Chapter 8
AI-Powered Sound Design, Synthesis, and Music Composition: Emerging Tools and Creative Innovation

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ABSTRACT

The chapter focuses on the changes in the role of artificial intelligence in sound design, synthesis and music creation by tracing the development of technology starting with the earliest forms of algorithmic systems and ending with more modern deep learning. It describes the growth of creative opportunities enabled by neural networks, generative methods, and advanced synthesis tools, alongside helping in mixing, mastering, and audio restoration. The chapter also emphasizes that AI can help to create new timbres, textures, and compositional forms to allow professional and novice creators to experiment with the larger soundscapes. Moral issues such as

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authorship, copyright, and training data, and artistic authenticity are also critically evaluated to explain the role of developers and creators. The chapter concentrates on the idea that AI can be a collaborative partner and a tool that improves creativity, democratizes production, and affects the way people interact with machines in the sonic arts in the future with the help of practical tools and case studies.

1. INTRODUCTION: THE ALGORITHMIC MUSE - THE EVOLUTION OF AI IN SOUND DESIGN AND MUSIC COMPOSITION:

The integration of artificial intelligence (AI) and the creative arts have witnessed the beginning of a new age where conventional music and sound boundaries are being redefined. There is no better place where this transformation has been witnessed as in the area of sound design, synthesis and music composition. A distinction between human creative power and machine-run process is growing less distinct as AI is turning into a collaborative partner, in some instances, a force of creativity in itself. (Audio Engineering Society, n.d.) The chapter of this book gets into the depth of this paradigm change, the historical landmarks and technological innovations, and the tricky ethical and creative issues that come to mind as a result of the implementation of AI into the sonic arts.

It is not the first time the idea of writing music with the help of algorithms has been suggested. The AI music seeds were planted as far back as the mid-20 th century. Earlier compositions such as the Illiac Suite developed by Lejaren Hiller and Leonard Isaacson in 1957 were among the earliest compositions that were produced by a computer. These initial experiments were mainly rule-based whereby the programmer wrote musical theories and structures to be followed by the computer. Though they were revolutionary, they were constrained by the strictness of their directions. Subsequent decades involved further development such as Experiments in Musical Intelligence (EMI) in the 1980s by David Cope which studied and modeled the styles of classical composers and produced new pieces which were often indistinguishable to those composed by humans.

The real revolution was however initiated with the development of machine learning and deep neural networks in the 21 st century. Unlike its predecessors, this new generation of AI can learn out of the huge datasets of already existing music, discern complex patterns and create completely new work. (Briot et al., 2020) demonstrated by systems such as Google Magenta and OpenAI's MuseNet, which produced a variety of music, ranging from classical piano to multi-instrumental compositions across different genres. These models are not merely a reversion of already existing elements, they are learning the innermost grammar and geometry