

# Mapping of NSynth

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## 1 Description of tool

NSynth was produced as a new and original approach to music synthesis with the aim to improve the creative process. With its deep neural network algorithm model, NSynth can "generate sounds at the level of individual samples" unlike other traditional synthesizers, and by learning directly from the data it can support the creators to have control over timber and dynamics. This approach gives the users the ability to explore and create new sounds that would not be possible with a hand-tuned synthesizer [1]. NSynth is classified as open-source software.

## 2 AI Algorithm

Nysnth uses a WaveNet-style autoencoder [1, 2, 3], which is a deep learning model.

## 3 Data-set

NSynths data-set consists of high-quality audio of approximately 300 thousand annotated musical notes sampled from a thousands of instruments [1].

## 4 Environment

The idea behind all the tools (or models) provided by Magenta is that they supply completed API:s and code libraries of their pre-trained models, which

users then can deploy however they see fit. These libraries come in two options, either they can be accessed by importing Python libraries, which users then can program and create new content. The other option is that users may do the same in a browser, with Javascript libraries. All magenta tools are powered by Tensorflow, an end-to-end platform for ML which among other things supports model construction, training, and export. Also, the Magenta team has developed a NSynth physical hardware interface, called the NSynth super interface [4]. The physical synthesizer may be used in combination with any MIDI source, sequencer or keyboard. However, it was only a prototype and will not be released for commercial use.

## References

- [1] NSynth. Nsynth: Neural audio synthesis, 04 2017. URL: <https://magenta.tensorflow.org/nsynth>.
- [2] Jesse Engel, Cinjon Resnick, Adam Roberts, Sander Dieleman, Douglas Eck, Karen Simonyan, and Mohammad Norouzi. Neural audio synthesis of musical notes with wavenet autoencoders, 2017. URL: <https://arxiv.org/abs/1704.01279>, doi:10.48550/ARXIV.1704.01279.
- [3] Aäron van den Oord, Sander Dieleman, Heiga Zen, Karen Simonyan, Oriol Vinyals, Alex Graves, Nal Kalchbrenner, Andrew W. Senior, and Koray Kavukcuoglu. Wavenet: A generative model for raw audio. *CoRR*, abs/1609.03499, 2016. URL: <http://arxiv.org/abs/1609.03499>, arXiv:1609.03499.
- [4] Paul Ridden. Google project creates hardware interface for algorithm sound generator, 03 2018. URL: <https://newatlas.com/google-magenta-nsynth-super/53822/>.