

MODULE 2: AI Tools and Models

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1 AI Tools Overview

AI tools can enhance your workflow in various ways, helping to automate tasks and improve efficiency. These tools fall into three main categories :

1. **Stand-alone AI tools** – These are independent software applications designed for specific tasks. They are accessible online or as downloads with minimal setup.
 - *Example* : Speeko, an AI-powered speech coach, helps improve communication skills by analyzing voice clarity, pacing, and word choice.
2. **Integrated AI features** – These are AI-powered enhancements built into existing software.
 - *Example* : Neural Filters in Adobe Photoshop allows users to edit images by adjusting colors, changing facial expressions, and blurring backgrounds.
3. **Custom AI solutions** – These are AI applications designed for specific organizational needs, often requiring dedicated resources.
 - *Example* : Johns Hopkins Hospital's AI solution detects sepsis early, enabling faster diagnosis and treatment.

2 AI Tools and AI Models

Terms like AI tools and AI models can be confusing because they sound similar but refer to different things. Recall that an AI tool is AI-powered software that can automate or assist users with a variety of tasks. An AI model is a computer program trained on sets of data to recognize patterns and perform specific tasks.

To illustrate this relationship, consider a car and its engine.



The car with its user-friendly interface like a steering wheel and dashboard, represents the AI tool. This tool helps you get to your destination, which could be a completed task or a desired output. Just like car engineers design different features for various needs, AI designers and engineers build AI tools with functionalities specific to their purpose. But under the hood, so to speak, lies the AI model. This unseen engine processes the information you provide, like your input into a photo editing software, and allows the AI tool to function.

Similar to how we choose cars based on their purpose, like a sedan for everyday driving or a pickup truck for hauling heavy loads, AI tools are developed for a wide range of applications. There are AI tools for generating different creative texts, images, videos, or even writing computer code. And regardless of the specific function of the AI tool, it's the underlying AI model that does the heavy lifting, powering the tool's capabilities.

Note : Some AI tools leverage multiple AI models, working together as a "family," to achieve more flexibility and perform a wider range of tasks. Each model within the family might be specialized for a specific subtask, ultimately contributing to the overall functionality of the AI tool. You'll explore these types of multimodal tools later in this course.

3 The Process of Training AI Models

AI designers and engineers develop AI models through a process called training. Here's an example of the typical steps a designer might take in this process, in this case for building a model that predicts rainfall :

1. **Define the problem to be solved.** AI designers and engineers want to predict rain to help people stay dry when commuting to and from work. They start by considering AI's capabilities and limitations before identifying an AI solution.
2. **Collect relevant data to train the model.** AI designers and engineers gather historical data of days when it rained and days when it didn't rain over the past 50 years.
3. **Prepare the data for training.** AI designers and engineers prepare the data by labeling important features, such as outdoor temperature, humidity, and air pressure, and then noting whether it rained. It's also common to separate the data into two distinct sets : a training set and a validation set to test with later.
4. **Train the model.** AI designers and engineers apply machine learning (ML) programs to the prepared training data. As the ML programs analyze the data, they begin learning how to recognize patterns that indicate the likelihood of rainfall, such as the combination of high temperatures, low air pressure, and high humidity.
5. **Evaluate the model.** AI designers and engineers use the validation set they prepared earlier to assess their model's ability to predict rainfall accurately and reliably. Analyzing a model's performance can uncover potential issues impacting the model, such as insufficient or biased training data. If any issues exist, the AI designers and engineers may revisit an earlier step in this process to try a different approach. Once the model performs well with its validation set, the process continues to the next step.
6. **Deploy the model.** When the AI designers and engineers are satisfied with their model's performance, they deploy it in an AI tool—helping people in their city stay dry on their way to work!

Model training is an iterative process. AI designers and engineers can repeat each step as many times as necessary and make adjustments until they create the best model possible. But the process doesn't stop at deployment. Once users interact with a model in practical situations, the model might be exposed to new challenges. AI designers and engineers should continuously monitor and collect feedback on their models, ensuring their models continue to perform reliably and to identify areas for improvement. It's this iterative process of continual refinement that makes AI models precise and versatile, which ultimately leads to effective, reliable AI tools. When you understand how AI models are developed, you can make informed decisions about when and how to use an AI tool to accomplish your goals.