Explain AI to Me Like I'm

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Anthony Onoja, PhD

Preface

Welcome, young explorers, to the amazing world of Artificial Intelligence (AI)! This book, “Explain AI to Me Like I’m sixty-five,” is your magical key to understanding how computers can think and learn just like us. Whether you are a curious older adult or a toddler with an inquisitive heart open to learning new things, this book is designed to take you on an exciting journey into the heart of AI in the simplest way possible. In a world where technology is becoming more and more a part of our daily lives, understanding AI can help us appreciate the wonders around us and inspire us to dream big. From the smart devices we use every day to the robots we see in movies, AI is everywhere, making our lives easier and more exciting. This book begins with an introduction to what AI is, followed by chapters that break down complex ideas into fun and simple concepts. We'll start by imagining computers as magical boxes with super smart helpers inside them. Then, we'll explore how these helpers, called AI, learn new things, just like how you learn new skills. Our goal is to make learning about AI fun and engaging. We have included colourful illustrations, real-life examples, and easy-to-understand explanations to help you grasp the magic behind AI. At the end of each chapter, you will find activities and questions to reinforce what you have learned and spark your imagination. Whether you are reading this book on your own, with a parent, in classroom or in an elderly home, we hope it will be a delightful and enlightening experience. By the end of our journey, you will have a solid understanding of AI and how it works, and who knows, maybe you will be inspired to create your own AI magic someday!

Thank you for joining us on this adventure. Let’s dive in and explore the incredible world of AI together!

Happy learning,

Anthony Onoja, PhD

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1.0 Chapter 1

1.1 The Magic Box

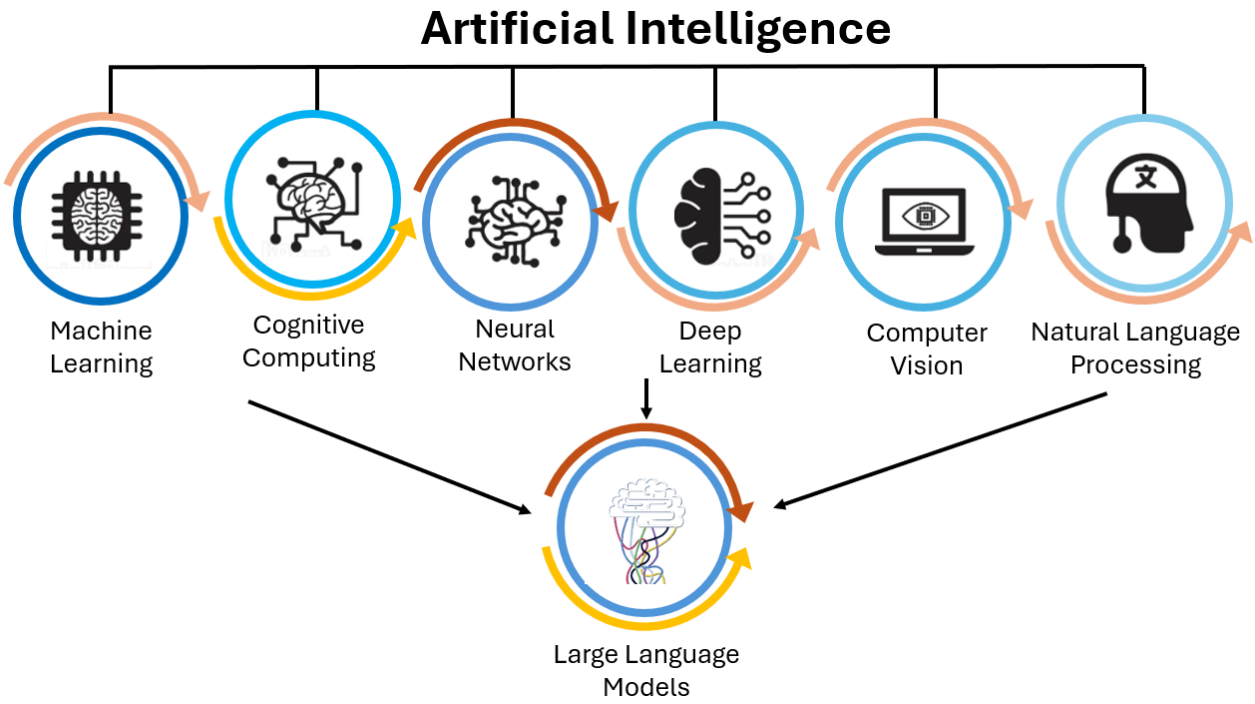
Welcome to the wonderful world of computers! Imagine a magical box that can do amazing things, like answering your questions, playing your favourite songs, or even helping you with your homework. This magical box is called a computer. But what makes it so special?

Inside this computer, there is something even more magical. It's called Artificial Intelligence, or AI for short. Think of AI as a super

smart helper that lives inside the computer. This helper can do things that usually only humans can do, like thinking, learning, and making decisions. Isn't that amazing?

Now, you might be wondering, how can a computer be so smart? Well, it's all thanks to AI. AI is like a special kind of brain for the computer. It helps the computer understand and do tasks that would be too hard for it to do on its own.

AI technology consists of several key components, including Machine Learning, Cognitive Computing, Neural Networks, Deep Learning, Computer Vision, Natural Language Processing, and Large Language Models, which are also known as Generative AI.



Machine Learning is like teaching your robot friend how to recognise different toys by showing it many pictures of each toy. The

more it sees, the better it gets at knowing what each toy is! We will dive deep into this later.

Cognitive Computing is like having a robot that can think and understand things a bit like people do. It tries to think and solve problems using what it has learned, just like how we use our brains.

Neural Networks are like a big web of lights that light up to show patterns. This web helps the robot understand and learn from lots of information, kind of like how our brains work with lots of connections.

Deep Learning is a special kind of neural network that gets really, really good at learning. It’s like having a super-smart robot that can figure out very complex things, such as recognising different kinds of animals in pictures.

Computer Vision is like giving your robot eyes so it can see and understand pictures and videos. This helps the robot know what’s in the pictures, like spotting a cat or a dog.

Natural Language Processing (NLP) is like teaching your robot to talk and understand human language. With NLP, your robot can listen to what you say and even answer you, almost like talking to a friend.

Large Language Models, or Generative AI, are like having a huge library inside your robot. This library is filled with lots of information that helps your robot write stories, answer questions, and have conversations about almost anything.

So, AI is like a bunch of smart robots and tools that can learn, see, talk, and help us in many amazing ways!

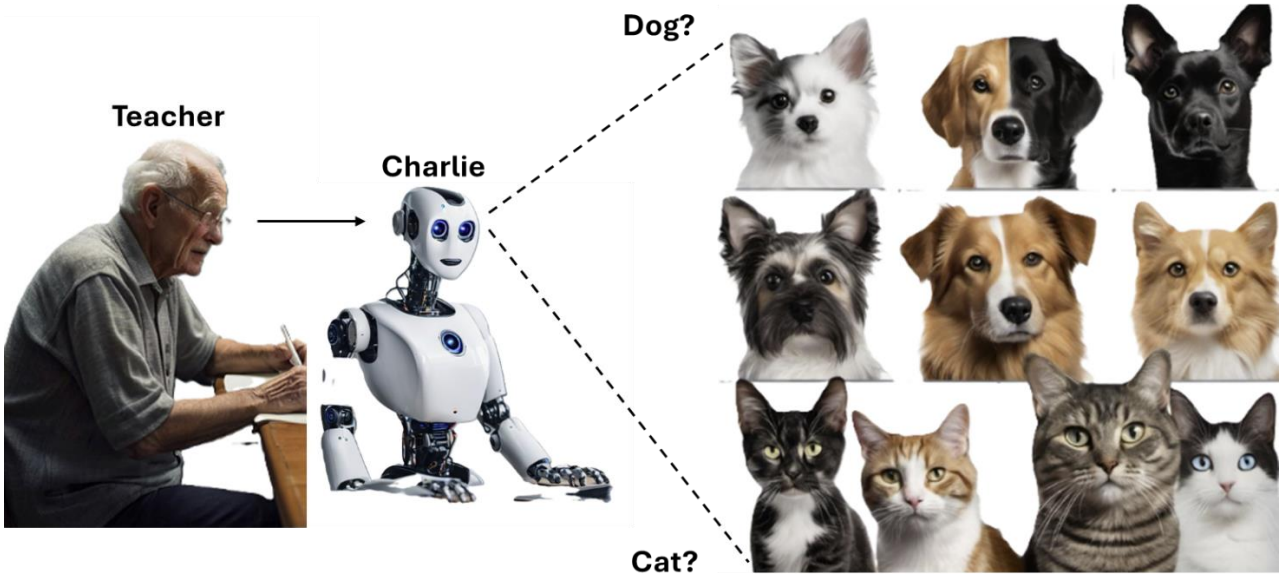
For example, have you ever asked a smart speaker like Alexa or Siri a question? AI is what makes them able to understand your question and give you the right answer.
Or maybe you've seen a robot vacuum cleaning the floor. AI helps it know where to go and what to clean.

So, when you think of AI, think of a magical helper inside the computer, making it super smart and able to do amazing things. And that's just the beginning of the magic we will explore in this book!

1.1.1 Learning Machines

Now that we know about the magical helper called AI, let’s talk about how it learns new things. Imagine you have a pet dog.

When you first got your dog, it didn’t know any tricks. But with time, patience, and lots of treats, you taught it to sit, stay, and even roll over. Computers with AI learn in a similar way, but instead of treats, they use something called data.

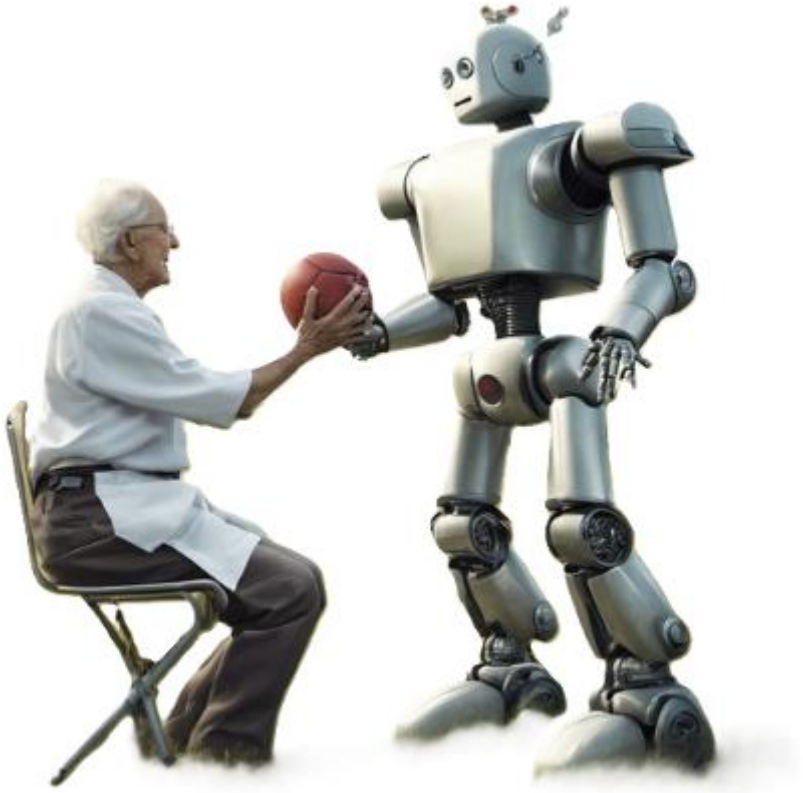


Data is like food for computers. It's all the information that the computer uses to learn. For example, if we want a computer to recognise pictures of cats and dogs, we need to show it lots of pictures of cats and dogs. The more pictures it sees, the better it gets at telling the difference between a cat and a dog.

Let's say we have a computer named Charlie. Charlie is learning to recognize cats and dogs. We show Charlie 100 pictures of cats and 100 pictures of dogs. Each time Charlie sees a picture, it tries to guess if it's a cat or a dog. If it gets it right, great! If it gets it wrong, we help it learn from its mistake. Over time, Charlie gets really good at knowing which pictures are cats and which are dogs.

This process of learning from data is called machine learning. It's like teaching the computer new tricks. The more data we give it, the smarter it gets. But remember, just like learning new tricks takes time

for your dog, it also takes time for the computer to learn from all the data.



Here’s another fun example. Imagine you have a robot friend named Robby. You want Robby to learn to play your favourite game.
First, you show Robby how to play by giving it lots of examples of what to do and what not to do. Robby watches and learns from these examples. Eventually, Robby gets better and better at the game, just like you!

So, when you think of AI, remember that it's like a super smart helper inside the computer. It learns new things by looking at lots of data, just like how you learn new things by practicing and getting

better each time. And the more it learns, the more amazing things it can do!

1.2 Chapter 1 Exercises

Ex.1: Draw your own magical computer with a super smart helper inside. What amazing things can your computer do?

Ex.2: Draw a picture of a robot, call it with your favourite name, now let the computer learning to recognise oranges and apples.

Ex.3: Draw Robby the robot learning to sing your favourite song. What data (audios, pictures, examples) would you show them to help them learn?

Remember, learning is fun and exciting, just like exploring the magical world of AI!

2.0 Chapter 2

2.1 Exploring Cognitive Computing

2.1.1 A Cogitative Flourish

To imbue the mind of steel with wisdom vast and deep, where cogitations bloom as gardens fair, is to endow the future with a spark divine. So let the spirit of discovery kindle in the silicon soul, that from its wellspring, knowledge may freely flow, and every thought, as golden threads, weave the tapestry of tomorrow's glory.

2.1.2 What is Cognitive Computing?

Imagine you have a magical toy that can learn things on its own, just like you do at school. It can listen to stories, look at pictures, and even talk with you.

This magical toy can help you solve puzzles and answer questions, but it doesn't just follow instructions like a regular toy. It tries to understand and think about what it learns, kind of like how you do!

That's what **cognitive computing** is all about. It's like teaching computers to be a bit more like us—learning and understanding things on their own.

2.1.3 How Does It Work?

2.1.4 Learning from Experience

Think about how you learn to ride a bike. At first, you might wobble and fall, but each time you try, you get a little better. You learn from your mistakes and get more confident.

Cognitive computing works in a similar way. It learns from lots of examples, just like you do. For instance, if we want a computer to recognize pictures of cats, we show it lots and lots of cat pictures.

The computer looks at all these pictures and starts to notice patterns, like how cats have pointy ears and whiskers. Over time, it gets really good at spotting cats, even if it sees a new picture, it’s never seen before!

2.1.5 Understanding Language

Imagine you have a friend who speaks a funny language, and you want to understand them. You might listen carefully and ask questions to figure out what they mean. After a while, you start to understand their language better.

Cognitive computing helps computers understand human language, too. When you talk to a smart assistant like Siri or Alexa, they have to figure out what you're saying. They learn from lots of conversations and practice understanding different words and sentences. This helps them answer your questions or help you find your favourite songs!

2.1.6 Solving Problems

Think of a big jigsaw puzzle with lots of pieces. At first, it seems really tricky, but as you start putting pieces together, you find that some pieces fit perfectly. You use what you know about the picture on the box to help you finish the puzzle.

Cognitive computing helps computers solve problems by using what they’ve learned. If a computer is trying to help you with a homework question, it looks at similar questions it has solved before and uses that knowledge to find the right answer. It’s like having a super-smart friend who can help you with your puzzles and homework!

2.2 Examples of Cognitive Computing

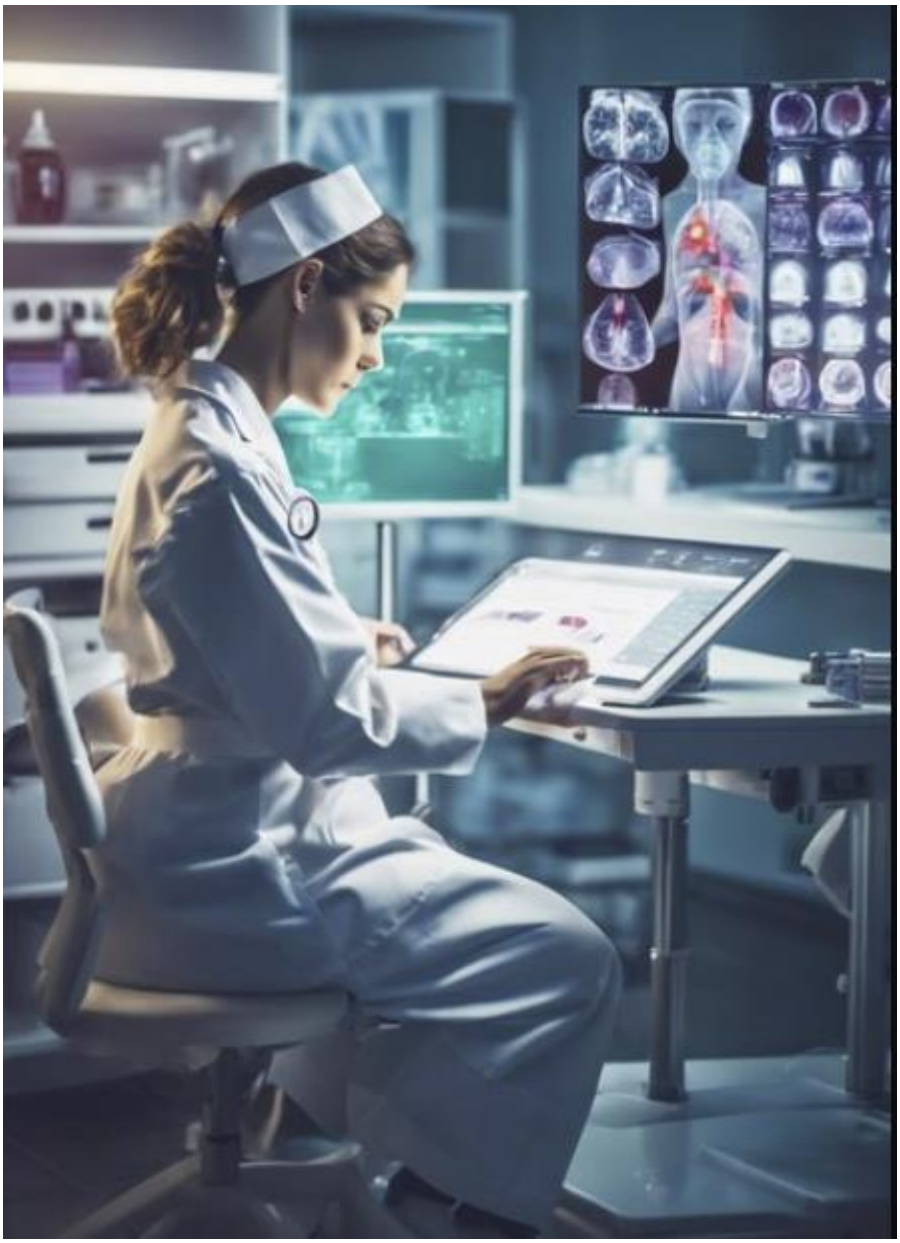
2.2.1 Chatbots

Imagine you’re talking to a friendly robot on the computer that helps you find out more about your favourite cartoon. This robot can understand what you say and give you answers or suggest new cartoons you might like. That’s a chatbot! It uses cognitive computing to understand your questions and give you helpful answers.

2.2.2 Smart Recommendations

Have you ever noticed that when you watch a lot of cartoons on TV, it starts suggesting new cartoons you might like? That’s another example of cognitive computing. It looks at what you’ve watched before and tries to guess what you might enjoy next.

2.2.3 Medical Helpers



Cognitive computing can also help doctors. Imagine if a computer could look at lots of pictures of sick people and learn what kind of treatments worked best. The computer can then help doctors by suggesting the best treatments for new patients. It’s like having a super-smart doctor friend who knows a lot about medicine!

2.2.4 Why is it Important?

Cognitive computing helps make our lives easier and more fun. It can understand us better, help us with our problems, and even keep us company. Just like how you get better at things with practice, cognitive computing gets smarter with every bit of information it learns.

So, next time you use a smart assistant, get a cool recommendation, or see a friendly robot online, remember that it’s all thanks to cognitive computing! It’s like having a clever helper that learns and grows, just like you do.

2.3 Chapter 2 Exercises

2.3.1 Exploring Cognitive Computing

Ex.1: Picture Puzzle

Objective: Understand how cognitive computing learns from examples.

Instructions:

1. **Create a Simple Dataset:** Draw or collect a set of pictures with different objects (e.g., cats, dogs, and cars). Use at least 3 pictures for each category.
2. **Label the Pictures:** Write down the category label for each picture (e.g., “cat,” “dog,” “car”).
3. **Imagine Teaching a computer:** If you were to teach a computer to recognise these pictures, how would you explain the process? Write a short description of how the computer would learn to identify each object.
4. **Draw Conclusions:** How do you think the computer would improve its accuracy as it sees more pictures?

Ex.2: Language Understanding

Objective: Explore how cognitive computing helps computers understand language.

Instructions

1. **Create a Dialogue:** Write a short conversation between two characters. One character should ask questions about a topic (e.g., their favourite food), and the other should respond.
2. **Identify Key Phrases:** Highlight or underline key phrases or words that help understand the context (e.g., “pizza,” “favourite”).
3. **Explain to a Friend:** Imagine you are explaining to a friend how a smart assistant like Siri or Alexa would understand this conversation. What parts of the dialogue are most important for the computer to understand?
4. **Reflection:** How does the computer’s understanding of language help it respond to your questions?

Ex.3: Solve the Puzzle

Objective: See how cognitive computing solves problems using past knowledge.

Instructions

1. **Create a Puzzle Scenario:** Think of a simple problem or puzzle you solved recently (e.g., finding the right book in a library).
2. **Break Down the Steps:** Write down the steps you took to solve the problem.
3. **Compare with a Computer:** How would a computer use its past knowledge to solve this problem? Describe how it would use information from similar problems to find a solution.
4. **Apply the Concept:** Imagine a computer is helping you with a homework question. How does it use its knowledge to assist you?

Ex.4: Chatbot Creation

Objective: Design a basic chatbot using cognitive computing principles.

Instructions

1. **Define the Chatbot's Purpose:** Decide what your chatbot will do. For example, it could help users find their favourite books or answer questions about a topic you like.

2. **Write Sample Questions and Answers:** Create a list of questions users might ask and write down how the chatbot should respond. For example, if a user asks, “What are your favourite books?” the chatbot could respond with a list of recommended books.

3. **Build a Flow:** Sketch a simple flowchart or diagram showing how the chatbot will handle different questions.

4. **Test Your Chatbot:** Share your chatbot with a friend and ask them to interact with it. How well does it understand their questions? What improvements could be made?

Ex.5: Medical Helper Scenario

Objective: Understand how cognitive computing assists in medical decisions.

Instructions

1. **Create a Medical Scenario:** Imagine a computer that helps doctors choose treatments for patients. Write a short description of a patient’s symptoms and the computer’s suggestions for treatment.

2. **Explain the Process:** How does the computer use past information to make its suggestions? Describe the process in simple terms.

3. **Discuss the Benefits:** What are some benefits of having a computer help doctors with treatment decisions? How might it improve patient care?

4. **Consider the Limitations:** Are there any limitations or challenges in using cognitive computing in medicine? Write a few sentences about what might go wrong or what should be considered.

3.0 Chapter 3

3.1.1 Understanding Neural Networks

3.1.2 What Is a Neural Network?

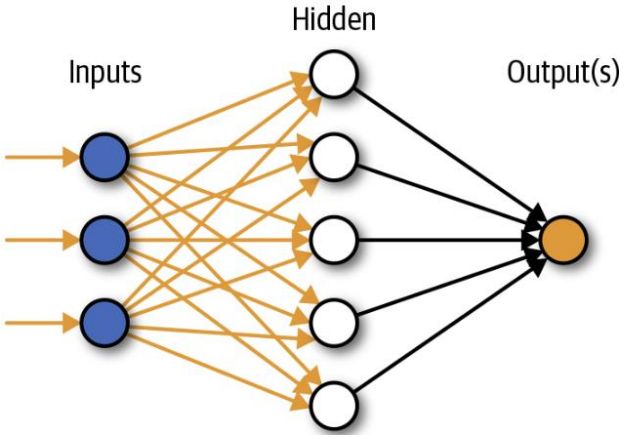
Imagine you have a big box of Lego bricks. Each brick can be connected to others in many different ways to build something amazing, like a house or a car. In the world of computers, a neural network works in a similar way but with "bricks" that are really tiny pieces of information.

A neural network is a type of computer system that tries to learn from examples, just like we do. It’s like teaching a child how to

recognise different animals by showing them lots of pictures of cats and dogs.

Over time, the child gets better at telling which is which. A neural network learns in a similar way, using lots of data to get better at making decisions or predictions.

3.1.3 How Does Neural Networks Work?



Just like building with Lego, a neural network is made up of layers. Each layer has many “neurons” (think of them as little Lego pieces). These neurons are connected to each other in a very specific way.

The input layer is the first layer where the network receives information. For example, if you want to teach it to recognise animals, you might give it pictures of animals.

Next, we have the input layers which are the middle part of your Lego model where you build the details. They work on the information from the input layer, figuring out more complex patterns. For example, it might learn that a cat has pointy ears and whiskers.

Lastly, we have the output layer, which is where the network gives its final answer. After working through the hidden layers, it will tell you if the picture is of a cat or a dog.

3.1.4 Training the Neural Network

Training a neural network is like teaching someone to be better at recognising animals.

You show them lots of examples, correct them when they make mistakes, and they gradually get better. Here's how it works; you give the neural network lots of examples of what you want it to learn. For

instance, you might show it 1000 pictures of cats and 1000 pictures of dogs.

The network tries to figure out the patterns in these pictures. It might notice that cats usually have pointy ears and dogs have different shapes of ears.

After making a guess about a picture, the network checks if it was right or wrong. If it was wrong, it makes small changes to improve. This is like adjusting the Lego model if it does not look quite right.

This process happens many times. The more examples it sees and the more corrections it gets, the better it becomes at recognising patterns.

Examples of Neural networks in everyday life include - smartphones, voice assistants and healthcare. When you use your phone’s camera to take a picture and it automatically enhances the photo or recognises faces, it’s using a neural network.

If you ask Siri or Alexa a question, they use neural networks to understand what you’re saying and find the right answer.

In healthcare, Doctors use neural networks to help spot signs of diseases in medical scans, making it easier to diagnose illnesses early.

3.1.5 Why Are Neural Networks Important?

Neural networks are important because they can learn from experience and make sense of complex information. They help us in many areas of our daily lives and are getting better at understanding things like speech, images, and even predicting future trends.

Imagine if your Lego bricks could magically build something just by you showing them how to do it once. Neural networks are like that magic – they take lots of examples, learn from them, and then help us with tasks that are too complex for simple rules.

3.2 Chapter 3 Exercises

Ex.1: Build Your Own Neural Network

Objective: Understand the basic structure of a neural network by creating a simple diagram.

Materials Needed:

1) Paper
2) Pen or pencil

Instructions

1) **Draw the Layers:** Draw three layers on your paper. Label the first layer as “Input Layer”, the middle layer as “Hidden Layer”, and the last layer as “Output Layer”.

2) **Add Neurons:** In the “Input Layer”, draw 3 circles (these are your neurons) and label them as “Input 1”, “Input 2”, and “Input 3”. In the “Hidden Layer”, draw 2 circles and label them as “Hidden 1” and “Hidden 2”. In the “Output Layer”, draw 1 circle and label it as “Output”.

3) **Connect the Neurons:** Draw lines to connect each neuron in the Input Layer to every neuron in the Hidden Layer. Then, draw lines to connect each neuron in the Hidden Layer to the neuron in the Output Layer.

4) **Explain Your Diagram:** Write a short paragraph explaining what each layer does in your diagram and how the neurons are connected.

Ex.2: Training a Neural Network

Objective: Understand the concept of training by simulating how a neural network learns.

Materials Needed:

1) Paper
2) Pen or pencil

Instructions

1) Imagine You Are Teaching a Neural Network: Think of a simple task, like teaching a neural network to recognise whether an image is a cat or a dog.

2) Create Examples: Write down 3 features that might help in distinguishing between a cat and a dog (e.g., “pointy ears”, “long tail”, “whiskers”).

3) Simulate Learning: Write down three example images (two cats and one dog) with the features you listed. For each image, note down whether the neural network guessed correctly or incorrectly.

4) Adjust the Learning: If the network guessed incorrectly, write down how it might change its approach based on the new information (e.g., “Increase the weight for recognising pointy ears”).

5) Reflect: Write a short paragraph on how your neural network would improve its guessing over time with more examples.

Ex.3: Real-Life Neural Networks

Objective: Identify where neural networks are used in everyday life.

Materials Needed:

1) Paper
2) Pen or pencil

Instructions

1) Think About Common Technology: List three (3) things you use regularly that might use neural networks (e.g., smartphone camera, voice assistant).

2) Describe the Use: For each item you listed, write a short paragraph explaining how a neural network might be used in that technology. For example, “My smartphone camera uses a neural network to recognise faces and improve photo quality.”

3) Share Your Findings: Discuss your findings with a friend or family member. Explain how neural networks are helping in these technologies and why they are important.

Ex.4: Fun Neural Network Quiz

Objective: Test your understanding of neural networks with a short quiz.

Instructions

Answer the Following Questions:

1) What are the three main layers of a neural network?
   a) Input Layer, Hidden Layer, Output Layer
   b) Start Layer, Middle Layer, End Layer
   c) Basic Layer, Intermediate Layer, Final Layer

2) What is the purpose of the Hidden Layer in a neural network?
   a) To receive the initial information
   b) To process and find patterns in the information
   c) To give the final result

3) How does a neural network learn?
   a) By guessing randomly
   b) By seeing many examples and correcting mistakes
   c) By memorising the data exactly

4) Name one real-life application of neural networks.

a) Microwave oven

b) Smartphone camera

c) Television remote

Check Your Answers: Compare your answers with the key below.

Answer Key:

a) Input Layer, Hidden Layer, Output Layer

b) To process and find patterns in the information

b) By seeing many examples and correcting mistakes

b) Smartphone camera

4.0 Chapter 4

4.1 Understanding the Art of Deep Learning

As pointed out in the previous chapter, neural network has an input layer, a hidden layer and an output layer. Deep learning is a special kind of neural network with a lot of hidden layers.

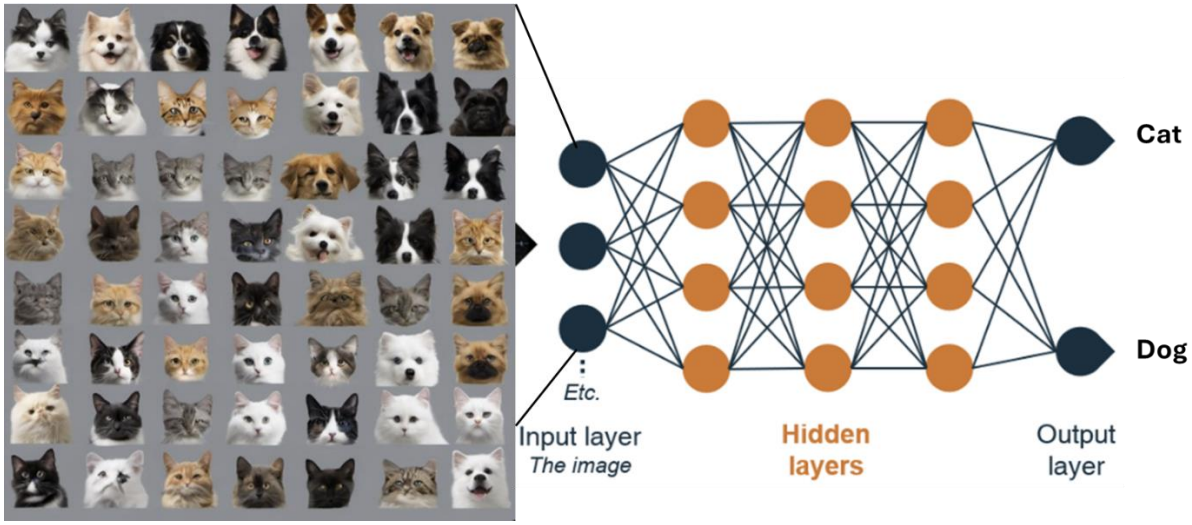
4.1.1 What is Deep Learning?

Imagine you have a toy box with lots of different toys in it. Some are cars, some are dolls, and some are blocks. Now, let’s say you want to organise your toys by type. You might first separate the cars from the dolls, then the dolls from the blocks. As you keep sorting, you get better at recognising each type of toy.

Deep learning is a bit like that, but instead of toys, it’s about sorting and recognising different patterns, like pictures, sounds, or words. It's a special kind of computer learning where the computer teaches itself to recognise patterns, just like you learn to recognise your toys.

4.1.2 How Does Deep Learning Work?

Deep learning uses something called neural networks. These networks are a bit like a brain made of many tiny parts called neurons. Each neuron has a job to do, just like each person in a factory has a job. When you give the network a task, like recognising a picture of a cat, the neurons work together, passing information along, until they come up with an answer.



Imagine your brain is like a big school with lots of classrooms. Each classroom is like a layer in a neural network, where the students (neurons) work on a problem. The first classroom might look at basic things like colours or shapes, and then pass that information to the next classroom, which looks at more details like eyes or ears. After going through many classrooms, the school can say, “Aha! This picture is of a cat!”

4.1.3 Learning by Example

Deep learning needs to see lots of examples to learn. If you wanted to teach a computer to recognise apples, you’d show it thousands of pictures of apples. At first, the computer might get confused and think a tomato is an apple, but as it sees more and more pictures, it gets better at knowing what an apple looks like.

Imagine teaching your dog to sit. The first few times, they might not understand, but with lots of practice (and some treats), they start to sit whenever you say the word. In the same way, deep learning needs lots of examples to learn from.

4.1.4 Techniques in Deep Learning

There are some cool tricks that deep learning uses to get even better at its job.

Convolutional Neural Networks (CNNs)

These are like special glasses that help the computer see better. They’re great at recognising pictures and are used for things like identifying faces in photos.

Recurrent Neural Networks (RNNs)

These networks have a memory! They remember what they saw before, which helps them understand things that happen over time, like a sentence in a book or the notes in a song.

Transfer Learning

This is when a computer learns something really well and then uses that knowledge to help with a new task. It's like when you learn to ride a bike, and then that helps you learn to ride a scooter.

Reinforcement Learning

Imagine playing a game and getting points every time you do something right. In reinforcement learning, the computer gets points (or loses them) based on what it does, helping it learn the best way to do something over time.

4.1.5 Putting It All Together

Deep learning is like teaching a really clever robot to do things by showing it lots of examples. It uses neural networks to figure things out, just like our brains do. With practice, it gets better and better at recognising patterns and making decisions.

So, next time you play with your toys, remember that deep learning is a bit like sorting your toys—only instead of cars and dolls, it's sorting out things like pictures, sounds, and words, helping computers understand the world just a little bit better.

4.2 Chapter 4 Exercises

Ex.1: Sorting the Toy Box

Imagine you have a toy box with cars, dolls, and blocks. Just like the neural networks in deep learning, you need to sort them into their different groups.

Task

1) Draw three circles on a piece of paper and label them “Cars,” “Dolls,” and “Blocks.”
2) Now, think about which toys go in each circle and draw or write them down. For example, “Red Car” goes in the “Cars” circle.

Question 1

How does sorting your toys help you understand how deep learning sorts of different types of information like pictures or sounds?

Ex.2: Teaching a computer

Imagine you’re teaching a computer to recognise pictures of apples. The computer needs to see lots of apple pictures before it learns.

Task

1) Pretend you're showing the computer five different fruits: an apple, a banana, a pear, an orange, and a grape.
2) Write down what you would say to the computer to help it learn which one is the apple.

Question 2

Why do you think the computer needs to see many examples of apples before it can recognise one on its own?

Ex.3: Memory Game with Recurrent Neural Networks

A Recurrent Neural Network (RNN) has a memory that helps it understand sequences, like the order of words in a sentence.

Task

1) Play a simple memory game. Think of a short sentence, like "The cat sat on the mat."
2) Cover the sentence and try to remember the order of the words. Say the sentence out loud without looking.

Question 3

How does remembering the order of words in a sentence help you understand how RNNs work in deep learning?

5.0 Chapter 5

5.1 Seeing the World with Computer Vision

5.1.1 What is Computer Vision?

Imagine you're looking at a picture of your favourite pet. You can easily tell whether it's a dog, cat, or rabbit. You might even notice the colour of its fur, whether it's sitting or standing, and if it's happy or sleepy.

Computer vision is the way computers "see" and understand images just like you do.

But unlike you, computers don’t have eyes. Instead, they use cameras to take pictures or videos, and special programs to make sense of what they “see”. These programs are designed to recognise objects, people, and even actions within images or videos.

5.1.2 How Does Computer Vision Work?

Let’s break it down into simple steps, just like a computer would.

Taking a Picture

Imagine your computer has a camera. It takes a picture, just like you would with your phone. But instead of seeing a dog, the computer sees a bunch of tiny dots called pixels.

Understanding the Picture

Each pixel has a colour. The computer looks at all these coloured dots to figure out shapes and patterns. It might notice that a group of pixels forms the shape of a dog.

Recognising Objects

Once the computer spots shapes, it tries to match them with things it has seen before. If it has been shown many pictures of dogs, it might say, “Ah, this shape looks like a dog!”

Learning from Examples

The more pictures the computer sees, the better it gets at recognising things. It learns just like you do when you see lots of different dogs – you get better at spotting a dog, even if it’s a different breed or colour.

Spotting Faces in Photos

Have you ever noticed how your phone can put a box around faces when you take a picture? That’s computer vision at work! The phone’s camera takes a picture, and its computer vision program looks for shapes that look like eyes, a nose, and a mouth. When it finds these shapes in the right order, it knows it’s found a face.

5.1.3 Why is Computer Vision Important?

Computer vision is used in many cool ways in our everyday lives. Here are some examples below.

Self-Driving Cars

These cars use cameras to “see” the road, just like you do when you drive. They look out for other cars, people crossing the street, and traffic signs to stay safe.

Healthcare

Doctors use computer vision to help look at medical images, like X-rays, to spot diseases or injuries more quickly and accurately.

Shopping

Some apps can look at a picture of a product and find where you can buy it online. It’s like having a super smart self-service checking out assistant!

5.1.4 How Computers Learn to See Better

Just like you practice drawing by sketching a picture over and over, computers need practice to get better at seeing. They practice by looking at thousands or even millions of pictures. Each time, they get a little bit better at understanding what they're looking at. This practice is called "training."

5.1.5 Computer Vision and Your Everyday Life

Next time you use your phone to unlock it with your face, remember that computer vision is helping your phone recognise you. Or when you use an app that adds funny filters to your selfies, its computer vision finding your face and placing the dog ears just right!

Computer vision is helping make our world smarter and more interactive. From helping us take better photos to making our cities safer, it's a powerful tool that's becoming a bigger part of our lives every day.

5.1.6 Seeing the World Differently

Have you ever wondered how your computer or smartphone can recognize your face or find specific pictures from your photo album?

This magic happens thanks to a special kind of AI called image recognition as seen in the previous chapter 5. AI can look at pictures and identify what’s in them, helping us find things quickly and easily.

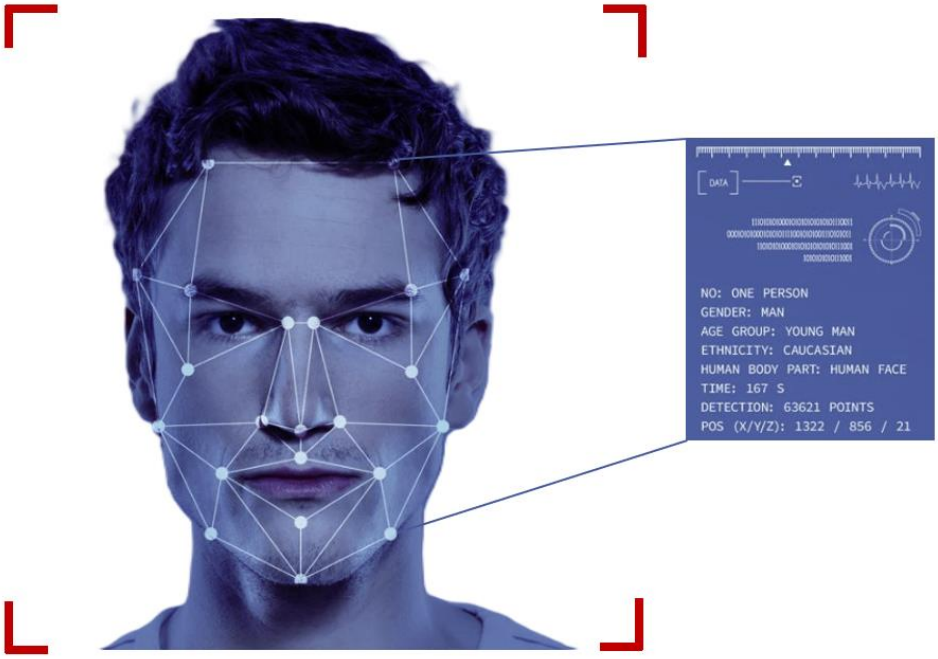
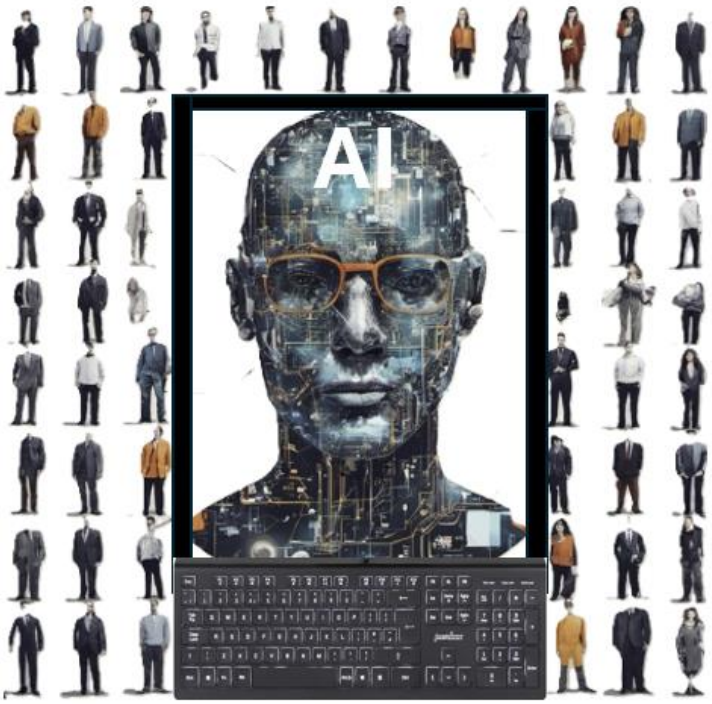


Image recognition is a way for computers to see and understand pictures, just like we do.

Think of it as teaching a computer to recognize objects, people, and places in photos. AI uses this ability to help us in many cool ways, from tagging friends in pictures to identifying different objects.



First, we show the computer thousands of pictures and tell it what each picture is. For example, we show it many pictures of cats and dogs and label them accordingly. The computer studies these pictures and learns the patterns that make a cat look like a cat and a dog look like a dog. This process is called “training the model.” Once trained, the computer can look at a new picture and guess what’s in it based on what it learned.

Have you noticed how your photo app can group pictures of the same person together? That's image recognition at work! It helps you organize your photos by identifying faces and places. Some smartphones use facial recognition to unlock the screen. When you look at your phone, it recognizes your face and unlocks itself, making it quick and secure. When shopping online, image recognition can help you find products. For example, you can take a picture of a pair of shoes you like, and the app will find similar shoes for you to buy.

For fun, take pictures of different objects around your home and see if an image recognition app can identify them correctly. Make a photo album with different categories like animals, food, or places. Use an image recognition app to help sort the pictures into the right categories.

5.2 Chapter 5 Exercises

Ex.1: Picture Puzzle

Imagine you have a puzzle with a picture of a cat. When all the pieces are together, you see the whole cat. But what if the pieces were scattered?

Task

1) Draw a simple picture of an animal or object and cut it into several pieces.

2) Mix them up and try to put them back together.

Question 1

How does putting the pieces back together help you understand how a computer identifies objects in a picture?

Ex.2: I Spy with My Little Eye

Play a game of “I Spy,” where you describe something you see, and someone else guesses what it is. For example, “I spy something that is red and round.”

Task

Think about what clues you give and how they help the other person guess correctly.

Question 2

How does this game help you understand how computers use clues to recognise objects in pictures?

Ex.3: Learning to See

Imagine you’re teaching a computer to recognise your favourite toy. First, you show it one picture, then another, and another.

Task

1) Draw or find three different pictures of the same toy.

2) Think about how you would explain to a computer that all these pictures are of the same thing, even if they look a little different.

Question 3

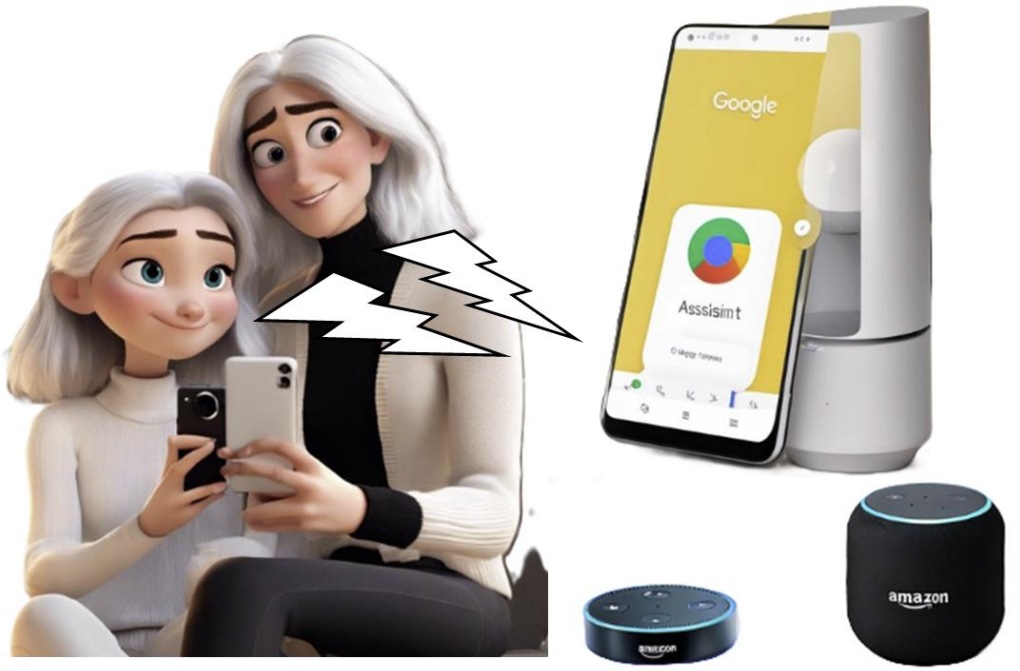
Why does a computer need to see lots of pictures to learn, just like you might need to see lots of different toys to recognise them all?

6.0 Chapter 6

6.1 How AI Helps Us Everyday

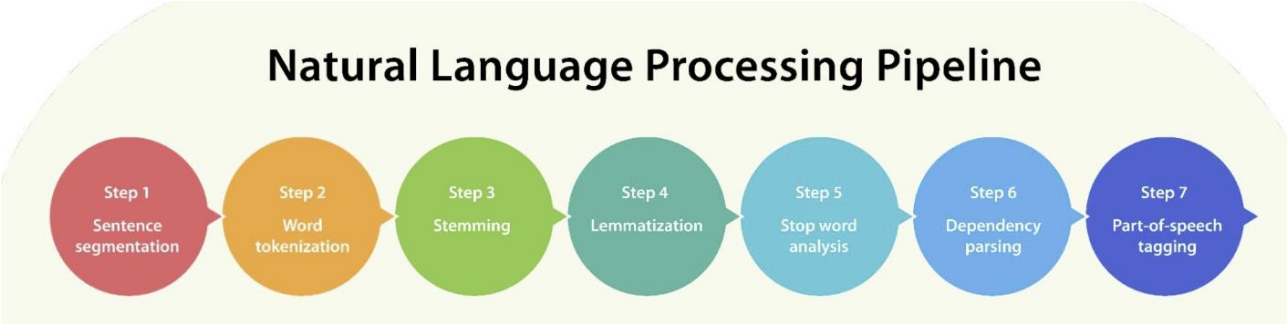
AI is not just about futuristic robots and complex algorithms. It's about the small, everyday magic that makes our lives better. From talking to machines with voice assistants to seeing the world differently through image recognition, AI is here to help us in more ways than we can imagine. As you continue reading, keep an open mind and enjoy discovering the wonders of AI!

Imagine having a friend who always listens to you and helps with almost anything just by talking. That’s what voice assistants like Siri and Alexa do! They're like friendly AI helpers who understand our words and respond in ways that make our lives easier and more fun.



Voice assistants are special programs that live inside our smartphones, tablets, and smart speakers. They can hear us when we talk to them and understand what we say. It's almost like having a conversation with a real person, but instead, you're talking to a super-smart computer helper.

When you say, “Hey Siri, what's the weather like today?” or “Alexa, play my favourite song,” these AI helpers use something called “natural language processing” (NLP).



NLP is a way for computers to understand human language. Here's how it works: First, the voice assistant listens to what you say using its microphone.

Then, it breaks down your words to figure out what you're asking. Using its knowledge and past data, it understands the meaning behind your words. Finally, it gives you an answer or performs the action you requested.

You can ask your voice assistant to check the weather, set reminders, or even do math problems. For example, “What’s 5 plus 7?” and Siri or Alexa will tell you the answer right away. If you feel like listening to your favourite song, just ask, “Alexa, play some music,” and it will start playing songs for you.

Voice assistants can also help control smart devices in your home, like turning off the lights, adjusting the thermostat, or locking the doors.

For fun, try asking your voice assistant different questions and see how it responds. Make a list of the coolest things it can do! Think of new commands you wish your voice assistant could follow. Share them with friends or family and see if they have similar ideas.

Voice assistants are just one way AI helps us in our daily lives, making tasks simpler and more interactive. Now, let’s move on to another fascinating aspect of AI – how it sees the world differently from us!

AI is not just about futuristic robots and complex algorithms. It’s about the small, everyday magic that makes our lives better. From talking to machines with voice assistants to seeing the world differently through image recognition, AI is here to help us in more ways than

we can imagine. As you continue reading, keep an open mind and enjoy discovering the wonders of AI! Embrace the magic of AI, and remember, this is just the beginning of your journey into the incredible world of artificial intelligence!

7.0 Chapter 7

7.1 The Magic of Large Language Models and Generative AI

7.1.1 What Are Large Language Models?

Imagine you're having a chat with a friend, and no matter what you say, your friend always knows just what to reply with. It's like they've read every book, every article, and every story ever written, so they always have the perfect response. This is a bit like how **Large Language Models** (LLMs) work.

LLMs are a type of artificial intelligence (AI) that have been trained to understand and generate human language. They've been fed massive amounts of text from the internet, books, and other sources, so they've "learned" how to write, answer questions, and even have

conversations. It’s as if they have a giant library inside their virtual brain!

7.1.2 What Can Large Language Models Do?

Now, let’s take a brief look at some of the amazing things LLMs can do.

Writing Stories and Poems

You can ask an LLM to write a story about a flying elephant or a poem about a rainy day, and it will create something unique just for you. It doesn’t copy from a book—it comes up with something new based on all the stories and poems it has “read.”

Answering Questions

If you ask an LLM, “Why is the sky blue?” it can give you an answer based on what it has learned from all the science books and articles it has processed. It’s like having a super-smart friend who knows a little bit about everything.

Helping with Homework

LLMs can help you with your schoolwork by explaining difficult concepts, solving maths problems, or even helping you practise a new language. Just ask, and it will do its best to assist you.

Creating New Ideas

If you’re stuck on what to draw or write about, an LLM can help you brainstorm. You might ask it for ideas for a story or what to name a character in your play. It’s like having a creative partner who’s always ready with fresh ideas.

7.1.3 LLMs Chatbots

You’ve probably come across chatbots on websites, where you can ask questions and get help. Many of these chatbots are powered by LLMs. When you type a question, the LLM reads it, understands what you’re asking, and then writes a reply based on what it knows. This makes it seem like you’re chatting with a real person, even though you’re actually talking to a computer!

7.1.4 How Do Large Language Models Work?

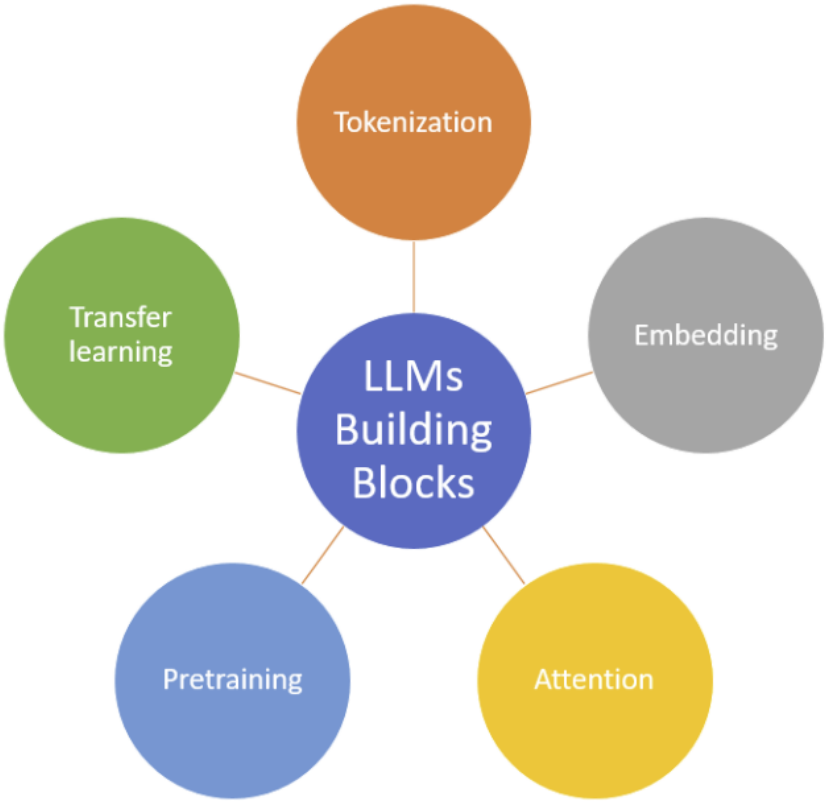


Image adapted from https://vitalflux.com/large-language-models-concepts-examples/

Let's break it down into simple steps:

1. **Learning from Text**: The LLM starts by reading a huge amount of text. This might include books, websites, and even social media posts. It learns the patterns of language—how words fit together to make sentences, and how sentences fit together to express ideas.

2. **Making Predictions**: When you ask an LLM a question or give it a prompt, it doesn’t just pick a random response. Instead, it predicts what comes next based on the patterns it has learned. If you start with "Once upon a time," it might predict that a story should follow.

3. **Generating Responses**: After predicting what should come next, the LLM generates a response. It writes out the words in a way that makes sense based on the context. This response is brand new, crafted just for you, using the LLM’s vast knowledge.

7.1.5 Generative AI

Generative AI is a special type of AI that doesn’t just recognise patterns or answer questions—it creates new things. This can be anything from new images to new pieces of music, or, in the case of LLMs, new text.

Creating Images from Text

Some generative AI models can take a description you write and turn it into an image. For example, if you type “a cat wearing a hat,” the AI will create a picture of a cat with a hat based on your description. This is similar to how LLMs generate text, but instead of writing, they’re drawing.

Writing Code

Generative AI can also write computer code. If you describe what you want your program to do, the AI can generate the code to make it happen. This is incredibly helpful for people learning to code or for developers who need a quick solution.

7.1.6 Training Large Language Models

Training an LLM is like teaching a child to read and write, but on a much larger scale. It takes a lot of data—think of it as giving the AI millions of books to read. The LLM learns from this data, recognising how people use language in different contexts.

This training process is very powerful, but it also has its challenges:

1) **Biases**: Since LLMs learn from text written by humans, they can pick up on human biases (unfair tendencies). This means they might sometimes generate responses that are unfair or unbalanced.

2) **Misinformation**: LLMs learn from everything they read, including text that is not true. This means they might sometimes give incorrect information. Also, sometimes it hallucinates or make up things that are not entirely true, as such the users should validate the information generated by the LLMs.

7.1.7 Using Large Language Models Responsibly

LLMs such as ChatGPT are like very clever tools, and like all tools, they need to be used carefully. It’s important to remember that while LLMs are very good at generating text, they don’t “understand” things the way humans do. They don’t have feelings, experiences, or common sense—they just process data.

When using LLMs, it’s good to:

1) **Check the Facts**: If an LLM gives you information, double-check it with a reliable source, especially if it’s something important.

2) **Be Creative, but Critical**: Use LLMs to help with creative tasks but remember that the best ideas still come from your own mind!

3) **Stay Ethical**: Use LLMs in ways that are fair and respectful, being mindful of the biases they might carry.

7.2 The Future of Language and Creativity

Large Language Models and Generative AI are transforming the way we interact with technology. From helping us write stories to answering our questions, they offer new ways to be creative and solve problems. But as with all powerful tools, it’s important to use them wisely and responsibly.

The future is bright for AI, and as it continues to evolve, it will open even more possibilities for learning, creating, and exploring the world around us.

Moreover, the goal is not to replace human roles but to foster effective human-AI partnerships. By combining human ingenuity with AI's computational power, we aim to tackle complex challenges with exceptional precision, accuracy, and efficiency.

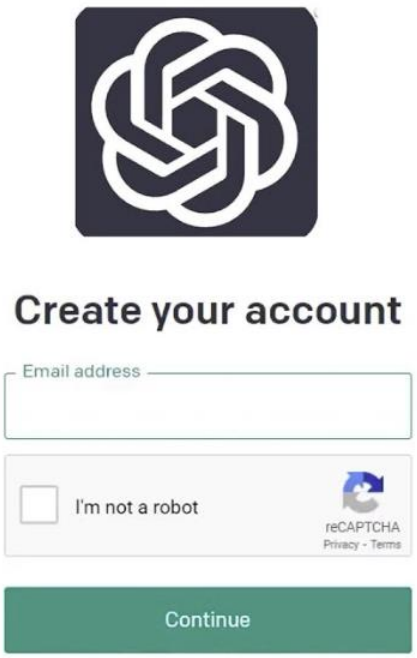
7.3 Chapter 7 Exercises

Ex.1: Story Time with AI

Imagine you want to write a story about a magical forest.

Task

If you have an email address, quickly use it to register with ChatGPT. See the screenshot below on how to register for ChatGPT at https://chatgpt.com/



After you have signup your email account, write the first sentence of your story, like “In a forest where the trees whispered secrets...”

Ask an ChatGPT to continue the story by generating the next few sentences.

Question

How does the AI’s continuation of the story compare to what you had in mind? What do you like or dislike about the AI’s version?

Ex.2: Chatbot Conversations

Pretend you’re talking to a chatbot powered by an LLM e.g., the ChatGPT.

Task

Think of three different questions to ask the ChatGPT (e.g., “What is the capital of France?”, “Can you tell me a joke?”, or “What’s your favourite colour?”).

Question

How does the chatbot respond? Does it feel like talking to a real person? What do you think makes it seem more or less human-like?

Ex.3: Creative Collaboration

Imagine you’re working on a creative project, like writing a song or designing a game.

Task

Use ChatGPT to help brainstorm ideas. Ask it for suggestions on song lyrics or game characters.

Question

1) How does collaborating with AI feel compared to coming up with ideas on your own?

2) Can the AI inspire you in unexpected ways?