Techionista Academy

Microsoft Azure Certified Data & AI Track

AI Guide

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Links

Bold underlined text in Plum color is a clickable link. **I am a link, click me!**

Introduction to Artificial Intelligence

Here you will learn more about AI!

What is AI?

Artificial Intelligence, or AI, can be used to describe machines or software that are designed to do a task just as good or even better than humans. The term "AI" was first introduced in the 1950s. Since then, the field has grown and has developed many sub-fields, such as **machine learning** (ML), computer vision (CV), or **natural language processing** (NLP). More on these later.

AI, as a field of study, is at the intersection of **mathematics**, **logic**, **robotics** and **computer science**, but also **philosophy** and **neuroscience**. For example, to design an AI application, you would need to understand calculus and probability in order to compute the next step the AI should take. Then, in an environment full of possibilities, you need logic to describe the objects, people, and available moves. The next step would be to code the AI's behavior in your programming language of choice, or to give it a physical body so your AI can interact in a 3D world. Finally, you need to integrate it with your culture's rules and ethical principles. More and more people nowadays take inspiration on how to do all these steps from the human brain. After all, if we want to design machines better than us, we should first understand how our mind works.

"Pepper", one of the most known AI-based robots.

Learn about AI with Techionista

You can learn to develop responsible and powerful AI as part of the **AI-900 certification**. If you choose to follow this track, you will learn the basics of some AI applications and how to implement them in Azure. Keep in mind that the AI-900 is a brief, one-day training, and it might feel both overwhelming and too short. However, it is an exciting opportunity to make "first contact" with everything AI and decide for yourself if this is something you want to look more into, as part of your personal and professional path.

This guide is meant to encourage and support you if you want to learn more about AI. You can make the most out of it and learn about AI without taking the AI-900 content.

Brief History

There are numerous primitive machines that are considered the ancestors of AI. One example is the Greek myth of Talos, a giant artificial warrior with an intrinsic life force. The idea of automating tasks using technology has existed for a thousand years. However, it was only in 1956 that John McCarthy first introduced the term of artificial intelligence, as "(...) the science and engineering of making intelligent machines." Funnily enough, the problem of AI was originally planned to be solved over a single summer. Here we are more than 60 years later!

The goal of building something as intelligent as us and similar in behavior is called reaching **general artificial intelligence**. You may have heard sci-fi scenarios, where the Earth is taken over by super-powered machines that overcome human intelligence, like in the Matrix. In that case, we would be talking about **artificial superintelligence**. At this moment in time, however, we are dealing with AI that is capable of excelling at very specific tasks, but which cannot generalize. An example would be the AI that beat the world's top chess player. This is **narrow artificial intelligence**.

Why AI?

It is estimated that, by 2025, AI would generate revenues of over 100 billion euros. You don't have to be interested in creating super machines to benefit from and work with AI. You can nowadays find AI everywhere, from your Netflix recommendations, to your HR management team (check out our Techionista guides to see how AI is used in the recruiting process!), and even in your own phone for facial recognition. With the gradual increase of computational power and the emergence of **big data**, AI is here to stay and to revolutionize how we think about and interact with the world.

For you, there are many exciting opportunities to boost your data-driven job.

- **Machine learning (ML)** can show you hidden patterns in the data.
- **Computer vision (CV)** can analyze images and videos and extract useful information.
- **Natural language processing (NLP)** can help generate text, translate into different languages, or even create chatbots.

You can learn how to apply all these technologies in easy, code-free Azure apps: Azure Machine Learning, Azure Computer Vision, and Azure Language Services, respectively.

Applications

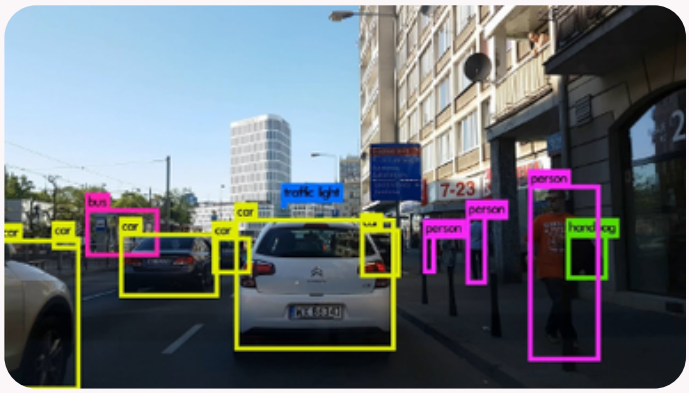
AI can be used in any situation that provides you with data, so everywhere! Whether it is a small company looking to branch out or a researcher looking to prove their theory, creating dashboards in AI is a great way to tell a story! Here are a couple of examples of very interesting applications.

- **Healthcare.** AI can be used for medical image analysis and in clinical decisions. AI is better than humans at ingesting large amounts of data over short periods of time. That is why it is a powerful tool to spot patterns in data that a human doctor might have otherwise missed. For example, AI is now better at detecting skin cancer than humans! In addition, AI is great to build models to test ideas we have about the human body. One application is this AI that can generate proteins we didn't know about before! This can, for instance, boost vaccine research.

AI signaling out potential cancerous moles.

- **Finance.** AI can be used in fraud detection, by comparing old customer behaviors with a new transaction. Another use of AI can be in assessing loan eligibility. This can have drastic consequences on someone's future, so it is important to design ethical human-AI loops and to avoid bias. Finally, AI can provide around-the-clock updates through chatbots, making a banker's life much easier.

- **Transportation.** If you own a GPS app you are probably using an AI! Services that indicate the best route based on traffic, existing accidents, or roadwork use AI to optimize your route. One other application of AI is that of self-driving cars. While there are quite some legislations in place that prevent you from having an 100% automated driving experience, cars can already recognize traffic signs, pedestrians, and other basic environment features.



How a self-driving car "sees" the world.

Getting started

Here you will learn more about starting up with AI of your local computer.

First Steps

Now that you've learned a bit about the history and applications of AI, it is time to get your hands dirty and create your own! It's very easy as well- if you've ever had to handle data, then you already know how to do more than half of the process.
AI gets as good as the data going into it. That means that the very first step of our AI application is to clean our dataset. Some useful guidelines to keep in mind are as follows:

- Check for **formatting errors** (wrong column names, using commas instead of periods in numerical values, dates following a different scheme).
- Make sure there are **no duplicate rows**.
- Try to **fill in empty values** if you can, otherwise decide if you want to remove certain rows or columns.
- **Adjust the types** of your columns so you can work better with them (for example, if an "Amount" column has entries as text instead of numbers).
- **Remove outliers** (a data point that differs significantly from other observations). If you don't, your results will be unreliable.

Now that you have **clean data**, feel free to play around with some visualizations! Knowing your data is very important when choosing the type of AI algorithm to apply to it. If you like Power BI (check Techionista's guide here), import your clean dataset and create a quick dashboard. If you prefer Python (check Techionista's guide here), open your favorite IDE and create some graphs. What does the data tell you? What are the questions you need AI to answer?

We are now ready to apply our algorithm of choice. Just like humans have to learn to do a new thing, AI does so too! There are 3 ways of machine learning: **supervised**, **unsupervised**, and **reinforcement learning**. In all cases, the AI needs to be fed some data.

- Supervised learning implies the existence of labels, so you tell the AI what to look for. **Classification** is an instance of this. An example would be building an AI that can classify images of pets into images of cats and images of dogs, with cat and dog being the labels.
- In unsupervised learning, AI finds patterns by itself. An application of this is **clustering**, where the AI groups similar data groups (or clusters) together based on intra-cluster similarity and inter-cluster dissimilarity. Banks do this when grouping their customer base into different customer types.
- Reinforcement learning is the most complicated type, and the AI self-regulates through **trial and error**. This type of learning happens for example when an AI is given a game to try different options and get the best outcome. This is how AI became the best at chess!

The world's best human chess player was defeated through reinforcement learning.

In Azure, you can learn how to implement machine learning algorithms here:

- **Supervised**: Build classical machine learning models with supervised learning, Create a classification model with Azure Machine Learning designer, Train and evaluate regression models
- **Unsupervised**: Train and evaluate clustering models, Introduction to Anomaly Detector
- **Reinforcement learning**: Reinforcement learning (preview) with Azure Machine Learning

In Python, here are some nice tutorials:

- Machine Learning with Python Tutorial - TutorialsPoint
- Machine Learning with Python - GeeksForGeeks
- Deep Learning with Python: Neural Networks (complete tutorial) - TowardsDataScience
- Natural Language Processing With Python's NLTK Package - RealPython

Taking your knowledge further

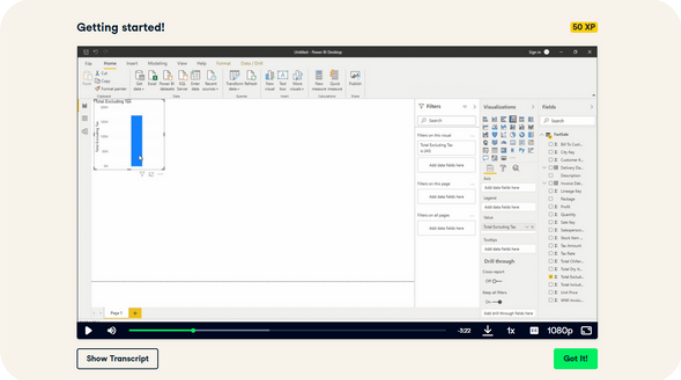
Here you will find additional resources to help you learn AI.

Techionista provided courses

To help you learn the hard skills needed as a Microsoft data professional, we will use the tools listed below. For more information about these tools, check out our Starter Guide which can be found in the file folder of the general channel.

You can revisit these tools to get more used to programming in Python and to analyzing and visualizing data.

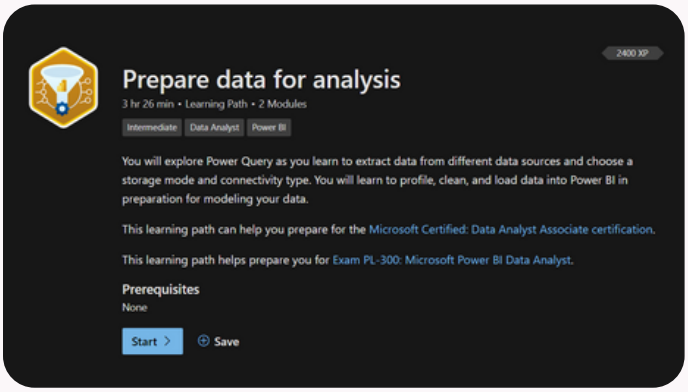
DataCamp



DataCamp is an interactive learning platform for data science. Through DataCamp, you can learn programming languages like Python and SQL through over 100 expert-taught courses. With its in-browser coding exercises, hands-on projects, and gamification features, DataCamp is the favorite learning platform of many Techionistas. After starting at the Techionista Academy, you will receive login details for DataCamp, giving you access to all their premium content during the track. These 4 DataCamp modules will help you learn AI.

- DataCamp: Introduction to Python
- DataCamp: Intermediate Python
- DataCamp: Introduction to Importing Data in Python

Microsoft Learn



Microsoft Learn provides free interactive, hands-on training content continuously updated by Microsoft. This is especially useful when preparing for Microsoft Certifications, as you can be confident that you are always learning the latest updated content. With over 1000+ courses available on the platform, you can learn a variety of topics. Microsoft Learn offers single modules and learning paths that combine single modules, allowing you to follow a step-by-step learning journey.

You can follow Microsoft Learn's AI-900 path below to learn about AI in Azure. Techionista also provides you with one day of live training for the AI-900 certification.

- Microsoft Azure AI Fundamentals: Get started with artificial intelligence
- Microsoft Azure AI Fundamentals: Explore visual tools for machine learning
- Microsoft Azure AI Fundamentals: Explore computer vision
- Microsoft Azure AI Fundamentals: Explore natural language processing
- Microsoft Azure AI Fundamentals: Explore decision support
- Microsoft Azure AI Fundamentals: Explore knowledge mining

Tips and Tricks from Techionista

It's not always about designing the fastest algorithm. Keep in mind that AI implementations exist within the culture they are deployed. It is not unheard of for AI to exhibit bias. Here are some ways AI can be ethically dubious or even cause harm to people in marginalized communities:

- AI in **predictive policing**: using AI to signal out people who may commit a crime, even if they haven't done anything wrong yet. For example, Dutch scientists developed a system that scores the likelihood of children under the age of 12 to become criminals.
- **Killer drones**. Governments increasingly use AI-powered drones in military operations. Some countries even use fully automated robotic guns at their borders.
- AI can also be a threat to one's privacy. There is an increasing trend in using **deepfakes** (overlapping someone's face over an already existing video or creating fake media) as revenge porn or for political misinformation. Check out this website of AI generated faces. Would you be able to tell the difference?

Remember to keep in mind such possible ramifications when working with AI! Microsoft even has some courses on how to create responsible AI:

- Identify guiding principles for responsible AI
- Detect and mitigate unfairness in models with Azure Machine Learning
- The Principles of Sustainable Software Engineering
- Understand the importance of building an AI-ready culture.

Additional learning materials

Articles & reading materials
Check out this article on the history of AI and how we slowly changed our approach to designing AI. Stephanie introduces a bit the context in which AI came to be and talks about cycles of hype and of strategy in the field of AI.

If you want to hear it from the man himself, John McCarthy answers all your questions about AI in this article. This piece covers deeper topics such as what is intelligence and what makes us different (or similar) from machines. You can also find some relevant definitions and useful examples for you to get to know AI better.

Videos and tutorials
If you want to dive into the world of machine learning and AI, the StatQuest with Josh Starmer YouTube channel will be your new best friend. Josh has very easy-to-follow knowledge clips on every AI-related algorithm you may be interested in. If you need a brief reminder on statistics, he's also got you covered!

TEDx Talks is always up-to-date with the newest breakthroughs and debates. Check out Artificial Intelligence and the Future of Work, The danger of AI is weirder than you think, Why we need to design feminist AI to get you inspired. Feel free to browse the channel for even more content!

Helpful cheat sheets
This page introduces the main buzzwords around AI, so you won't get lost in definitions. If you're more focused on applications, Scikit-learn is a Python library used to create machine learning models. Here is a useful cheat sheet for the main algorithms you can implement with it.

Book recommendations
Here is a list of interesting books about AI, whether you're more interested in understanding or developing it.

Techionista exercises
Are you excited to dive deeper into AI algorithms and applications? We have prepared 3 Jupyter Notebooks for you where you can learn about different machine learning algorithms:

- Supervised learning: **Regression**
- Unsupervised learning: **Clustering**
- Deep learning: **Neural Networks**.

You can access the exercises by clicking on this **GitHub link**. Simply download each file on your computer, and open it through **Google Colab**.

Check out the **Python Guide** if you need some brushing up on your programming skills. Remember, if you're stuck, Google is your best friend!

Techionista guides
As mentioned, you can check our guides to see how AI is being used in the recruitment process.

- **Applicant Tracking Systems**
- **AI Interviews**

Questions & where to go for help

Here you will find more information about where to ask questions and find help.

Where to go with questions?

A part of becoming a data analyst, data engineer, or data scientist if having good problem solving skills. Throughout the track you may run into situations where you feel stumped and need help finding an answer. In order to practice great problem solving skills there are a few avenues of support we recommend trying before using the Question Form provided by Techionista. Here are the avenues available to you that can help you find answers to many problems:

Your favorite search engine
Google (or your favorite search engine) will be your best friend during this track! If you find yourself stuck, the possibility to finding your answer online is high and we always recommend starting there. You would also be surprised by how many data experts use the internet to search for answers in a daily basis!

Your fellow Techionistas
If you still can't find the answer you are looking for on the internet or via one of the learning materials provided check with your study group or the other members in your cohort! Chances are someone may have the answer to your question or there are other people in the group who also are wondering the same thing! You can work together to share knowledge and find answers, which are also important skills to have: teamwork and collaboration!

Live training days
Come prepared for live training days with your hard skills questions! The best time and place to get your questions answering is by our great instructors. During live training days there is always enough time to answer your remaining questions!

Weekly Open Coffees
If you have general questions about the track's schedule or assignments, the Open Coffee is a great place to ask! During Open Coffees we provide you with an overview of the upcoming weeks and have plenty of time for questions!

Questions Form
If you are unable to find an answer to your question, please don't hesitate to ask the Techionista Team! Whether is be about the hard skills, career skills, schedule, or a personal issue, please reach out via the **Question Form**. The Question Form then is routed to the rest team member for your question and you will receive a response via a MS Teams message within two working days.