

# Applications

In **Part III**, we will explore some of the key applications of the generative modeling techniques that we have seen so far, across images, text, music, and games. We will also see how these domains can be traversed using state-of-the-art multimodal models.

In **Chapter 9** we shall turn our attention to Transformers, a start-of-the-art architecture that powers most modern-day text generation models. In particular, we shall explore the inner workings of GPT and build our own version using Keras, and we'll see how it forms the foundation of tools such as ChatGPT.

In **Chapter 10** we will look at some of the most important GAN architectures that have influenced image generation, including ProGAN, StyleGAN, StyleGAN2, SAGAN, BigGAN, VQ-GAN, and ViT VQ-GAN. We shall explore the key contributions of each and look to understand how the technique has evolved over time.

**Chapter 11** looks at music generation, which presents additional challenges such as modeling musical pitch and rhythm. We'll see that many of the techniques that work for text generation (such as Transformers) can also be applied in this domain, but we'll also explore a deep learning architecture known as MuseGAN that applies a GAN-based approach to generating music.

**Chapter 12** shows how generative models can be used within other machine learning domains, such as reinforcement learning. We will focus on the “World Models” paper, which shows how a generative model can be used as the environment in which the agent trains, allowing it to train within a hallucinated dream version of the environment rather than the real thing.

In **Chapter 13** we will explore state-of-the-art multimodal models that cross over domains such as images and text. This includes text-to-image models such as DALL.E 2, Imagen, and Stable Diffusion, as well as visual language models such as Flamingo.

Finally, **Chapter 14** summarizes the generative AI journey so far, the current generative AI landscape, and where we may be heading in the future. We will explore how generative AI may change the way we live and work, as well as considering whether it has the potential to unlock deeper forms of artificial intelligence in the years to come.