

LEARNING MADE EASY



Generative AI

for
dummies[®]
A Wiley Brand



Dive into your options
for generating content

Discover the tricks
of writing effective prompts

Explore how to build
AI into your work

Pam Baker

Author of *ChatGPT For Dummies*



Generative AI

by Pam Baker

for
dummies[®]
A Wiley Brand

Generative AI For Dummies®

Published by: **John Wiley & Sons, Inc.**, 111 River Street, Hoboken, NJ 07030-5774, www.wiley.com

Copyright © 2025 by John Wiley & Sons, Inc. All rights reserved, including rights for text and data mining and training of artificial technologies or similar technologies.

Media and software compilation copyright © 2025 by John Wiley & Sons, Inc. All rights reserved, including rights for text and data mining and training of artificial technologies or similar technologies.

Published simultaneously in Canada

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the Publisher. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permissions>.

Trademarks: Wiley, For Dummies, the Dummies Man logo, Dummies.com, Making Everything Easier, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and may not be used without written permission. All other trademarks are the property of their respective owners. John Wiley & Sons, Inc. is not associated with any product or vendor mentioned in this book.

LIMIT OF LIABILITY/DISCLAIMER OF WARRANTY: THE PUBLISHER AND THE AUTHOR MAKE NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS WORK AND SPECIFICALLY DISCLAIM ALL WARRANTIES, INCLUDING WITHOUT LIMITATION WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTY MAY BE CREATED OR EXTENDED BY SALES OR PROMOTIONAL MATERIALS. THE ADVICE AND STRATEGIES CONTAINED HEREIN MAY NOT BE SUITABLE FOR EVERY SITUATION. THIS WORK IS SOLD WITH THE UNDERSTANDING THAT THE PUBLISHER IS NOT ENGAGED IN RENDERING LEGAL, ACCOUNTING, OR OTHER PROFESSIONAL SERVICES. IF PROFESSIONAL ASSISTANCE IS REQUIRED, THE SERVICES OF A COMPETENT PROFESSIONAL PERSON SHOULD BE SOUGHT. NEITHER THE PUBLISHER NOR THE AUTHOR SHALL BE LIABLE FOR DAMAGES ARISING HEREFROM. THE FACT THAT AN ORGANIZATION OR WEBSITE IS REFERRED TO IN THIS WORK AS A CITATION AND/OR A POTENTIAL SOURCE OF FURTHER INFORMATION DOES NOT MEAN THAT THE AUTHOR OR THE PUBLISHER ENDORSES THE INFORMATION THE ORGANIZATION OR WEBSITE MAY PROVIDE OR RECOMMENDATIONS IT MAY MAKE. FURTHER, READERS SHOULD BE AWARE THAT INTERNET WEBSITES LISTED IN THIS WORK MAY HAVE CHANGED OR DISAPPEARED BETWEEN WHEN THIS WORK WAS WRITTEN AND WHEN IT IS READ.

For general information on our other products and services, please contact our Customer Care Department within the U.S. at 877-762-2974, outside the U.S. at 317-572-3993, or fax 317-572-4002. For technical support, please visit <https://hub.wiley.com/community/support/dummies>.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media that is not included in the version you purchased, you may download this material at <http://booksupport.wiley.com>. For more information about Wiley products, visit www.wiley.com.

Library of Congress Control Number is available from the publisher.

ISBN 978-1-394-27074-3 (pbk); ISBN 978-1-394-27076-7 (ebk); ISBN 978-1-394-27075-0 (ebk)

Table of Contents

INTRODUCTION	1
About This Book	2
Foolish Assumptions	3
Icons Used in This Book	3
Beyond the Book	4
Where to Go from Here	4
PART 1: DIVING INTO GENERATIVE AI FUNDAMENTALS	5
CHAPTER 1: Mapping the Lay of the Generative AI Land	7
So, What Exactly Is Generative AI?	7
Unveiling the BIG Secret to Working Successfully with GenAI	10
Understanding the Infamous Finger Problem and Other GenAI Quirks	13
Figuring Out How to Work with GenAI — It’s All About Your Prompts	14
Why GenAI appears so human	14
Realizing the human influences behind Generative AI’s abilities	16
Discovering the Differences in GenAI Models and Options	17
Checking Out Practical Uses of GenAI	19
Separating Gen AI Fact from Fiction	20
CHAPTER 2: Introducing the Art of Prompt Engineering	23
First Things First: What Is a Prompt?	23
Revealing the Secret Behind Successful Prompting	24
Discovering the secret sauce in prompt engineering	25
Understanding how prompts guide GenAI responses	25
Crafting Effective Prompts for Diverse AI Applications	27
Tips and Tricks for Optimizing Your Prompts	30
Using Prompts to Provide Supplemental Data for the Model	31
Avoiding Common Prompting Pitfalls	32
CHAPTER 3: Collaborating Creatively with GenAI	35
Exploring Human-AI Partnerships in Creative Fields	36
The role of AI in art, music, writing, and video production	37
Different art forms, same prompting issues	38
Looking at some benefits of using GenAI as a creative tool	40
Collaborative success stories	41

	Knowing Who's at Fault for Mishaps, Misfortunes, and Law-Breaking	44
	Understanding Your Role in Responsible AI	45
	Ethical considerations in AI collaboration	46
	Evolving ethical guidelines for working with AI	47
CHAPTER 4:	Navigating the Evolving Landscape of GenAI	49
	Identifying Key Players and Evaluating GenAI Providers	50
	Who's who in the GenAI market	50
	Assessing GenAI services and solutions	54
	Getting GenAI that Plays Nice with Other Technologies	55
	Integrating ChatGPT with other software	55
	Bringing in autonomous AI agents	56
	Keeping Up with the Pace of GenAI Advancements	57
	Staying informed on GenAI trends	58
	Preparing for the future of Generative AI	60
CHAPTER 5:	Applying GenAI in Practical Scenarios	63
	GenAI as Writing Assistant	63
	Using GenAI to generate ideas	64
	Drafting content with the help of GenAI	65
	Sprucing up your writing with GenAI	68
	Getting a Visual Assist from GenAI	69
	GenAI in graphic design and visual arts	69
	Generating visual content with AI tools	70
	Harnessing GenAI for even more visual creativity	71
	Problem-Solving with AI in Creative Projects	72
	PART 2: MASTERING CREATIVE CONTENT WITH GENERATIVE AI	75
CHAPTER 6:	Manipulating the GenAI Model to Milk It for More or Better Content	77
	GenAI's Shame That No One Is Talking About	78
	Unveiling AI: It's way more human than you think	79
	Illuminating flaws in GenAI's DNA	80
	Lying to the Model for Increased Productivity	82
	The ethics of misleading AI for better outputs	83
	Strategies for guiding AI to desired results	84
	Rewarding and Punishing GenAI to Produce Better Content	86
	Implementing reinforcement learning techniques	87
	The role of feedback in AI content generation	87

	What to Do If the GenAI Ignores You or Freezes	88
	Troubleshooting common GenAI interaction issues	89
	Ensuring smooth operation and response from AI	90
	Addressing GenAI's Lying, Misleading, or Hallucinating Tendencies.	90
	Techniques aimed at improving AI honesty and accuracy	92
	Preventing AI from generating false information.	93
	Repurposing Content with GenAI	94
CHAPTER 7:	Producing Long-Form Content	97
	Writing Academic Papers with GenAI Assistance	98
	Using GenAI for research and academic writing.	98
	Supporting the academic publication process	103
	Developing White Papers and Reports Using Generative AI.	105
	Crafting professional documents with AI support	106
	Enhancing business communication with AI.	107
	Crafting Research Designs and Outlines with GenAI	107
	Structuring research projects with AI	108
	From concept to outline: GenAI as a planning tool	109
	Integrating Citations and References.	110
	GenAI-assisted reference management.	111
	Ensuring academic integrity with GenAI	111
	Producing Long-Form Articles with GenAI.	112
	Techniques for GenAI-enhanced feature writing	113
	Maintaining depth and quality in GenAI-assisted articles.	115
	Writing Books with GenAI.	116
CHAPTER 8:	Customizing Content for Niche Topics	119
	Tailoring GenAI to Produce Content for Specialized Fields.	120
	Options in GenAI models aimed at specialized writing	121
	Where to find small and specialized GenAI models.	123
	Case studies: GenAI use in high-stakes domains	123
	Balancing Expertise and Creativity in GenAI-Based Writing	125
	Merging subject matter expertise with AI for niche content.	125
	Crafting expert content with a creative edge	127
	Warnings: Hazards Ahead	128
	Anticipating challenges in niche content generation.	129
	Preparing for the unpredictable in GenAI-assisted writing.	130
CHAPTER 9:	Creating Short-Form Content	133
	Getting Better Results by Combining Different Types of AI	134
	AI aggregation	134
	Output stitching.	136
	AI chaining	137

Enhancing Blogging.....	139
Leveraging GenAI to elevate blog content and engagement	139
Streamlining the blogging workflow with GenAI.....	140
Writing Short News Articles with AI	141
GenAI-assisted journalism: Quick news writing	141
Balancing speed and integrity in GenAI-generated news	143
Adding GenAI Pizzazz to Speechwriting	143
Crafting memorable speeches with GenAI support.....	144
Personalizing public speaking through GenAI.....	145
Designing and Writing Content for Websites	146
GenAI-driven website design.....	147
Optimizing website copy with GenAI insights	148
Checking the wisdom of adding GenAI chatbots to your website	148
Crafting Logos and Slogans	149
Generating creative brand elements with GenAI	149
Creating Social Media Content	152
Tailoring GenAI-generated content for social media platforms	152
Strategies for viral GenAI-enhanced social media posts	153
Repurposing social media content with GenAI	154
Pitfalls and Pitstops.....	154
Recognizing the limits and risks of GenAI in short-form content	155
Ethical considerations and quality control.	156
CHAPTER 10: Luring Images, Music, and Video Out of GenAI	157
Getting Ready to Create with GenAI	158
Writing Prompts to Create Artistic Outputs.....	160
Different prompts for different types of creators	160
The art of artsy prompting	162
Harnessing GenAI for Multimedia Content Creation	165
Innovations in AI-Generated Imagery and Soundscapes	166
Making music with AI	167
Making videos with AI	168
CHAPTER 11: Speeding, Improving, and Checking Your and GenAI's Work	171
Getting to the Point with GenAI-Powered Summarization	172
Extracting key points	172
Using GenAI for concise summaries and abstracts	174
Pushing GenAI for bullet points, pull quotes, and excerpts	176
Enhancing information retrieval with GenAI summarization tactics.	177

Using GenAI to Check Character Traits and Actions.	181
Storyboarding with GenAI	182
Adapting Writing Style and Tone for Varied Audiences Using GenAI	184
Customizing content tone with GenAI for different demographics	185
GenAI-assisted style adaptation for targeted communication	185
Checking Your Content's Market Appeal and Value.	186
Ensuring Coherence and Concision in Multi-Author Content.	187
Optimizing Keywords and Phrases (SEO) with GenAI for Better Search Rankings.	189

PART 3: EXPLORING ADVANCED GENAI MODELS AND TECHNIQUES. 191

CHAPTER 12: Leaning on Advanced Tactics to Move Your Content to Another Level.	193
Evaluating AI Models in Terms of Your Specific Needs	194
Tailoring GenAI Models for Specialized Topics	195
Customizing AI for industry-specific content.	196
Examples of specialized GenAI models available on the market.	197
Dealing with Software Integration Issues	198
Overcoming common integration challenges.	199
Programming with GenAI no-code options.	200
CHAPTER 13: Delving into Specialized GenAI Tools.	203
Discovering the Difference Enterprise-Level AI Tools Make	204
The impact of GenAI on large-scale operations	205
Checking out common features and benefits of enterprise GenAI tools	207
Finding Mini GPTs and GPT App Stores	209
Navigating the world of specialized AI marketplaces.	210
Demystifying micro GenAI applications	211
Exploring Autonomous AI Agents and Personalized AI	213
Autonomous AI agents	213
Personalized AI	214
Deploying GenAI with autonomous agents and AI twins for individualized interactions.	215

CHAPTER 14: Enhancing Creativity and Productivity with GenAI	217
Capturing Inspiration and Cashing In: A Case Study	217
Giving GenAI Multiple Personalities for Better Perspective	224
Diversifying AI outputs with varied personalities	224
Techniques for multi-perspective AI content generation	224
Enhancing Readability and Reader Engagement with GenAI	226
Using GenAI-driven strategies to captivate audiences	226
Analyzing and improving content readability	228
Mind Mapping with GenAI for Enhanced Idea Generation	230
Rethinking Your Creative Processes to Better Leverage GenAI	233
Remembering GenAI is a generator and not a creator	234
Adapting traditional creative methods for GenAI collaboration	235
Seeing GenAI as a medium rather than a generator	236

PART 4: NAVIGATING THE INTERSECTION OF ETHICS, QUALITY, AND HUMANITY 239

CHAPTER 15: Upholding Responsible AI Standards in GenAI Use	241
Achieving Originality and Excellence in GenAI-Generated Content	241
Strategies for ensuring originality in GenAI creations	242
Maintaining quality standards in GenAI outputs	244
Applying Journalism Ethics to GenAI-Generated Content	246
Following basic journalistic principles	246
Adhering to truth and integrity in GenAI-assisted reporting	248
Balancing speed with ethical considerations in GenAI content generation	249
Joining the Responsible AI Movement	249
Understanding the goals of the Responsible AI movement	250
Contributing to ethical AI development and use	251
Aligning with global efforts for responsible AI practices	252
CHAPTER 16: Unveiling the Human Element in GenAI	255
Are We Humans Becoming Obsolete?	256
Implementing Quality Control through Human Oversight	258
Establishing protocols for human-AI collaborative review	259
Ensuring GenAI accountability through human supervision	264
Training GenAI Models on Human Expertise	265

PART 5: THE PART OF TENS	267
CHAPTER 17: Ten Ways GenAI Can Boost Your Creativity	269
Unleashing Your Inner Artist: Exploring the Power of AI Play.....	269
The Muse in the Machine: Finding Inspiration with AI Content Generators.....	270
Writing Reimagined: How GenAI Can Enhance Your Storytelling.....	271
Composing Music with GenAI Assistance.....	271
Creative Collaboration: Partnering with AI for Innovative Solutions.....	272
Breaking the Block: AI Techniques to Overcome Creative Barriers.....	273
Customized Creativity: Tailoring AI to Your Artistic Style.....	273
Visualizing the Unseen: Using AI to Generate New Art Forms.....	274
The Idea Incubator: GenAI as a Brainstorming Partner.....	275
From Data to Art: Transforming Numbers into Narratives with AI.....	275
CHAPTER 18: Ten Tips for Advanced Prompting	277
Leverage Keywords.....	277
Structure Prompts Logically.....	278
Explain Through Examples.....	278
Employ Constraints.....	279
Ask for Iterations.....	279
Incorporate Logic and Reasoning.....	280
Sequence Your Prompts.....	280
Reference Past Interactions.....	281
Be Explicit About Style.....	281
Use Meta-Prompts.....	282
INDEX	283

Introduction

Welcome to *Generative AI For Dummies*, a groundbreaking book that's one of the first, to my knowledge, to be professionally produced with the assistance of Generative AI and crafted by an award-winning, best-selling author in collaboration with a premier publishing house. To be absolutely clear, I wrote this book using GenAI models to help with research and drafting only. As impressive as they are, GenAI models and applications fail at writing books to professional standards. However, they can be useful when used properly in a junior-level assistant capacity.

Many people on the editorial, technical, and AI sides at Wiley collaborated to make this book possible and to make sure it met the highest standards. It's a team of incredibly talented people who were fearless in pioneering book production with Generative AI (GenAI) to learn, advance, and help others find success in the GenAI space. Also know that I have researched, tested, and used many of the techniques and methods you find here to write this book. It's been a hard and trying trek for all of us through the unknown — not to mention dealing with the stubbornness in GenAI behaviors. But it all proved worth it in the end. I hope you think so, too!

Rather than drone on about the technical aspects, my intention is to help you move past the hype and common frustrations in working with GenAI to actually produce usable works that meet your specifications and goals. I hope you find this book an inspiration, a real-world example of what can be done with GenAI, and an exceedingly helpful guide to help you level up your skills, too.

If you feel some unease about AI in general and GenAI in particular, know that your gut reaction is common and not entirely unwarranted. This technology will most certainly change the nature of work and how your job is done. But also know that GenAI is not going to take jobs away from most people. Someone good at using GenAI will. Be that someone!

You can learn this. It's not as hard as you think!

About This Book

Although you can find lots of content on various GenAI models, applications, and the basics in prompting on YouTube and in blogs, articles, social media, and elsewhere, this book uniquely reveals and explains advanced prompting and other AI methods to generate professional-level outputs no matter which GenAI model you're using or what type of content you are working to create.

It's a comprehensive text on the nitty-gritty details you need to push past the basics, the hype, and the common frustrations to make GenAI tools work like you need them to, yet these are things almost any user can do. Be kind to yourself as you experiment along your path to success.

If you're already experimenting or working with GenAI, you'll find several ways in this book to leverage what you already know and new tips and techniques to incorporate into your efforts to get even more from it.

As with any *For Dummies* book, the goal is for you to quickly access the information you need, no matter where you jump in. With that in mind, here are a few conventions I used when writing the book:

- » "Generative AI" and "GenAI" are used interchangeably, though I primarily use the shorter GenAI throughout the book.
- » References to GPT-like models or ChatGPT-like chatbots may or may not mean that they're technically similar to these models and tools since this book covers a wide range of Generative AI options. For example, competing models may or may not have Large Language Models (LLMs) as their foundation, as ChatGPT does, but are still referred to as "similar" here because their user interface and function closely resemble those of ChatGPT. In this way, you as a user can more easily compare and understand the various GenAI tools on the market without getting dragged through the technical weeds.
- » Whenever I introduce a new GenAI-related term (and there are lots of them in this ever-changing space), I place it in *italics* upon its first mention in a chapter and follow up with a quick definition. Keywords and action steps appear in **bold**.
- » Some web addresses break across two lines of text. If you're reading this book in print and want to visit one of these web pages, simply type the address exactly as it's noted in the text, pretending the line break doesn't exist. If you're reading this as an ebook, you have it easy; just click the web address to be taken directly to the web page.

Foolish Assumptions

This book is for anyone seeking to understand, use, and improve their work with GenAI models and tools. Having said that, I did make a few assumptions about you, dear reader, as a practical matter:

You have at least a basic level of comfort and skill in working with computing devices, browsers, and web applications.

You possess a limited understanding of the full range of GenAI options and their capabilities.

You, like many users, are frustrated or stuck with GenAI outputs that fall far short of ideal in terms of meeting your goals and needs. Of the things that might make you seriously contemplate screaming out your window or would make a saint take to drinking, GenAI would be near the top of the list.

You are smart and pressed for time and, therefore, want all meat and no fluff in a fast and easy read. I hope I've hit that mark for you.

Icons Used in This Book

Occasionally you'll come across some icons in the margins of this book that draw your attention to certain bits of the text. Here are what these symbols indicate:



TIP

This icon points to tips and tricks you may want to use to make your work with ChatGPT easier, faster, more efficient, or simply more fun.



REMEMBER

This icon highlights information of particular importance in successfully understanding or using ChatGPT.



WARNING

This icon warns you of a stumbling block or danger that may not be obvious to you until it's too late. Please make careful note of warnings.

Beyond the Book

In addition to the material in the print or ebook you're reading right now, this product also comes with an access-anywhere Cheat Sheet. To access the Cheat Sheet, go to www.dummies.com and type **Generative AI For Dummies Cheat Sheet** in the search box. You'll find helpful user tips and info on GenAI in its many forms, pointers on advanced prompt writing, and guidance on how to make it deliver the output you need precisely the way you need it, all within a convenient online article you can access on the go.

Where to Go from Here

This is a reference book, so you don't have to read it cover to cover unless you want to. Feel free to read the chapters in any order and skip over any ones that don't pertain to you or your needs. Each chapter is designed to stand alone, meaning you don't have to know the material in previous chapters to understand the chapter you're reading. Start anywhere and finish when you feel you have all the information you need for whatever task is at hand.

However, if your aim is to get better results from Generative AI immediately, you should read the chapters that specifically address prompting and the type of content you are trying to create, such as Chapter 2 for an introduction to the art of prompt engineering, Chapter 9 for many advanced prompting techniques and AI tactics, and chapters 7–10 for guidance on producing specific types of content. Or if you're worried that AI will take your job or abuse your private information in some way, there's good news for most of us in chapters 15 and 16.

Feel free to experiment with each new tool or tip you learn about in this book as you go. Many find it easy to follow along this way. But however you choose to learn and experiment with GenAI, you'll likely find these tips and methods relatively easy to do. The hardest part is stretching your own imagination to allow yourself to reach further with each new project.

The key to success, however, lies in your own talent. GenAI tools are nothing without it.

1

Diving into Generative AI Fundamentals

IN THIS PART . . .

Grasping the basics in using GenAI as a creative tool

Knowing the difference between generating and creating

Navigating through a variety of GenAI models

Layering GenAI to improve your work

Busting myths about GenAI

Practical considerations for working with GenAI

IN THIS CHAPTER

- » Selecting the right GenAI model
- » Understanding GenAI capabilities
- » Creating with GenAI
- » Grasping its many uses
- » Conquering fears and piloting opportunities

Chapter 1

Mapping the Lay of the Generative AI Land

Welcome to the exciting world of Generative AI (GenAI)! This chapter is your starting point in understanding the vast landscape of GenAI and its transformative capabilities. Whether you're a curious beginner or a tech enthusiast, you'll find the information here to be an accessible guide to the basics of GenAI. You can easily build on these skills through practice, regular use of an AI application, or by returning to this book from time to time to enhance your skills further.

So, What Exactly Is Generative AI?

You can think of AI (short for *artificial intelligence*) as incredibly sophisticated software. Although it doesn't behave like any other software ever made, it is still software. Illustrations depicting AI as robots reflect the difficulty in drawing AI software in a way everyone will instantly recognize. But the robot is actually mindless hardware, and the AI is the "smart" brain-mimicking software installed to enable it to function in ways we consider to be intelligent in a non-organic sense.

Technically speaking, GenAI refers to a subset of artificial intelligence technologies that use sophisticated *natural language processing* (NLP), neural networks, and *machine learning* (ML) models to generate unique and humanlike content. It belongs to a classification of AI called *Large Language Models* (LLMs), which analyze huge amounts of data in numerous languages including human languages, computer code, math equations, and images.

LLMs typically have a substantial number of parameters, which are numerical values used to assign weight and define connections between nodes and layers in the neural network architecture. Parameters can be adjusted to change the weights of various values, which in turn, changes what the model prioritizes in the prompt and data and how it interprets various data points, words, and connections.

Imagine you have a recipe for making a cake, and the recipe is your GenAI model. The ingredients — like flour, sugar, eggs, and butter — are like the data points, words, and connections in the model. Now, the amount of each ingredient you use (how many cups of flour, how much sugar, and so on) are like the weights of various values in the GenAI model or GenAI application.

Just as you might adjust the ingredients in your cake to make it sweeter or fluffier by adding more sugar or an extra egg, you can adjust the parameters in a GenAI model to change what it focuses on and how it interprets the information it's given. If you want your GenAI to pay more attention to certain words or data points, you increase their *weight* just like adding more chocolate chips to your cake if you want it to be extra chocolatey. This way, the GenAI model, like your cake, turns out the way you want it to, based on what you prioritize in the recipe.

LLMs use parameters to predict the next word in a sequence — meaning they predict the word most likely to follow the words in your prompt, and then the word that most likely follows its first predicted word, and so on until the model believes it has finished the most probable pattern. It generates images in much the same way by predicting the image that follows your description in the prompt. The models can complete the process incredibly quickly. For example, LLMs like GPT-3 and GPT-4o developed by OpenAI are capable of processing billions of words per second. It is the speed of its response, the appearance of nuanced understanding, and its fluid use of natural language that gives GenAI interactions a humanlike feel.



REMEMBER

However, GenAI and LLMs are not human and do not think — again, they predict. It's a very complicated prediction process, to be sure. Nonetheless, it is a prediction. And if anything happens to tilt its predictive capabilities, nonsense ensues. You can see one example of that in Figure 1-1, which is an OpenAI incident report about an adjustment they made to the model resulting in ChatGPT responding to users in incomprehensible gibberish.

Unexpected responses from ChatGPT

Incident Report for OpenAI

Postmortem	<p>On February 20, 2024, an optimization to the user experience introduced a bug with how the model processes language.</p> <p>LLMs generate responses by randomly sampling words based in part on probabilities. Their "language" consists of numbers that map to tokens.</p> <p>In this case, the bug was in the step where the model chooses these numbers. Akin to being lost in translation, the model chose slightly wrong numbers, which produced word sequences that made no sense. More technically, inference kernels produced incorrect results when used in certain GPU configurations.</p> <p>Upon identifying the cause of this incident, we rolled out a fix and confirmed that the incident was resolved.</p> <p>Posted 4 days ago. Feb 21, 2024 - 17:03 PST</p>
Resolved	<p>ChatGPT is operating normally.</p> <p>Posted 4 days ago. Feb 20, 2024 - 23:14 PST</p>
Monitoring	<p>We're continuing to monitor the situation.</p> <p>Posted 5 days ago. Feb 20, 2024 - 16:59 PST</p>
Identified	<p>The issue has been identified and is being remediated now.</p> <p>Posted 5 days ago. Feb 20, 2024 - 15:47 PST</p>
Investigating	<p>We are investigating reports of unexpected responses from ChatGPT.</p> <p>Posted 5 days ago. Feb 20, 2024 - 15:40 PST</p>

FIGURE 1-1: A routine effort to optimize ChatGPT resulted in its producing gibberish in response to users' prompts.

Source: OpenAI incident report

GenAI VERSUS VIRTUAL ASSISTANTS

AI models and applications are the software driving the robot or the autonomous car or whatever form it's given in the corporeal world. But strictly speaking, AI has a digital form. Because of that, it can be squeezed into almost anything, and many a vendor does exactly that. You'll find various types of AI are embedded or otherwise at use in all sorts of products and services. However, not all AI is the same.

Here are the main differences between GenAI apps like ChatGPT and virtual assistants like Siri, Alexa, and Google Assistant.

(continued)

(continued)

Virtual assistants:

This class of AI runs on a proprietary mix of technologies in a blend developed by their respective corporate owners. Certain components, such as machine learning, deep learning, natural language processing, smart search or search engines, and speech synthesis make the assistants appear and sound much like ChatGPT.

However, their responses are more limited than GenAI models. People typically use these to retrieve answers to common questions or perform uncomplicated tasks like “where is the nearest pharmacy?” or “play a song by Taylor Swift” rather than to generate original answers.

GenAI models (specifically ChatGPT in this comparison):

This class of AI runs on a single AI model, meaning on one version or another of Generative Pre-trained Transformers (GPT) AI models. GenAI is a broad category of AI that includes models capable of varying capabilities such as generating text, images, or computer code or some combination of these.

People typically use GenAI web apps, but some mobile apps and a few wearable devices are available as well. But in all cases, the apps run on a single GenAI model.

Unveiling the BIG Secret to Working Successfully with GenAI

If you remember nothing else I’ve written in this book, you must remember what I tell you in this section. For here is the big secret — the master key — that you need to make GenAI models work at the level you need them to perform. If you don’t grasp this, GenAI will likely appear to you to be nothing more than a fascinating toy or a tool that falls far too short of your expectations.



TIP

In a nutshell, GenAI generates outputs that appear to be original thoughts or images from a computer, rather than results produced by very advanced, contextual predictive software. GenAI retrieves words or images pulled from a database and repurposes them into a new response. The big secret is that the humanlike feel in the “conversation” is an illusion. You are not having a conversation with a machine. It doesn’t understand a word you wrote in your prompt.



REMEMBER

Current GenAI models don't think or create things *per se*, but instead *generate* new things from parts of old things found in its database. (The term “things” in this context being images, videos, numbers, or text, depending on the GenAI application you are using.) A GenAI output is the model's best prediction of what you are seeking. In an oversimplified explanation of a complex technology, GenAI seeks to complete a pattern that you began with your *prompt*, which is your question or command as entered into the prompt bar on the GenAI's user interface (UI). In other words, GenAI predicts what letters, words, or images are likely to follow those that are in your prompt. Its predictions are based upon comparison to patterns that exist within its training dataset and/or datasets to which it was subsequently given access.

Think of GenAI outputs as the result of repurposing or remixing information that the model has access to in datasets, including the following:

- » Data it is exposed to in its training database along with any additional data provided in subsequent fine-tuning.
- » Data added in system messages or prompts.
- » Data added via methods such as *retrieval-augmented generation* (RAG), which is a tactic to enhance accuracy, relevancy, and reliability by adding external sources to the GenAI's database.

RAG combines the strengths of both *information retrieval AI*, which is a set of algorithms that retrieve contextually relevant information from huge datasets, and GenAI, which uses neural networks and machine learning models to generate new content. It might help to think of RAG as GenAI that is augmented by more traditional information retrieval AI, or retrieval AI for short.



WARNING

Since GenAI generates outputs that are the result of its remixing or repurposing of information, it has no concept of true or false, fact or fiction. GenAI can accurately define these terms, but it does *not* understand their meaning. It doesn't understand anything you wrote in the prompt or that it wrote in its response. It only appears to understand terms and concepts. This is an illusion. This is why you must always factcheck its work.



REMEMBER

GenAI responses are limited to the confines of the data it has access to. Put another way, if its training data were a mound of Legos and there were no end caps in that mound, GenAI would build its outputs without end caps. It would not know that end caps exist at all. In the same way, it does not know fact from fiction unless those labels are applied to specific data points in its dataset. But, if a falsehood is labeled as fact, GenAI will unquestionably accept it as fact. It still doesn't understand the difference.

To illustrate this analogy, I wrote a caption first and then used it as a prompt in Azure OpenAI Studio DALL-E playground (Preview). The result is the stunning concept illustration you see here in Figure 1-2.



FIGURE 1-2:
If data were Legos, GenAI could only build things with the Lego pieces it has access to, and it is completely unaware that any other types of Lego pieces exist.

Art generated by Azure AI Studio DALL-E playground.

GenAI can repurpose and remix only the data it has access to, which is a major reason why GenAI outputs can be highly reliable or totally false or something in-between. The data itself can be insufficient — in one way or another — to provide the foundation or elements for the model to generate an accurate answer. Outdated data from an aging training dataset and data limited to too few perspectives or examples are common issues, but there are many others.

When — not if — outputs are wrong, people call them *hallucinations*. It's unclear why no one calls them lies, falsehoods, or simply errors, but in any case, you cannot assume that GenAI outputs are solid enough to bet your life or business on without doing some serious factchecking first.



REMEMBER

While GenAI does consider context when it analyzes the words in your prompt, it does not understand you or what you said in the prompt. This is why you must not confuse GenAI with General AI, also known as Artificial General Intelligence (AGI). AGI does not yet exist outside of science fiction movies, books, and TV shows. Yet

some people are so in awe of GenAI capabilities that they are sure this must be it — the thing from the movies that’s going to take over the world! This is not that.

Understanding the Infamous Finger Problem and Other GenAI Quirks

Perhaps the most wondrous thing about using GenAI is the delicate dance between human and machine that begets something neither would have made alone. But once you move past the first exhilarating moments of viewing GenAI marvels, you’ll begin to see a few cracks here and there.

For example, it is common for GenAI models to draw people with six or more fingers on one hand. This is typically because the patterns it sees in its data is of multiple fingers on one human hand. No clear pattern emerges of there being just five fingers on one hand, so GenAI can’t predict how many fingers it needs to generate.

Essentially GenAI is parroting the answer from its database. It doesn’t understand the question or the answer; therefore, it does not know to draw only five fingers. Instead, it looks for patterns in hands depicted by images or text in the datasets to which it has access. But the pattern of the total number of fingers is unclear. Images in most databases that GenAI models use typically show hands in different positions wherein only some fingers are visible or fingers from two hands or more are intertwined. GenAI cannot therefore see a consistent pattern of the total number of fingers per hand. However, if you were to ask the model how many fingers are on a hand, it will almost always tell you that there are five. Even though it gives you the right answer as to the number of fingers, it does not understand its own reply and, therefore, still doesn’t *know* the answer.

Data pattern inconsistency and the resulting probability prediction error is why you can end up with too many or too few fingers in any image GenAI generates. This is often the reason for other issues in images and videos that GenAI creates such as errors in shadowing or movement.



REMEMBER

Although GenAI is impressive, its reasoning is limited. In fact, it’s extremely difficult for GenAI to reason at all. To overcome this shortfall and make it more powerful, add one or more humans to the mix and you’ll soon see real magic in the result. It is the collaboration between you and this extremely sophisticated software that will take you to the goals you seek.

Figuring Out How to Work with GenAI — It's All About Your Prompts

Here's the thing: Natural human language is a computer language now. In the case of GenAI, this means that the machine still works like a machine and the human like a human, but they can now interact through a computer language that everyday, non-programmer types of people can understand and use.

However, you, the human, still must think like a machine to get the most out of GenAI. Ask any computer programmer how important it is to think like a machine while programming — and this is true regardless of their choice of programming language, be that JavaScript, Java, HTML/CSS, SQL, Python, English, or French.

And why is changing how you think important? Because you are not having a conversation with GenAI. You are giving instructions (and, yes, even when your prompt is a question, it is an instruction) on what you want the model to produce, much like any programmer does. You must think beyond the language to the depths of the result you seek. The value of a programmer is not their computer language knowledge, although that is important too, but the problem-solving ability that they can then convert into language that renders the precise solution the programmer wants to produce. This is how you need to think and work with GenAI models, too.

Your prompts need to be more concise and detailed than the typical conversations you have with another human. For one thing, you cannot make assumptions that a listener will automatically fill in common details because GenAI often doesn't know those details. Despite appearances, GenAI does not think and doesn't truly understand your prompt; many of the natural assumptions you make in speaking to another human will not work in the same way in interactions with these models.



TIP

The GenAI winning formula: Machine speaks like a human. Human thinks like a machine. The better you get at telling GenAI what you want, the better it'll get at giving you what you need. It's all about practice.

Why GenAI appears so human

From crafting sentences to conjuring up images, composing music, or creating synthetic data, GenAI is a master in making something instantly that can often readily pass as human made.

The interesting thing is that its outputs *are* human made in some sense. GenAI can be thought of as a creative tool like an artist's paints, crayons, and pencils. Those

items produce images first imagined in the artist’s mind and executed by the artist’s hand and skill. Similarly, GenAI delivers outputs according to the user’s vision and skilled prompting.

Further, much of the data that GenAI models learn from is generated by humans. But it learns far more from this information than you might imagine. It also learns the habits, attitudes, biases, and other human attributes behind the text, audio, and image data that it consumes.

For example, GenAI models have been known to be “lazy” in the summertime around peak vacation periods — meaning GenAI models may produce less content in response to a prompt than usual. GenAI may even tell a user to get the information for themselves. Sometimes a GenAI model also responds slower than normal, announces a delay, or makes excuses.

Such actions aren’t due to a bug or a flaw in the system. The AI is merely mimicking human behavior. Models learn human behavioral patterns along with data patterns from their training dataset. They make no distinctions in the values of the information versus the behavior and so are likely to distribute both, or either, in their outputs.

GenAI can also deliberately lie and act angry or sad or cheerful for the same reason. It may even appear to ignore you from time to time. On the flipside, GenAI models tend to perform better when given a virtual reward or a compliment. Again, all of this is just mimicry of the human behaviors it has learned. It’s important to remain aware of such idiosyncrasies when using GenAI. Strategically playing into these GenAI quirks can level up the responses you pull from it.

Depending on the model you’re using, inputs and outputs can be in text, images, and/or audio forms. Unlike traditional AI, which analyzes, makes decisions, and delivers outputs drawn from data, Generative AI can repurpose information to create seemingly original outputs in a conversational or artistic manner. But it can also plagiarize and pillage the works of other humans. You must always check its outputs for grievous and potentially liable or dangerous behaviors.



WARNING

A key point to remember is that if you use GenAI you are legally liable for what it does. It is not a “separate legal entity . . . responsible for its own actions” as Air Canada once argued trying to defend itself in a court case after ChatGPT gave one of its customers incorrect information. You’ll find more information in the discussion on responsibilities in Chapter 3. (And if you’re curious about the Air Canada story, you can access it here: www.bbc.com/travel/article/20240222-air-canada-chatbot-misinformation-what-travellers-should-know)

Realizing the human influences behind Generative AI's abilities

It's important to distinguish between generating and creating. GenAI “creates” text or images by generating a response from repurposed information based on its prediction of the “best” match to your prompt. GenAI does not create in the truest sense, which dictionary.com defines as “to cause to come into being, as something unique that would not naturally evolve or that is not made by ordinary processes.”

GenAI works mostly by making predictions, which technically is an ordinary process in that predictions are a common thing that people and analytics do. However, GenAI's prediction processes are quite extraordinary in that they exist at a level never before achieved. By machine standards this achievement is extraordinary because it generates a new response as opposed to a regurgitated response or picking one of a limited number of “canned” responses. By human standards, GenAI's performance is extraordinary because it can analyze huge amounts of data and respond in a conversational manner or with a newly generated image in seconds or minutes.



TIP

One way to remember the difference is to think “To generate is AI, to create is human or human and AI.”

But make no mistake, GenAI is not as humanlike as it appears. Another distinction is in motivation. Humans are motivated to create; some even feel driven by their passions. By contrast, GenAI is not motivated to generate anything. Ever. It doesn't get hungry, thirsty, lonely, inspired, emotional, cold, hot, uncomfortable, dedicated to a cause, politically activated, or otherwise stimulated so there's no reason for it to do anything at all.

You must provide the vision, the passion, and the impetus in a prompt. Then it will try to generate whatever that is for you. Otherwise, it will sit idle for centuries — or however long its supporting hardware and electrical power exists. That's why no one need worry whether GenAI will take over the world.

However, everyone should worry about the humans using GenAI to take over the world. As a tool, GenAI is neither good nor bad. But its users can be either or both. It is the blend of human and AI capabilities that makes GenAI models perform so uniquely and wonderfully. And sometimes comically or poorly.

Discovering the Differences in GenAI Models and Options

GenAI interacts through natural language and generates new content by repurposing data into new outputs. They are most commonly used in areas that require fresh ideas and original output, such as customer service, graphic design, digital media, entertainment, software development, and writing.

However, they can also be used in specialized tasks for a variety of industries such as healthcare, pharmaceuticals, life sciences, manufacturing, and the financial sector.

This section offers a breakdown of specific GenAI models and their corresponding outputs.

Image outputs:

- » **DALL-E 2:** This AI model can convert textual descriptions into detailed images or artistic creations, demonstrating the power of language-based image synthesis.
- » **StyleGAN 3:** This model is known for generating high-resolution, photorealistic images of subjects such as human faces, animals, and vehicles, offering customization options. It's also used to animate images.
- » **Stable Diffusion:** This GenAI model specializes in generating lifelike images, videos, and animations derived from textual descriptions and visual prompts.
- » **Imagen:** Trained to understand and interpret image-text pairings, this GenAI system excels in crafting images from textual cues and performing neural style transfers.
- » **Adobe Firefly:** A GenAI tool designed for converting written descriptions into visual content, Adobe Firefly aids in the creation of artistic and creative imagery.
- » **Midjourney:** This GenAI tool is adept at converting textual prompts into distinctive and captivating artwork very quickly.

Text outputs:

- » **ChatGPT:** Developed by OpenAI, this advanced chatbot can generate text that is coherent and indistinguishable from human conversation across various topics.
- » **OpenAI Codex:** This model specializes in generating and completing code based on natural language prompts, forming the backbone of tools like GitHub Copilot.

- » **HuggingChat:** This is an open-source AI chatbot created by Hugging Face, providing a ChatGPT-like experience using the Open Assistant Conversational AI Model for dialogue-based engagements.

Audio outputs:

- » **Jukebox:** Another creation by OpenAI, Jukebox composes music across different genres, illustrating GenAI's capacity to craft musical pieces.
- » **PaLM 2:** A Google-developed transformer model that excels in generating multilingual content and performing coding tasks.
- » **AudioCraft:** This suite includes MusicGen, AudioGen, and EnCodec, three distinct models that work in tandem to produce authentic audio and music based on textual descriptions, providing an avenue for crafting rich and captivating auditory content.
- » **Project Music GenAI Control:** A nascent tool from Adobe Research, this generative AI specializes in music creation and refinement, enabling artists to spawn musical pieces from text inputs and adjust the resulting audio.

Video outputs:

- » **Stable Diffusion:** This model employs diffusion techniques to generate photorealistic images, videos, and animations from textual and visual prompts.
- » **Neural Radiance Fields (NeRFs):** This novel neural network approach can be used for creating 3D visuals from 2D image data.
- » **Synthesia:** An AI video generator tool that transforms textual input into video content, featuring AI-driven avatars and voiceovers for simplified video production.

Multimodal inputs and/or outputs (generates more than just text):

- » **Copilot AI:** Made by Microsoft, this model aims to boost workplace efficiency by offering chat-based interfaces for information retrieval, composing emails and summaries, crafting images from textual descriptions, and programming in multiple coding languages.
- » **ChatGPT 4o (omni):** This model allows multimodal inputs and generates multimodal outputs. Additionally, the availability of specialized GPTs in the GPT Store can be used to add capabilities. For example, Image Generator can be used within ChatGPT to create images to illustrate its textual output.