Chapter 10
Securing the Imagination:
Security and Privacy Challenges in Generative AI Systems

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ABSTRACT

Generative Artificial Intelligence (AI) has rapidly become a mainstream technology capable of autonomously producing realistic and diverse media content, including text, images, video, music, and code. As models like GPT, DALL·E, and Stable Diffusion transform industries such as entertainment, marketing, education, and software development, they also introduce a complex landscape of security and privacy risks. This chapter, per the authors, explores critical vulnerabilities such as prompt injection, adversarial attacks, data poisoning, and model inversion, which can lead to unethical outputs and exposure of sensitive training data. It further examines threats arising from large-scale data scraping, copyright violations, and lack of user consent, while also addressing ethical issues tied to misinformation, deepfakes, and surveillance. The chapter reviews technical safeguards including differential privacy, federated learning, watermarking, adversarial training, and secure deployment methods like sandboxing and real-time monitoring.

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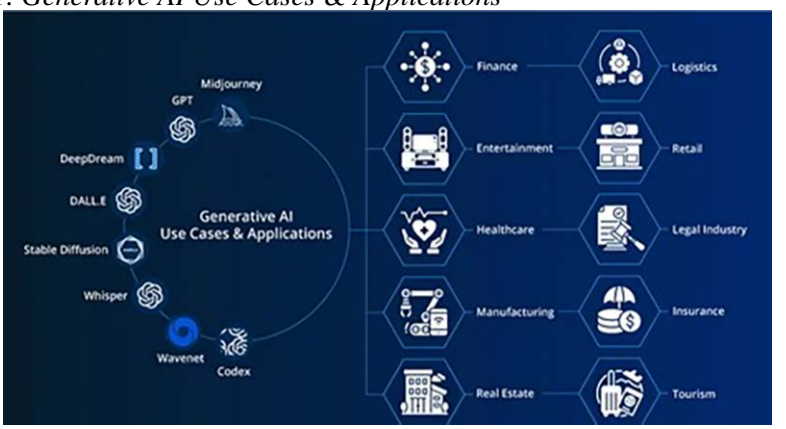
1. INTRODUCTION

1.1 The Rise of Generative AI and Its Societal Impact

Generative Artificial Intelligence (AI) once was a new area of research; it is now an all-embracing and revolutionary technology, which has redesigned the process of content creation, consumption, and personalization. Generative AI systems have found their way to many applications such as text-based interactions with language models, synthetic images, deepfake media, AI-assisted music and code creation, and more, which penetrate society on a massive scale. Such models can create the equivalent results with human creativity and already open new horizons in the world of journalism and art, healthcare, and software engineering.

This authority is however, not free. Generative AI systems are also prone to potential uses that are not intended and potentially harmful exactly because of the nature that makes them compelling and makes them frightening: to autonomously generate new and realistic content. Cases of misinformation, user impersonation, and accelerated bias as AI occurs have already been recorded on various platforms. With the prominence of these systems, the necessity of securing that they are used in terms that do not infringe on the privacy of the users is becoming an issue of prime concern (Abadi et al., 2016).

Figure 1. Generative AI Use Cases & Applications



1.2 Why Security and Privacy Matter in Creative AI

In contrast to the traditional AI systems where a classification or prediction problem is addressed, generative AI works in the highly open-ended domain, therefore,