Chapter 1   Introduction to Artificial Intelligence (AI)

A Day with AI in Our Lives

Let's start by exploring some examples of how AI integrates into our daily lives. You may encounter some unfamiliar terms, but don't worry—we'll explain everything in later sections.

AI is becoming increasingly intertwined with various aspects of our daily lives. Here are some examples:

1. Unlocking Your Phone with Face ID

If you have an iPhone, the moment you pick up your phone and unlock it using Face ID, you're already using AI. This involves computer vision technology that scans your face and uses machine learning algorithms to verify your identity, allowing you to access your phone.

2. Logging into Social Media for Updates

After unlocking your phone, you might start checking social media to get the latest updates. AI operates behind the scenes on platforms like Facebook, Instagram, or Twitter, analyzing your past activities to recommend news, information, or advertisements that are likely to interest you. It also employs machine learning techniques to identify and filter out fake news or cyberbullying content.

3. Sending or Receiving Emails

When you sit down to write an email, you might use tools like Grammarly to check and correct spelling errors. These tools leverage AI and natural language processing. On the receiving end, spam filters use AI to prevent unwanted emails from reaching your inbox by recognizing and filtering potential spam.

4. Searching for Information on Google

We often use Google to search for information daily. AI assists in providing you with relevant search results based on your history and personalized settings, making it easier for you to find what you need quickly.

5. Getting Help from Digital Voice Assistants

From finding restaurant directions to checking the weekend weather, digital voice assistants like Siri, Alexa, or Google Home are incredibly helpful. They use AI-based natural language processing to understand your queries and provide accurate responses.

6. Enhancing Convenience with Smart Home Devices

Many households are becoming smarter with devices like Google Nest Hub. These devices learn your daily habits and adjust settings, like temperature, according to your preferences. Some smart refrigerators can even create shopping lists based on what's missing and suggest wine pairings for your dinner.

7. Commuting with Autonomous Vehicles

AI is also revolutionizing transportation. In addition to apps like Google Maps that monitor traffic conditions,

autonomous vehicles are becoming more common. For example, in Mountain View, California, you can use Waymo, a subsidiary of Google, for autonomous commuting.

8. Ensuring Secure Banking Transactions

Modern banking systems employ AI to enhance transaction security and detect fraudulent activities. For instance, when you use mobile check deposits or receive balance alerts, AI is working behind the scenes to monitor your account.

9. Shopping on Amazon with Personalized Recommendations

Amazon, the largest online retailer in the U.S., is another common AI application in our lives. The system accurately recommends products based on your habits and personalizes your shopping experience. Amazon's predictive analytics and AI algorithms are so advanced that they often know when you're likely to make a purchase and can pre-stock items with relevant shipping companies.

10. Relaxing with Netflix Streaming Services

After a busy day, many people unwind by watching videos on Netflix. The company's recommendation engine is powered by AI, which suggests content based on your viewing history. In fact, 80% of what you watch on Netflix is determined by AI recommendations. Similar techniques are used by platforms like YouTube to recommend videos and push advertisements.

The Role of AI in Enhancing Human Life

AI helps increase productivity and improve convenience in our lives. We should learn more about AI and leverage its advantages to solve problems rather than fear it or view it as competition. While AI raises concerns such as privacy violations and ethical issues, these will be discussed in detail in later sections of this book.

Below are four example scenarios with usage of AI, which should be quite familiar to you:

1. Waking up: You wake up to an alarm set by your phone, which automatically plays your favorite music and provides accurate weather information through the weather app.
2. Browsing the Web: While surfing the web on your tablet in the living room, the system automatically pushes news, information, and advertisements that might interest you.
3. Using a Ride-Sharing Service: While waiting for a shared car, you can use the app to plan your route and track the car's arrival time. During the wait, you might use a shopping chatbot to quickly order essential items.
4. Interacting on Social Media: Sharing photos and updates with friends and tagging those who are absent, allowing them to interact even if they couldn't attend in person.

Understanding Human and Artificial Intelligence

Before diving into Artificial Intelligence (AI), let's first discuss what we mean by "Artificial" and "Intelligence." "Artificial" simply refers to something that is man-made rather than naturally occurring. In this context, we're talking about machines created by humans, such as refrigerators, ovens, TVs, computers, cars, and mobile phones.

"Intelligence" has many definitions, but it generally refers to the cognitive abilities unique to humans, such as perception, learning, reasoning, logic, understanding, association, emotions, knowledge, thinking, creativity, and problem-solving. For example:
- Thinking: When you plan something, you need to "think."
- Conversing: During a gathering with friends, you engage in "conversation."
- Reasoning: While playing chess, you "reason" about your next move.
- Dancing: When you hear music or feel happy, you might "dance."
- Recognizing: When you see a cat or dog, you can easily "recognize" them.
- Problem-Solving: When faced with a challenging problem, you have the ability to "solve it."

These capabilities constitute what we call "Human Intelligence (HI)," which includes the ability to:
- Perceive, understand, and analyze information.
- Learn and expand knowledge.
- Make decisions based on knowledge.

What is Artificial Intelligence?

Artificial Intelligence aims to make machines exhibit behavior similar to Human Intelligence, with the capability to handle a wide range of tasks, such as:
- Robots with rich personalities and social cognition: They can "think" about how to interact meaningfully with humans.
- Conversing with Siri or Google Voice Assistants: We can "chat" with them, ask for jokes, riddles, or service reservations.
- Playing Chess with AI: AI can "reason" its next move to win the game.
- Dancing Robots: AI-powered robots can "dance" rhythmically to music.
- Recognizing Objects: AI systems can "identify" objects like curled-up cats on a sofa with precision.
- Solving Problems: AI is widely used to "solve problems" in various industries, such as quickly identifying defective products in factories.

The Relationship Between Human and Artificial Intelligence

While AI has made remarkable progress in certain areas, such as playing Go—traditionally considered a major challenge in AI—the 2016 AlphaGo match (as documented in the film "AlphaGo") marked a significant breakthrough. DeepMind's AI, using various algorithms, including Monte Carlo Tree Search and deep learning,

defeated the world's top professional Go player Lee Sedol. This victory was a landmark achievement in AI, comparable to IBM's Deep Blue beating a world chess champion in 1997.

AI is also making strides in other areas like autonomous driving, voice recognition, facial recognition, and generative AI. These advancements are impressive, but does this mean AI is smarter than humans? In some aspects, particularly tasks requiring rapid data processing, AI excels. However, when it comes to tasks requiring substantial background knowledge, Human Intelligence still outperforms AI.

Discussion: When Does AI Struggle?

If we provide a machine with only a small amount of training data or if there are many distracting elements in the background of images, such as non-white backgrounds or colorful patterns, how effective will AI be? While AI can be quick and accurate in some tasks, it may not perform well in all applications. The effectiveness of AI depends on the context in which it is applied. Therefore, collaboration between Human Intelligence and Artificial Intelligence is crucial.

Human Intelligence vs. Artificial Intelligence

When discussing AI, it's common to compare it to Human Intelligence, but this has always been a controversial topic. The way these two operate is fundamentally different, and the definition of "intelligence" in humans and machines is not entirely the same, at least for now. Rather than getting caught up in these comparisons, we should try to better understand AI's functions.

According to the Computer Science Teachers Association (CSTA) and the Association for the Advancement of Artificial Intelligence (AAAI), AI education initiatives highlight five key concepts: Perception, Representation & Reasoning, Learning, Natural Interaction, and Societal Impact. These concepts can help beginners systematically understand what AI is through real-life applications and examples, providing a strong foundation in AI literacy.

The Complexity of Human vs. Artificial Intelligence

Although there are similarities between Human and Artificial Intelligence (such as perception, learning, and reasoning), Human Intelligence remains far more complex than Artificial Intelligence. Many things that come naturally to humans are challenging for machines. For instance, while humans can effortlessly express emotions during conversations, machines find this difficult—though it's an area scientists are keen to improve. Additionally, the operational mechanisms of Human Intelligence and Artificial Intelligence differ significantly. Therefore, it's essential to view Human Intelligence (HI) and Artificial Intelligence (AI) as distinct entities.

While AI has achieved remarkable feats, it's crucial to recognize that its strengths lie in processing large amounts of data and performing specific tasks efficiently. However, AI is not a replacement for Human Intelligence. Instead, the future lies in the collaboration between AI and humans, leveraging the strengths of both to solve complex problems, improve productivity, and enhance our quality of life.

Understanding AI's limitations and potentials allows us to utilize it effectively while mitigating risks such as privacy concerns and ethical dilemmas. As we explore AI's role in our daily lives, we must ensure that it serves as a tool for human advancement, not as a competitor or a threat.

In the following chapters, we will delve deeper into the technical aspects of AI, explore its various applications, and discuss the ethical considerations that come with it. By the end of this journey, you'll have a comprehensive understanding of AI, equipped to harness its capabilities while being mindful of its challenges.

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