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2022

Using Neural Networks to Model Guitar Distortion

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Recommended Citation

Koch, Caleb; Hawley, Scott; and Fyfe, Andrew, "Using Neural Networks to Model Guitar Distortion" (2022). *Science University Research Symposium (SURS)*. 49.

<https://repository.belmont.edu/surs/49>

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Guitar players have been modifying their guitar tone with audio effects ever since the mid 20th century. Traditionally, these effects have been achieved by passing a guitar signal through a series of electronic circuits which modify the signal to produce the desired audio effect. With advances in computer technology, audio “plugins” have been created to produce audio effects digitally through programming algorithms. More recently, machine learning researchers have been exploring the use of neural networks to produce audio effects that yield strikingly similar results to their analog counterparts. Recurrent Neural Networks and Temporal Convolutional Networks have proven to be exceptional at modeling audio effects such as overdrive, distortion, and compression. The goal of this research is to analyze the inner workings of these neural networks and how they can replicate audio effects to such a high caliber. Some of these networks will also be used to model a distortion effect and compare the results they yield with the original audio device modeled.