industrial applications. First is Cuebric. Hollywood's first generative AI tool created by our company, Seyhan Lee, for streaming the production of film backgrounds. A normal virtual production workflow uses three dimensional world building which involves a bunch of people building 3D worlds that are custom made for that film. It's time consuming, expensive, and requires a lot of repetitive tasks. An alternative now is to augment 2D backgrounds into 2.5D by involving generative AI in the picture creation process. The second example would be Stitch Fix. When they suggest garments to discover their customer's fashion style, they use real clothes along with clothes generated with DALL-E. And finally, marketers and filmmakers use text to image models when ideating for a concept in a film. And actually, they may later on continue to use it to make storyboards and even use it in the production of the final art of their campaigns and films. Just like we have seen in Cuebric. A recent example from the marketing world would be Martini that used the Midjourney generated image in their campaign. Another one would be Heinz and Nestle that used DALL-E in their campaign. And GoFundMe that used Stable Diffusion in their artfully illustrated film. Marketers prefer using generative AI in their creative process for two reasons. First, for its time and cost-saving efficiency, and the second, for the unique look and feel that you get from text to image based tools.

Generative Adversarial Networks (GANs)

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Another renowned generative AI model is generative adversarial networks, also referred as simply GANs. To illustrate how GANs work, let's give a game of forgery as a metaphor. Imagine you have an artist called The Generator who is trying to recreate a painting that is so realistic that it looks like a famous painting. And you have another person called The Discriminator who's an art expert and trying to spot the difference between the real painting and the forgery. The Generator creates a painting and The Discriminator evaluates it, giving feedback to the generator on how to improve the next iteration. The Generator and The Discriminator played this game repeatedly until The Generator creates the painting that is so realistic that The Discriminator can't tell the difference between it and the real painting. In the same way, a GAN model has a generator and a discriminator. The two parts work together in a competition. That's why it's called generative adversarial networks. In this way, they improve the generator's ability to create realistic data, and over time, the generator becomes better and better at creating realistic data. And the results start yielding in the creation of products, assets, faces, people, that didn't exist before, just like we have seen with text-to-image that we have seen in the former session. The difference though is that with GANs, you input one type of data, like pictures or bank transitions, and then you output the same type of data. Let's now give three real-world examples where GANs were used. We're going to start with Audi. They trained their own GANs to get inspiration for their wheel designs. This process created lots of different wheel designs that simply didn't exist before, and gave inspiration to Audi designers so they can pick and choose which designs they wanted to use in their final decisions. And remember, AI didn't design the final wheel. AI was simply a tool that the wheel designers used to inspire themselves for the final designs that they would make. Next, Beko, that is a European-based appliance brand, they use custom trained GANs in their sustainability stand film, which also happens to be the world's first brand-funded AI film created and produced by Seyhan Lee. We use GANs to generate lightning, leaves, roots, eyes, flowers, and created seamless transitions to flow between humans and nature. GANs have this beautiful transitional quality. And finally, in the context of financial fraud detection, GAN models can be used to generate synthetic versions of fraudulent transactions, which can then be used to train a fraud detection model. You know what's really surprising with GANs is that the same generative AI model can be used for two very distinct professions. Here we are seeing some financial fraud detection solving and create a new tire styles for Audi. And then later on, the same AI model makes impossibly beautiful visual effects for film, and that versatility is the greatest power of GAN models.

VAE and Anomaly Detection

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Let's now move to talking about an application of generative AI that may not be as obvious as it's used in generating images, like we have seen earlier, audio or text. But it's still very important application nonetheless, and it is going to be the anomaly detection. One of the main models that we use in this space is Variational Autoencoders, referred as VAE. These models can be used for anomaly detection by training the model on a dataset of normal data, and then using the trained model to identify instances that deviate from the normal data. This can be used to detect anomalies in a wide range of situations, like finding fraud in financial transactions, spotting flaws in manufacturing or finding security breaches in a network. For example, Uber has used VAE for anomaly detection in their financial transactions to detect fraud. Another example would be Google has also used VAE to detect network intrusions using anomaly detection and another one of a real world application of VAE would be anomaly detection in industrial quality control. In this scenario, a VAE can be trained on a dataset of images of normal products and then used to identify images of products that deviate from the normal data. In this way, it can be used to detect defects in products such as scratches, dents, or misalignments. Another real world example would be healthcare where VAE is used to detect anomalies in medical imaging such as CT scans and MRI, like Children's National Hospital in Washington, DC uses a generative AI model to analyze electronic health records. The model uses data such as vital signs, laboratory results and demographic information to predict which patients are at risk of sepsis, allowing healthcare providers to intervene early and improve patient outcomes. Variational Autoencoders are a flexible, generative model that are not only able to detect anomalies but are also a part of the architecture of several other generative AI models.

Future predictions

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The best way to predict the future, as they say, is to invent it so let's talk about the future. In two to three years in the gaming, film and marketing sectors generative AI will continue to be used in computer graphics, and animation to create more realistic, and believable characters, and environments. This is going to be particularly important in 3D modeling. Generative AI will be used to improve natural language understanding in virtual assistants and chatbots making them more and more capable of handling complex and nuanced conversations. In the energy sector, generative AI models will be used to optimize energy consumption and production, such as predicting demand, and managing renewable energy sources, as well as improving the efficiency of energy distribution networks. As for the transportation sector, generative AI models will be used to optimize traffic flow and to predict maintenance needs for vehicles. In short, generative AI will be used to automate repetitive tasks and improve efficiency in a wide variety of industries. My predictions for the next 10 to 15 years would be generative AI will be used to create more and realistic, and accurate simulations in fields such as architecture, urban planning, and engineering. The second would be to be used to create new materials and products in fields, such as manufacturing and textile design. The third will be natural language generation will be improved in the fields of content creation such as news articles, books, and even movie scripts. It will also improve self-driving cars by generating realistic virtual scenarios for testing and training, and also it will excel in audio to asset generation where you can speak, and then have the AI generate an asset. In short, my prediction for the upcoming 10 to 15 years would be generative AI will be used in the creation and production of mass media quality books, films, and games. Meanwhile, it will also be the technology behind paradigm shifting implications in the job market, such as self-driving cars, advanced robotics for manufacturing, and for warehousing, and improved crop yield and precision agriculture.

The future of jobs

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When starting to work with generative AI, it's imperative that we hold conscious contemplations for the future of jobs. As you know, there's a lot of hype at the moment filled with a lot of Hollywood-powered fear that machines are now taking over. This is simply not true. If anyone is taking over, it is us humans who are entering in a new golden age for creativity and production. Will there be a shift in the job market? Yeah, absolutely, as it has always been throughout history. Whenever a new advanced technology is introduced, it's normal for some jobs to disappear, while other new ones are introduced. Let's give an example. Before alarm clocks, there were knocker uppers. These were kids who were hired to knock on the windows to wake people up. The job obviously disappeared when new job opportunities for alarm clock manufacturers emerged. The second example would be the switchboard operator jobs. They disappeared due to the widespread adoption of automated telephone exchange systems, and even though it made jobs disappear, automated telephone exchange systems revolutionized communication and connected people all across the world. What if I were to tell you that there's a very high possibility that certain parts of your job that are repetitive, dirty, dull, dangerous, or difficult, the four D's, can be automated? As a result, you will have more time focusing parts of your skills that are more human-centric, like creativity, problem solving, empathy, and leadership. Just like the digital revolution in the 90s gave birth to the emergence of new companies, we're now witnessing several new endeavors due to the generative AI revolution. As the co-founder of a generative AI-powered creative company, let me assure you that all our operations are run by humans. Our company employs developers, cloud architects, generative AI artists, customer relations, project managers, writers, creative directors, and human producers. If the Industrial Revolution created jobs that were robotic for humans, the Generative AI Revolution will be our liberation and freedom from them. Each person will turn into their own creative studio and the barriers between your vision and its manifestation will disappear. Complex films, music, writing, and all forms of creative production tools will be simplified and given to your fingertips. Humanity will transcend from a society of consumers to creators. The ones that excel in the future of job markets will be those that strengthen their unique personal emotional skills that no computer can ever mimic. My advice would be to start investing in expanding your consciousness, start getting to know what makes you unique, and sharpen your interpersonal, emotional, and creative skills.

Moral and executive skill set required to work with GenAI

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Any executive or business leader should approach generative AI tools with caution. We should at all times self-monitor and self-question if the generated results fits our quality and satisfaction parameters. Just because ChatGPT generates headlines, it doesn't mean that what it makes is great. Or just because we can generate a landscape with Stable Diffusion, it doesn't mean it's ready for the final pixel of a movie. During this grace period where we learn to co-create with algorithms, it's crucial that we deepen our executive skills. If we are a founder or an executive in a generative AI company, we shall, at all times, always ask ourselves who is benefiting from our tools? Our moral compass should always direct towards transparency, fairness, empathy, and responsibility. I highly recommend organizing a board or a council at your organization that acts like the ethical foundation for the integration of generative ai. Provide, please, all your employees with ethical guidance and education on how to use generative AI effectively, and also how to overcome their fears, challenges, and biases towards this new advanced tool. As the technology continues to evolve, it's very likely that the distinction between human and algorithm-generated content will become increasingly blurred, and it will become even more important for leaders like you to have a clear understanding of the role of each. We will remain in control of AI by always positioning the human consciousness in the very center of generative AI companies and solutions. Especially in our organizations, we must ensure that humans remain the sole decision makers. In this way, we will be setting the objectives and determine the direction of AI-generated content. By keeping humans at the very center, we can ensure that the content produced by generative AI aligns with your company values and goals, which have to do with serving the elation and elevation of humanity. By actively engaging with generative AI technology and developing a deep understanding of its capabilities and limitations all across your team, we can avoid the potential risks associated with blindly relying on AI to make decisions for us. Well, ultimately, the goal is to strike a beautiful balance between leveraging the power of generative AI to enhance human creativity and imagination, and optimizing production, while also maintaining human control and oversight over this advanced technology.

Caution when working with Gen AI

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I want to round out this course with a controversial statement. The greatest bias in AI is not race, is not ethnicity, nor gender. It is human's inferiority complex. If we see machines as superior to humans, we place them on a pedestal, and if we see humans as incapable fragile beings, we again place AI on a pedestal, but this time with the power of an authority. We should always emphasize the crucial and essential role of human creativity and decision-making in the process. Nowadays, popular headlines suggest that AI is designing, AI is coding, but let's remember, it's humans who wrote the algorithms for AI, and it's humans who conceptualize, curate, and oversee the algorithms to produce the desired outcomes. If we place AI and technology at the center of our workflow in storytelling, we risk dehumanizing ourselves and contributing to a future where human jobs may really be eliminated. Instead, we should focus on highlighting the central role that humans play in the creation and the use of AI. I know even though sentences such as like, "AI made this art, and, "AI is advancing quickly, AI is so cool," are common in the collective, we should strive to correct ourselves in centering our actions and self-expression around humans. It is humans that are making art by using generative AI-powered tools, and it is, again, humans that are working in tandem with each other to advance several different human-benefiting technologies, including generative AI. By modeling our tools after ourselves, we are inevitably transferring our own judgments, our own insecurities, and our own limitations onto this technology. So it is essential that we work to overcome our own insecurities and approach AI as a tool that can augment and empower us, rather than compete or replace us. By doing so, we can create AI systems that contribute to the elation of humanity, assist us with creative productivity, and help us achieve our greatest potential as a species.