CHAPTER 1
INTRODUCTION TO ARTIFICIAL INTELLIGENCE

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1.1 INTRODUCTION

The history of artificial intelligence (AI) began in 1950 when Alan Turing proposed the Turing Test to assess machine intelligence (Turing, 1950). Six years later, during the first AI conference, John McCarthy introduced the term "artificial intelligence" while presenting the Logic Theorist as the inaugural AI software (McCarthy et al., 1956). In 1967, Frank Rosenblatt developed the Mark 1 Perceptron, the first neural network computer, followed by the influential book *Perceptrons* by Marvin Minsky and Seymour Papert in 1968. The 1980s witnessed the rise of neural networks with the introduction of backpropagation. In 1995, Russell and Norvig's *Artificial Intelligence: A Modern Appro*ach became a pivotal AI textbook. Then, Lieserson (1997) defeated international business machines (IBM's) Deep Blue, defeating chess champion Garry Kasparov in 1997, IBM Watson won "Jeopardy!" in 2011, and DeepMind's AlphaGo defeated Go champion Lee Sedol in 2016. In 2023, the debut of large language models like chat generative pre-trained transformer (ChatGPT) signified a significant advancement, enhancing AI's potential through deep-learning models pre-trained on vast datasets.

These tasks encompass learning, reasoning, problem-solving, perception, understanding natural language, and interacting with the environment. AI seeks to replicate cognitive functions linked to human intelligence, like learning from experience, adjusting to new situations, and making decisions based on accessible data. AI pertains to developing computer systems that perform tasks traditionally requiring human intelligence. These tasks include learning, problem-solving, reasoning, perception, understanding natural language, and interacting with the environment. AI aims to emulate cognitive functions associated with human intelligence, such as learning from experience, adapting to new situations, and making data-driven decisions.

AI refers to advancing computer systems capable of performing tasks traditionally relying on human intelligence. These tasks encompass learning, problem-solving, reasoning, perception, understanding natural language, and interaction with the surrounding environment. AI aims to replicate cognitive functions linked to human intelligence, including learning from experiences, adjusting to new situations, and making data-based decisions. The capabilities of AI in analytics include data processing and analysis, predictive analytics, natural language processing, machine learning, image and video analysis, anomaly detection, personalised recommendations, and optimisation and automation. These capabilities enhance analytics processes, enabling organisations to gain valuable insights and drive innovation.

The rise of digitisation, big data, and AI is reshaping all aspects of life, driving innovation to meet market demands and consumer needs. Data-driven innovation, facilitated by digital tools, is now a primary source of value creation. With technological advancements, innovation is progressing rapidly, highlighting the importance of effective information management for embracing new concepts. The third industrial revolution replaced human labour with automation and electronic information technology. The Fourth Industrial Revolution integrates industrial automation and advanced production techniques to enhance working conditions and redefine value-creation processes. This revolution enables dynamic interactions between humans and machines

through various interfaces, fostering communication and engagement. The advent of AI has further transformed human-machine interaction, fundamentally altering the nature of work on production lines.

This book focuses mostly on AI practices in segmentation, identification, and interaction. Combining edge and cloud services to increase latency, data privacy, and performance is known as edge-cloud continuum computing. Support vector machine (SVM)-based flower pollination algorithm (FPA) outperforms particle swarm optimisation (PSO) with an accuracy of 91.48%. Agriculture needs to identify plant diseases. Segmentation methods like U-Net, segment anything model (SAM) and convolutional neural networks (CNNs) in computer vision and deep learning improve illness detection and picture segmentation. Tomato leaf segmentation accuracy increases with the use of SAM and HSV colour space transformations. 96.88% accuracy in garbage classification is a promising result for the ResNet-50 deep learning model in waste management; nonetheless, further study is required for scalability. The interactivity recognition graph neural network (IRGNN) refines human-object interaction detection, which improves scene interpretation, while the honey-badger algorithm (HBA) refines handwritten character recognition.

The book is broken up into six chapters, the first of which is an introduction to artificial intelligence. The remaining five chapters follow. Upon reading the books, readers will gain an understanding of AI's concepts and benefits. AI enhances accuracy and efficiency in segmentation, identification, and interaction. Deep learning models such as CNNs enable precise segmentation and faster data processing. In addition, AI improves object detection accuracy, real-time analysis, and task-specific customisation. Moreover, it automates tasks with chatbots and virtual assistants and adapts dynamically to inputs, resulting in more accurate, efficient, and adaptable systems.

AI has the potential to transform various fields and revolutionise industries such as healthcare, transportation, finance, education, marketing, and entertainment. Listed are the vast importance implications of AI: