

Deep Dreaming Sounds

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2017

The Idea

- Train a convolutional neural network on sound data
- Apply Google's Deep Dream algorithm to different layers
- Find out how a neural network represents sound internally

What's Deep Dream again?

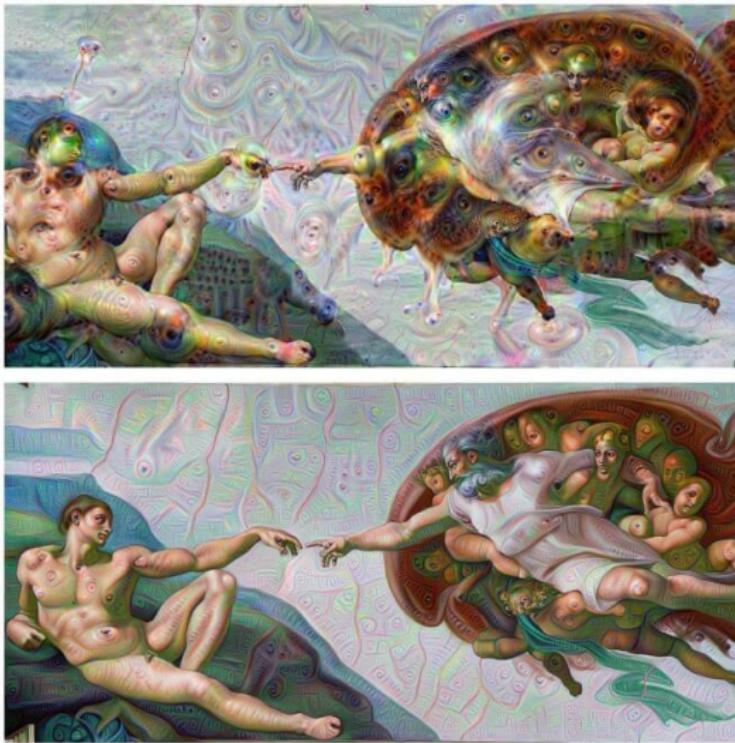
- way of visualizing the internal concepts of layers of artificial neural networks
- instead of updating the weights of an untrained network, update the values of the input image presented to a trained network via standard backpropagation
- input values are modified in order to maximize the activation of a specific layer

What's Deep Dream again?



[3]

What's Deep Dream again?



[4]

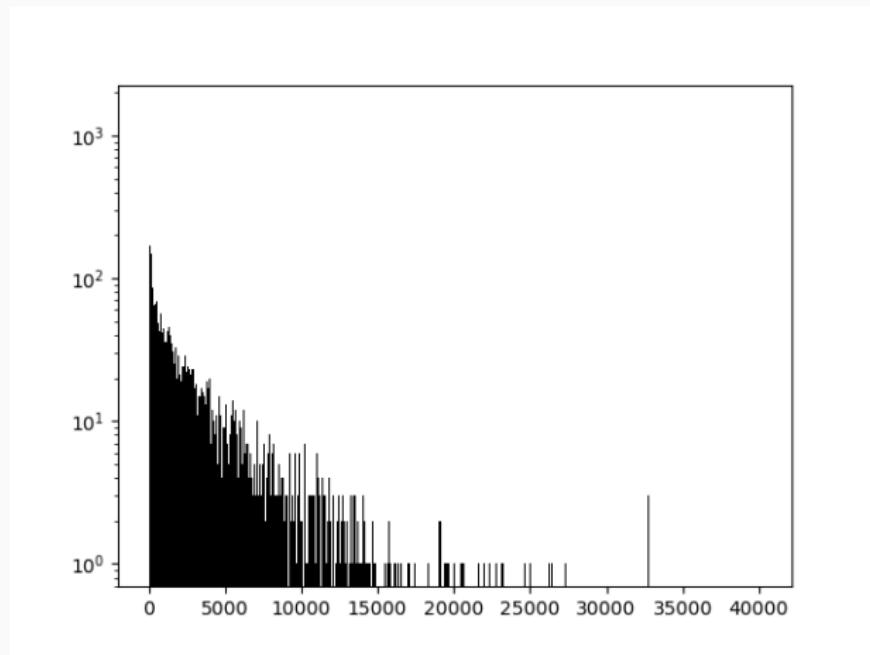
The Dataset

Urbansound8k dataset [6]

- built by NYU researchers
- sampled from freesound.org
- consists of 8,000 WAVE-files from
- 10 different categories, e.g. car horns or playing children

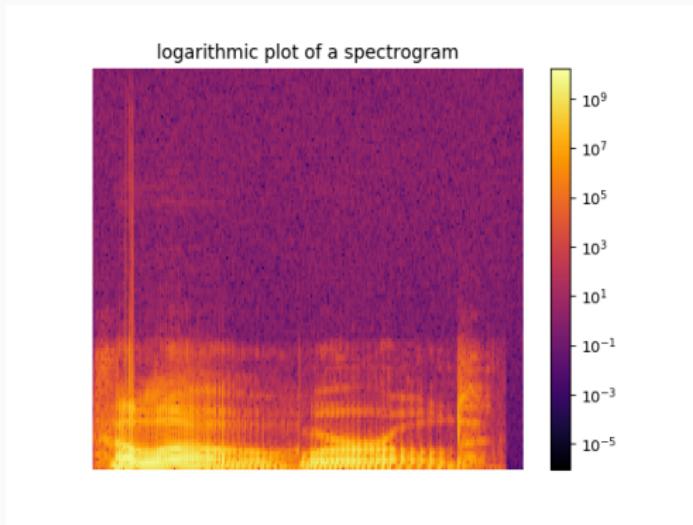
Data Formatting

A WAVE (.wav) file contains a timeseries of discrete airpressure measurements.



Data Formatting

- apply fourier transform to the data to transfer it from time space to **frequency space**
- visualize frequency space using **spectograms**



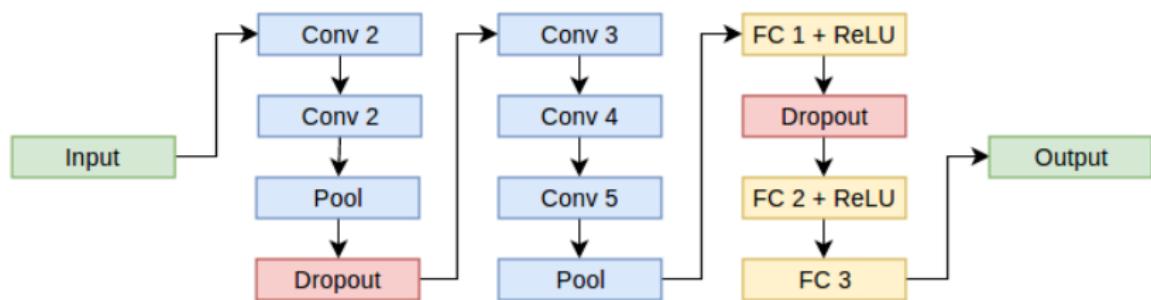
Data Formatting

Furthermore

- only include every tenth timestep
- set all values below a certain value to zero
- normalize values

The Network

Architecture of the CNN



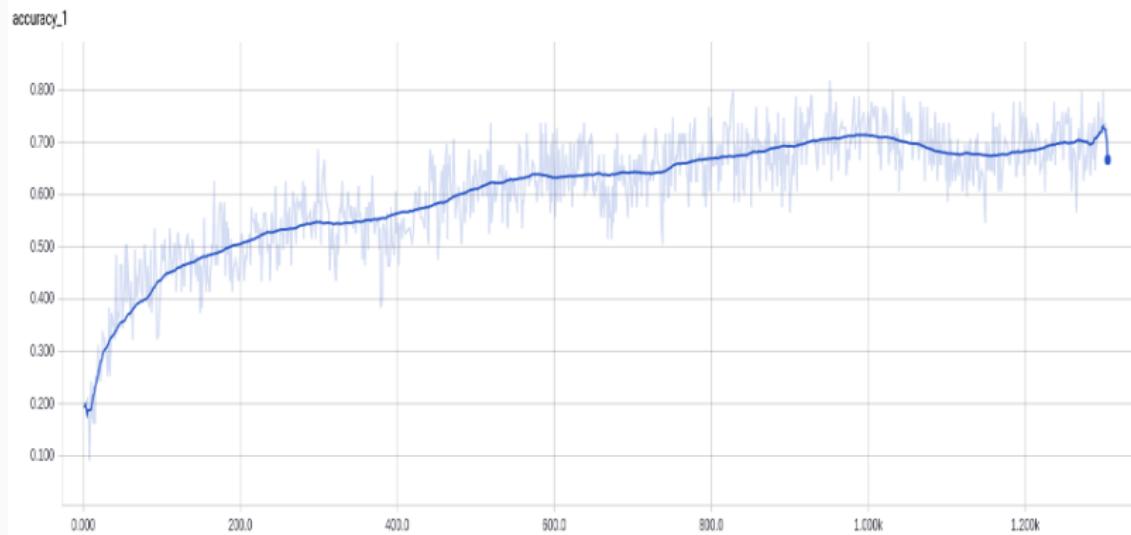
The Network

Hyperparameters of most recent run

- Dropout Keep Probability = 0.7
- Batch Size = 100
- Activation Function = Leaky ReLU
- Weights Stddev = 0.8
- Learning Rate = 0.03

The Network

Accuracy of most recent run



References

- File <http://www.pngmart.com/files/3/Sound-Wave-PNG-Photo.png>
- File <https://deepdreamgenerator.com/assets/landing/img/gallery/4.jpg>
- File http://storage.googleapis.com/deepdream/pilatus_flowers.jpg
- File https://www.ibrahimevsan.de/wp-content/uploads/sites/259/KyleMcDonald_Michelangelo_DeepDream_Art-e1437725048729.jpg
- File <http://www.cbcity.de/wp-content/uploads/2013/08/connectionFrequencyTime-1200x811.png>
- File [@inproceedings{Salamon:UrbanSound:ACMMM:14, Address = Orlando, FL, USA, Author = Salomon, J. and Jacoby, C. and Bello, J. P, Booktitle = 22st ACM International Conference on Multimedia}](https://serv.cusp.nyu.edu/projects/urbansounddataset/urbansound8k.html)

(ACM-MM'14), Month = Nov., Title = A Dataset and Taxonomy for Urban Sound Research, Year = 2014