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Basics of AI for High School Students

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Artificial intelligence is likely to be the defining technology of the 21st century - which is why we think it's so important for students to learn about it! In this post, I'll summarize a few areas of AI knowledge that I'd love for everyone to learn about, and share some resources for how to learn more. Of course, the [AI Scholars Live Online](#) program is a great way to dive into your AI journey!

Applications

You probably already use AI every day - and you might be curious about when we'll see some of the more "sci-fi"-style innovations come to life. Here's a small sampling of some of the areas of AI applications in action today:

Natural Language Processing: you probably used AI that understands language today, if you talked to Siri or used Google Translate! NLP powers tools like [therapy chatbots](#) or super-realistic [phone conversations](#). Recently, there's been a lot of conversation about [GPT-3](#), an incredibly powerful and complex system that can write human-like texts on any topic - you can play with an older version [here](#).

Computer Vision: did you use Face ID to log into your phone? Then you've used an AI system that can understand visual input. Computer vision is used for everything from [tracking deforestation](#) to fight climate change to programming [self-driving cars](#) to [identifying crime suspects](#) (is this a good idea?). AI can even invent new [photos](#) and [art](#)!

Medical AI: AI has shown incredible promise in healthcare: [discovering new antibiotics](#), [diagnosing cancer](#), [guiding robotic surgery](#), and even [solving one of the hardest problems in biology](#). But you might not see AI in your own doctor's office until we find ways to make it reliable and [understandable](#) - which brings us to the area of AI Ethics.

Ethics

It's easy to get excited about the ways AI can [transform the world for the better](#). But I think it's just as important - and fascinating - to think about the risks of using the technology: how can we ensure that it's used responsibly? Here are a few areas of concern:

Bias: It's tempting to think of computer systems as neutral and objective. But it turns out that AI is brilliant at [replicating human biases](#): computer vision systems [fail for people of color](#); resume screening tools learn to [ignore women](#); algorithms used in courts [send Black people to jail more](#). The problem comes not only from biased datasets, but also from a [lack of diversity](#) in the people creating technology.

Privacy: AI systems are constantly processing your personal data. Sometimes, this is useful: maybe you like getting [personalized ads](#) and [recommendations](#) based on what you read, watch, and listen to (although recommendations have [their own dangers](#)). Other times, it's creepy: are you comfortable with companies collecting and selling data about your [location](#), your [face](#), even your [brain waves](#)?

Social Change: AI could improve our economy and society in wonderful ways: for example, [fighting poverty](#) and creating [new kinds of jobs](#). But along the way, technological disruption could make [millions of people unemployed](#), and the spread of [deepfakes](#) and [fake news](#) could threaten our democracy. Some experts even fear that [super-intelligent AI](#) could doom the world!

Algorithms

You're probably curious about how AI systems actually work! Here are some of the most influential ideas:

Machine Learning: Today's AI systems usually aren't explicitly programmed with rules. Instead, AI systems work through *machine learning*: they learn patterns by examining data. This could be as simple as a [line of best fit](#), or as complex as a giant system that learns language by [crawling the entire web](#). The importance of machine learning explains why AI presents a challenge to privacy - the more data a system has, the better it (usually) works!

Neural Networks: Our own brains are immensely powerful, and they're the (loose) inspiration for one of today's biggest machine learning tools: *artificial neural networks*. Just as [your brain learns](#) through information flowing between cells, [artificial neural networks](#) learn as inputs move through mathematical operations. Although today's *deep learning* (read: giant neural network) systems can have millions of neurons, that's still a tiny fraction of [your brain](#)!

Math for AI: AI algorithms depend on math: for example, neural networks use [derivatives](#) to learn from data. Although you can build intuition and even complete machine learning projects without getting into the details, to become an expert you'll need the math! Look out for [opportunities](#) to learn about calculus, linear algebra (matrices), statistics, and probability.

Learning More

So how do you learn more about AI? It depends on what you're interested in:

AI applications and social impact. Follow the links above and explore from there! You might enjoy finding [articles](#), [blogs](#), [videos](#), and [books about AI](#), or even reading and writing [science fiction](#). Do take care with blogs and YouTube: while many experts post great explanations online, there's also plenty of material that's wrong or unhelpful.

Coding and algorithms: Dive into some tutorials! Python is our favorite language for AI programming: it's relatively easy to pick up and also often used professionally, which means there are a ton of tools and [resources](#). Some good sources for line-by-line tutorials include [Machine Learning Mastery](#), the [TensorFlow Tutorials](#), and [Kaggle](#).

All of it: Join our [AI Scholars Live Online](#) course to dive into AI applications, algorithms, ethics, and coding with a supportive mentor and community! And however you begin your AI journey, remember to be kind to yourself. It can be hard to get started in a huge, complex, and growing field - but as Dr. Rachel Thompson says, [AI needs all of us](#).