

BEYOND VISUALIZATION

KIRELL BENZI, PH.D.

Generative art

Art created by an autonomous process defined by the artist

Often algorithmic, it can draw inspiration from nature

Can also be data-driven

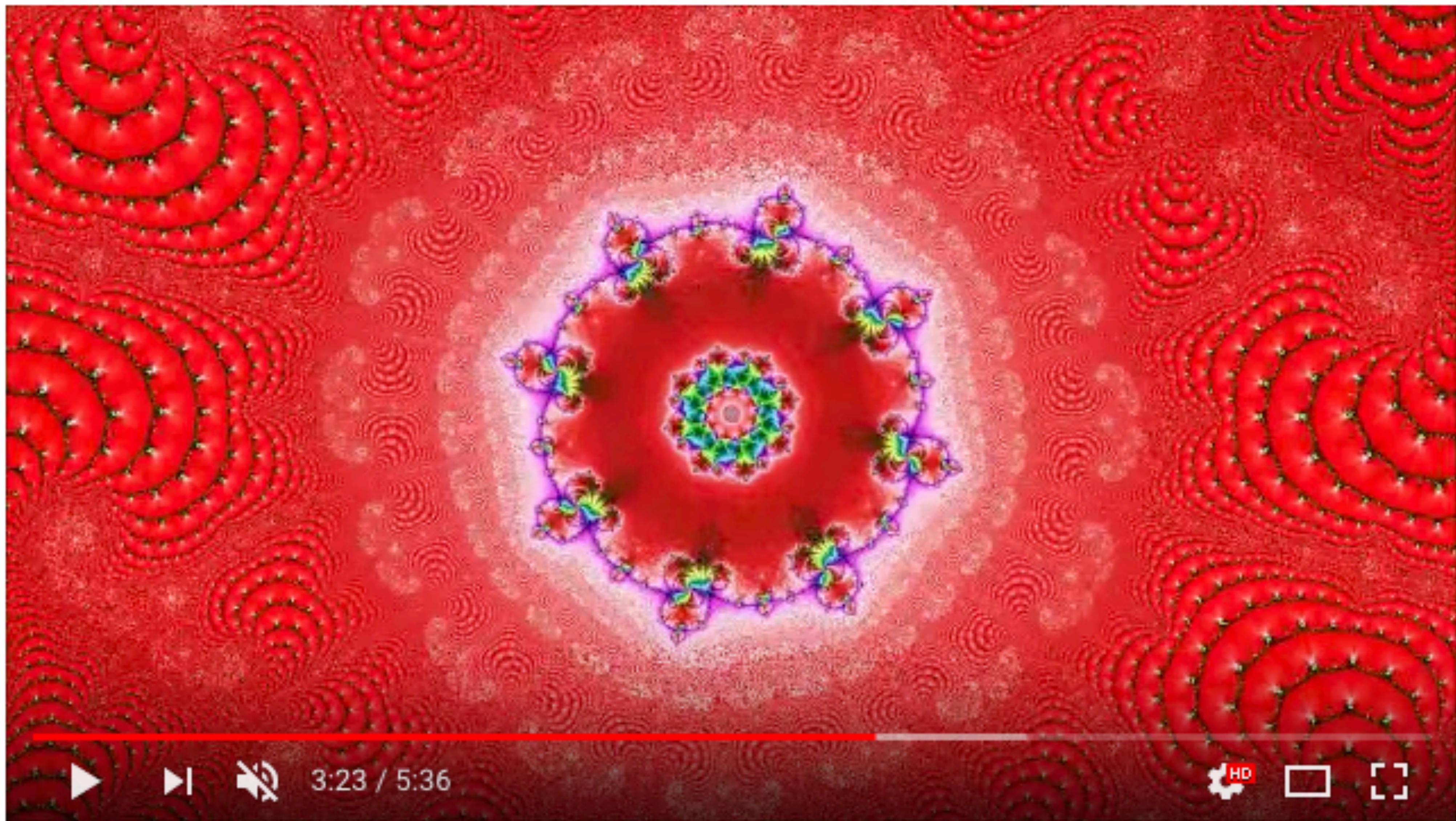




[Rowan Mersh]



[Rowan Mersh]



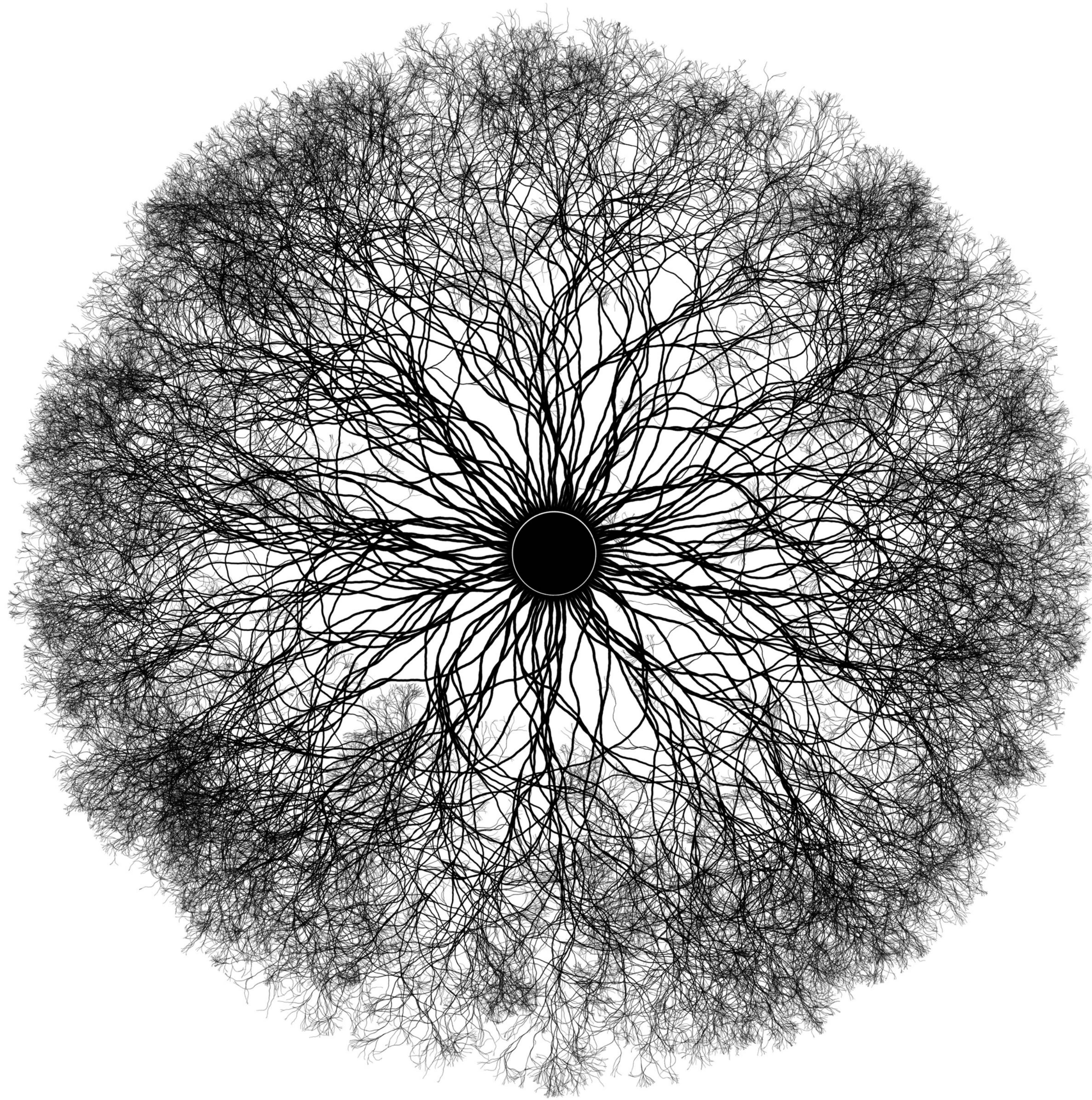
The Hardest Mandelbrot Zoom in 2017 - New record, 750 000 000 iterations!

Creative coding

Use code to generate art

Used in audio-visual shows,
like VJing, art installations

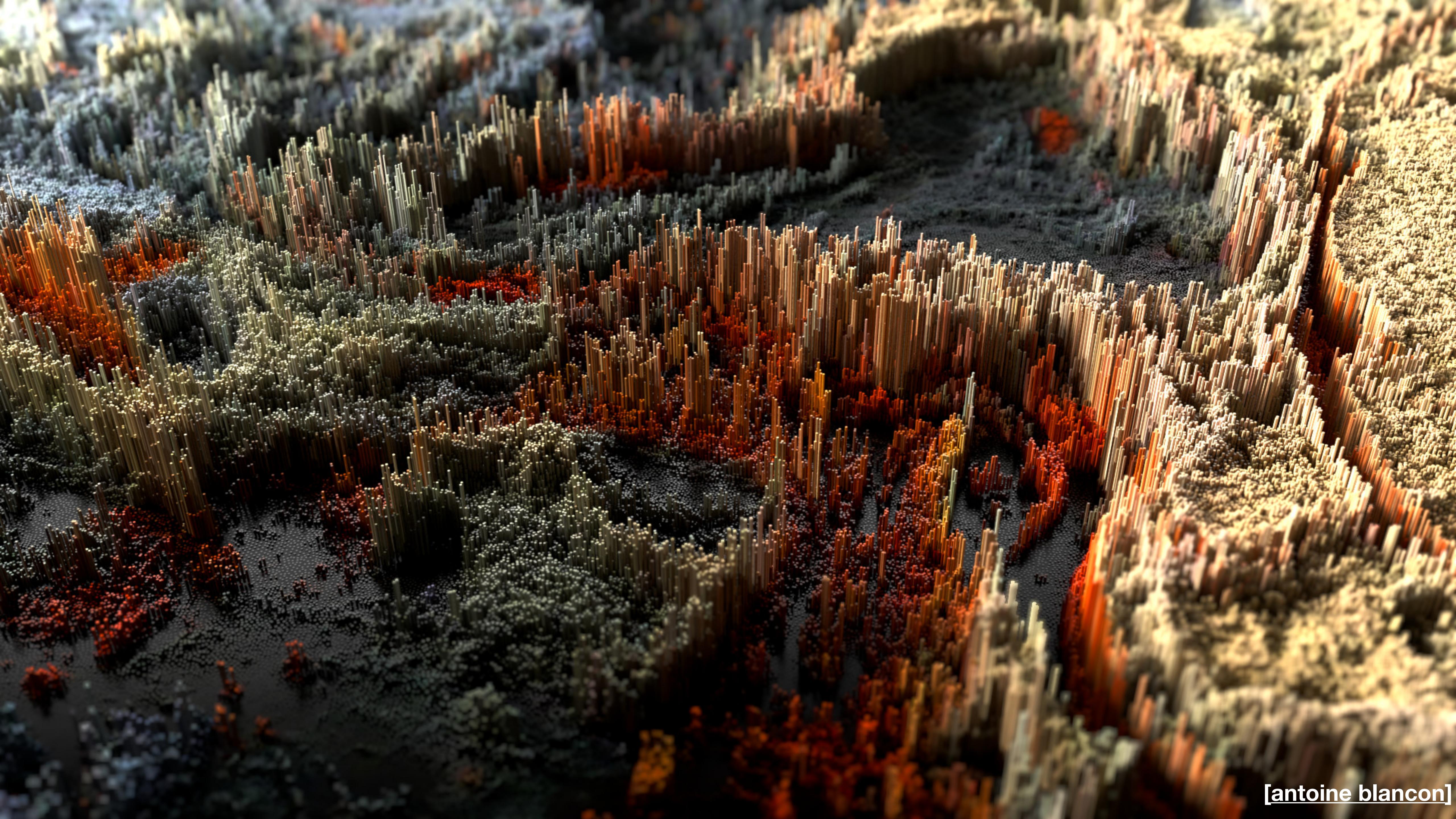




[artfromcode]



[Rectangle World]



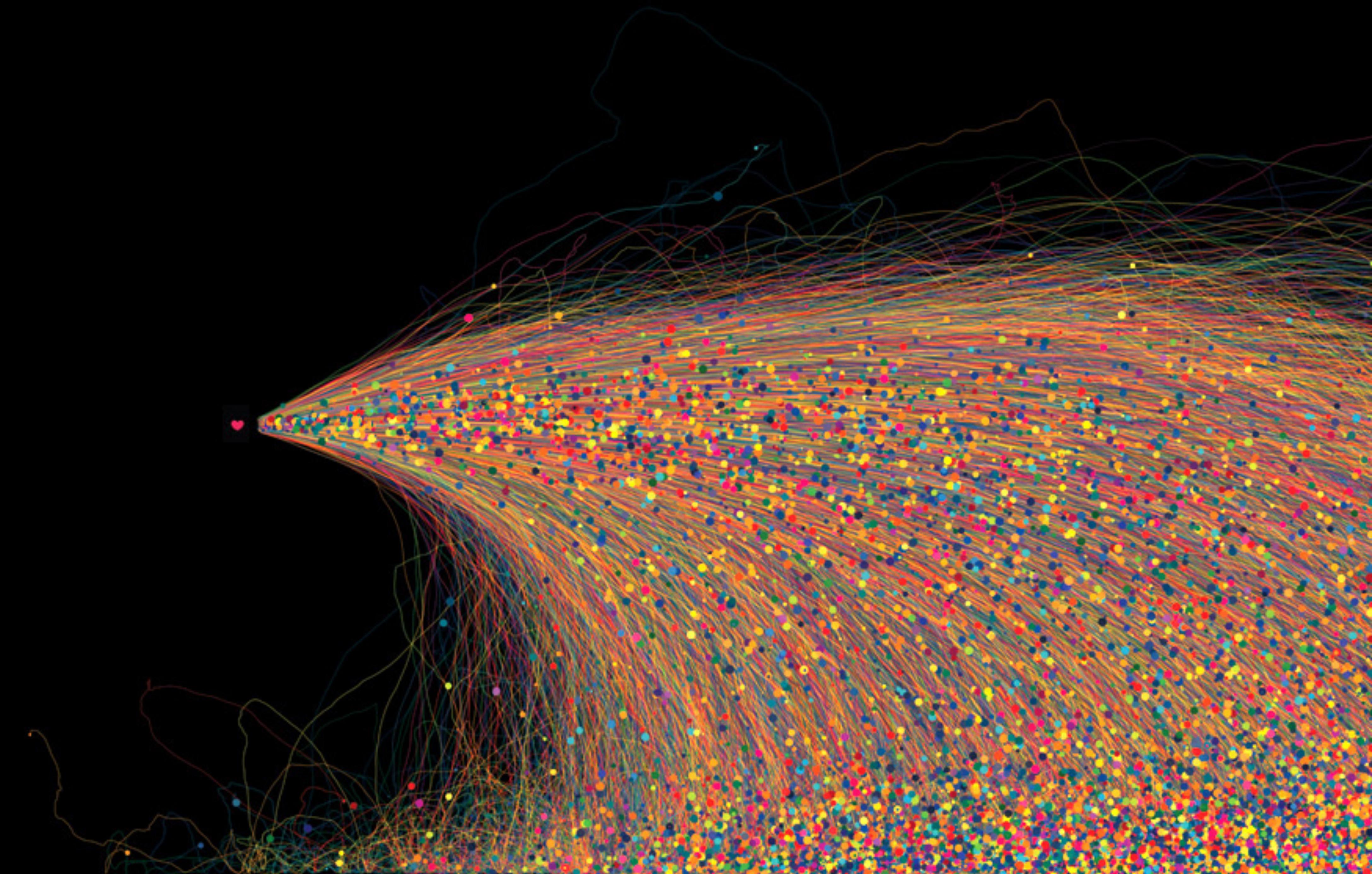
[antoine blancon]

Data art

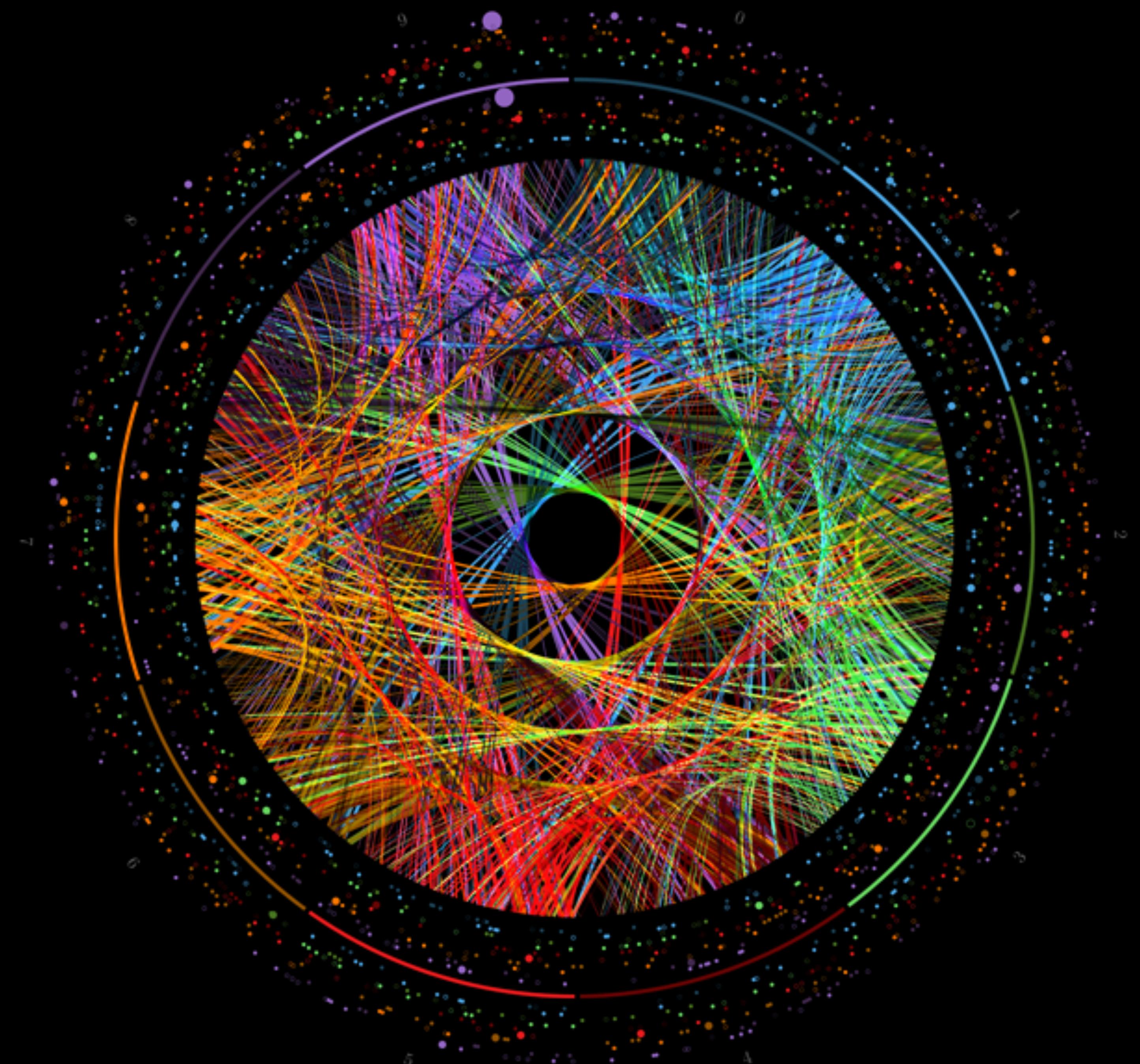
Creation of artistic artworks and aesthetic shapes from complex datasets

Allows to transform data into: [images, videos, sounds, animations](#)

Based on algorithms, it has a scientific, factual component wrapped in a creative, artistic vision



[Harris & Kamvar]



[Ilies Vasile and Kryzinski]



Kindl Benn

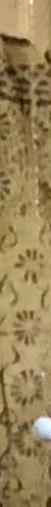
Euphorie scientifique
Scientific Euphoria

Le 4 juillet 2012, les physiciens de CERN ont dévoilé la première preuve de la présence d'un nouveau boson de Higgs. Ce résultat a été obtenu grâce à l'analyse des milliers de millions d'événements détectés par les deux grands détecteurs du LHC : le CMS et l'ATLAS. Les deux équipes ont travaillé ensemble pour atteindre ce résultat. Le succès de cette recherche est une source d'inspiration pour tous les scientifiques et tous les citoyens.

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ATLAS
CERN



AI art (neural style)

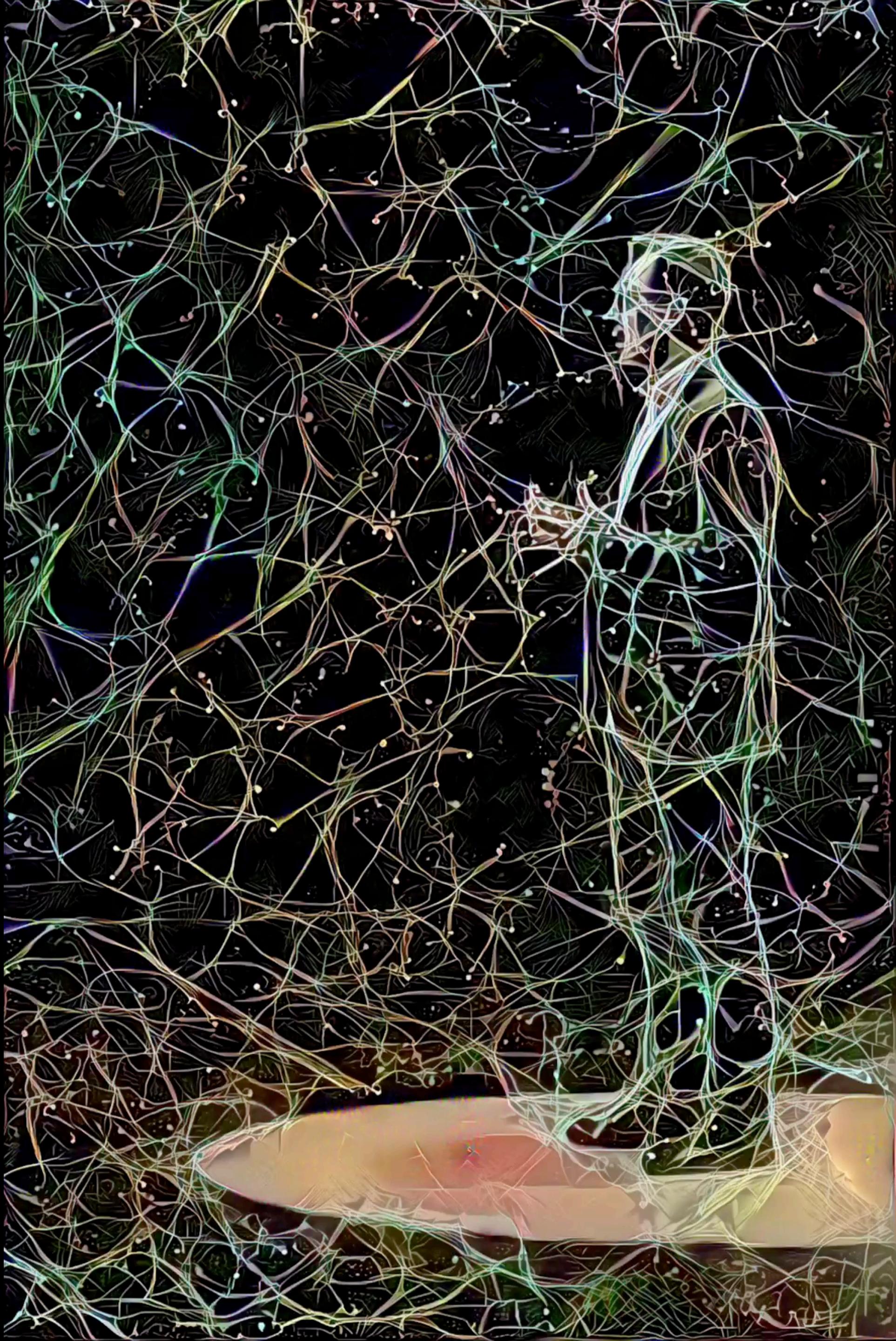
Created by the machine (generally deep neural networks) from an input dataset

Started to be popular with Google deep dream

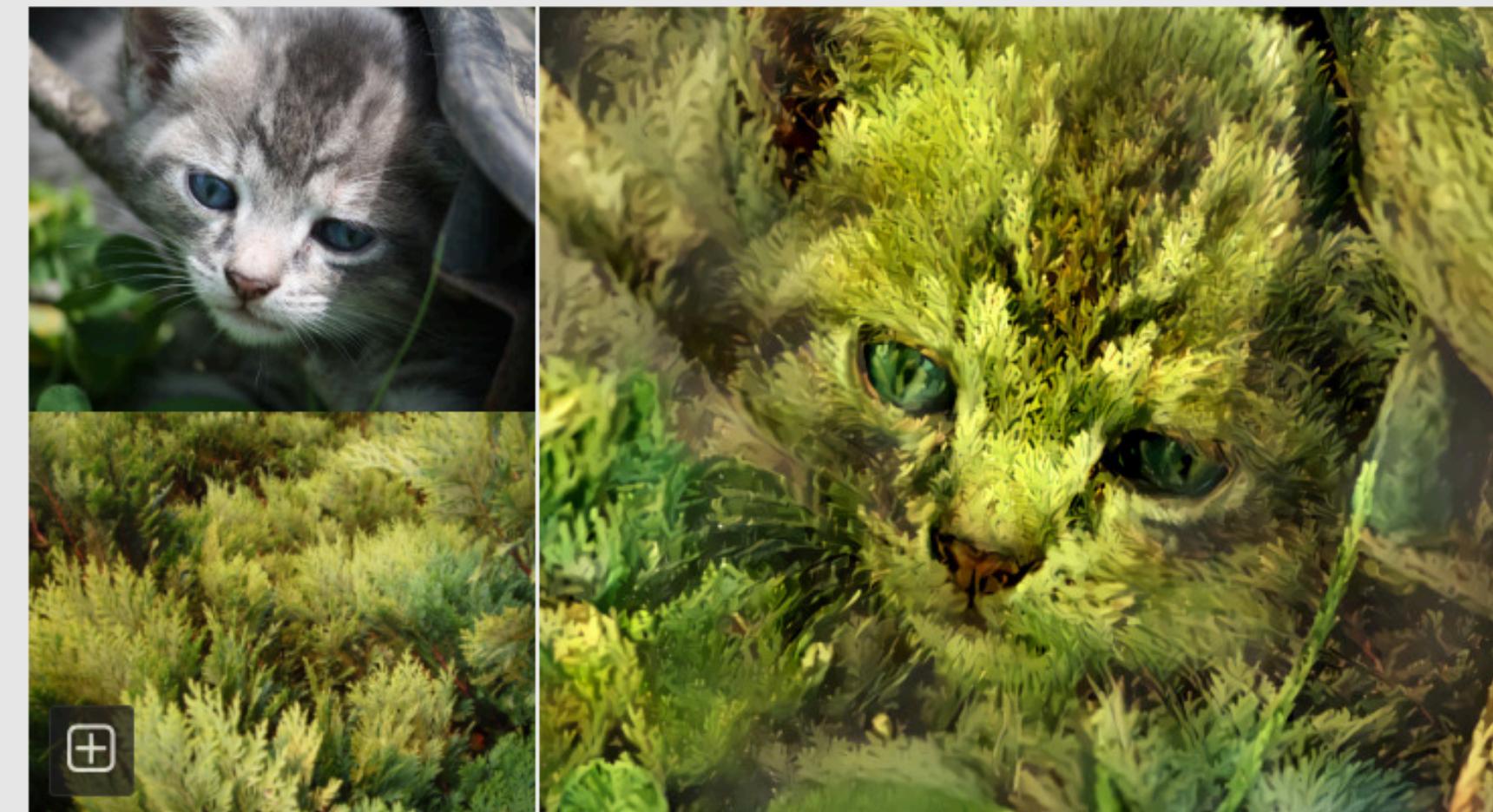


[Google DeepDream]

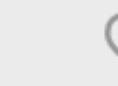




[Kirell Benzi]

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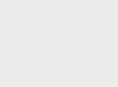
5 days ago



104

**Sh4d0wStrike**

5 days ago



89



Magenta

Magenta is Google's open source deep learning music project. They aim to use machine learning to generate compelling music. The project went open source in June 2016 and currently implements a regular RNN and two LSTM's.

GitHub: <https://github.com/tensorflow/magenta>

Great, because: It can handle any monophonic midi file. The documentation is good, so it's relatively easy to set-up. The team is actively improving the models and adding functionality. For every model Magenta has provided a training bundle that is trained on thousands of midi files. You can start generating new midi files right away using these pre-trained models.

Challenges: At this point, Magenta can only generate a single stream of notes. Efforts have been made to combine the generated melodies with drums and guitars – but based on human input, as of yet. Once a model that can process polyphonic music has been trained, it could start to create harmonies (or at least multiple streams of notes). This would indeed be a mighty step on their quest for the generation of some compelling music.

Sounds like: The piece below is generated by Magenta from the 8th note onward. Here they use their attention model with the provided pre-trained bundle.



DeepJazz

The result of a thirty-six-hour hackathon by Ji-Sung Kim. It uses a two layer LSTM that learns from a midi file as its input source. DeepJazz has received quite some news coverage in the first six months of its existence.

GitHub: <https://github.com/jisungk/deepjazz>

Great, because: Can create some jazz by being trained on a single midi file. The project itself is also compelling proof that creating a working computational music prototype using deep learning techniques can be a matter of hours thanks to libraries like Keras, Theano & Tensorflow.

Challenges: While it can handle chords, it converts the jazz midi to a single pitch and single instrument. It would take a few more post-processing steps for the deep learning created

Tools and libraries

Processing

Processing is a flexible software sketchbook and library for learning how to code within the context of the visual arts.

Java-based

Started in 2001, it is very popular in the community

Interactive programs with 2D, 3D or PDF output

OpenGL integration for accelerated 2D and 3D

Multiplatform



Cover

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Welcome to Processing 3! Dan explains the new features and changes; the links Dan mentions are on the [Vimeo page](#).

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Please join us as a member of the Processing Foundation. [We need your help!](#)

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[Particle Flow](#)
by NEOANALOG



[Objectifier](#)
hv Biørn Karmann

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Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts. Since 2001, Processing has promoted software literacy within the visual arts and visual literacy within technology. There are tens of thousands of students, artists, designers, researchers, and hobbyists who use

p5.js

JS evolution of Processing in
the browser

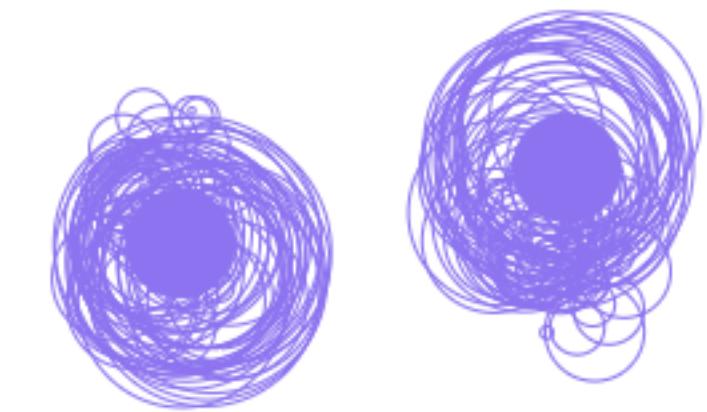
Nice, cleaner API

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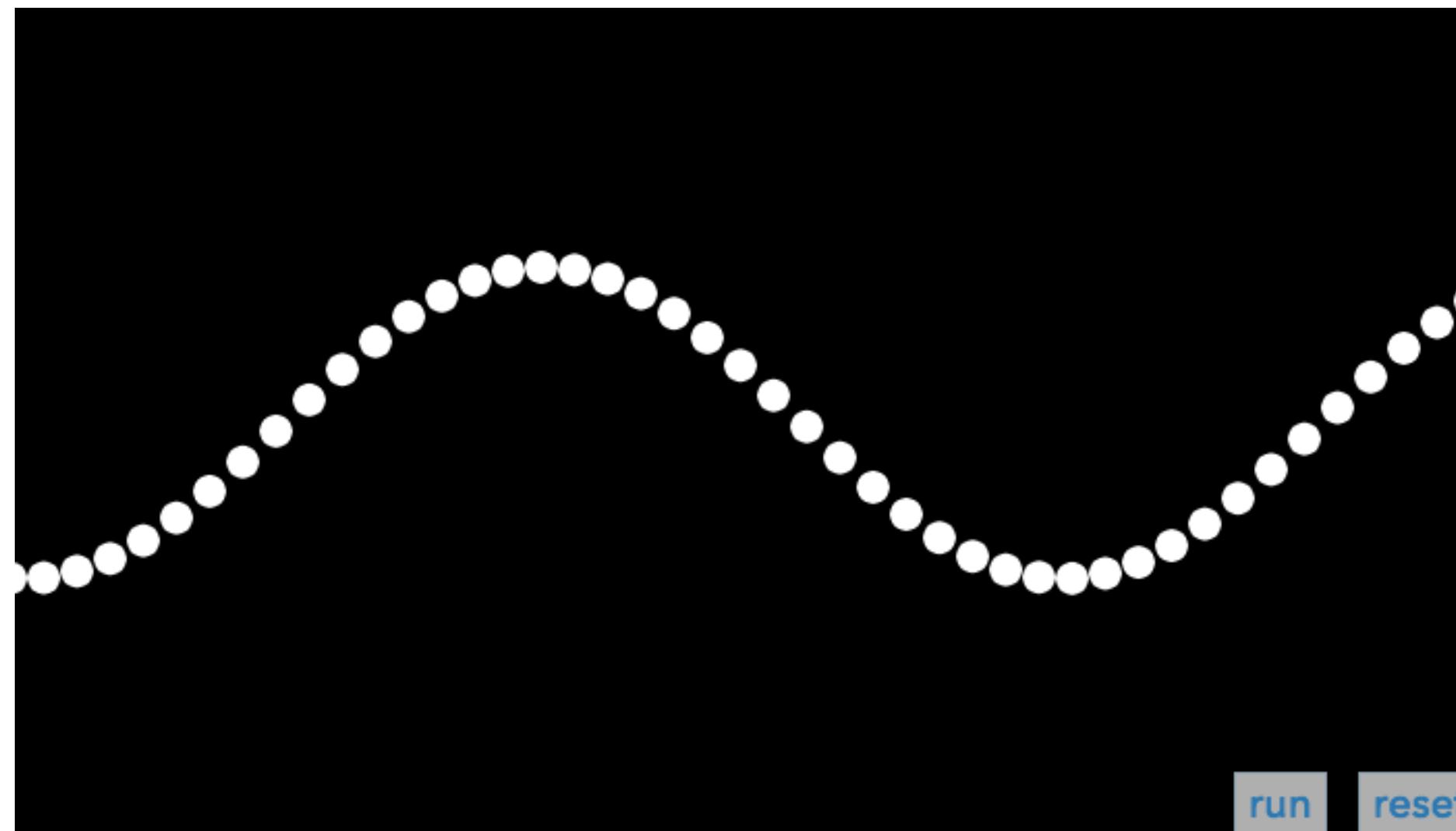
[Hello!](#) p5.js is a JavaScript library that starts with the original goal of [Processing](#), to make coding accessible for artists, designers, educators, and beginners, and reinterprets this for today's web.

Using the original metaphor of a software sketchbook, p5.js has a full set of drawing functionality. However, you're not limited to your drawing canvas, you can think of your whole browser page as your sketch! For this, p5.js has addon [libraries](#) that make it [easy to interact](#) with other HTML5 objects, including text, input, video, webcam, and sound.

p5.js is a new interpretation, not an emulation or port, and it is in active development. An official editing environment is coming soon, as well as many more features!



Example



Color
Constants
Conversion
DOM

Data
Environment
Events
IO

Image
Lights, Camera
Math
Rendering

Shape
Structure
Transform
Typography

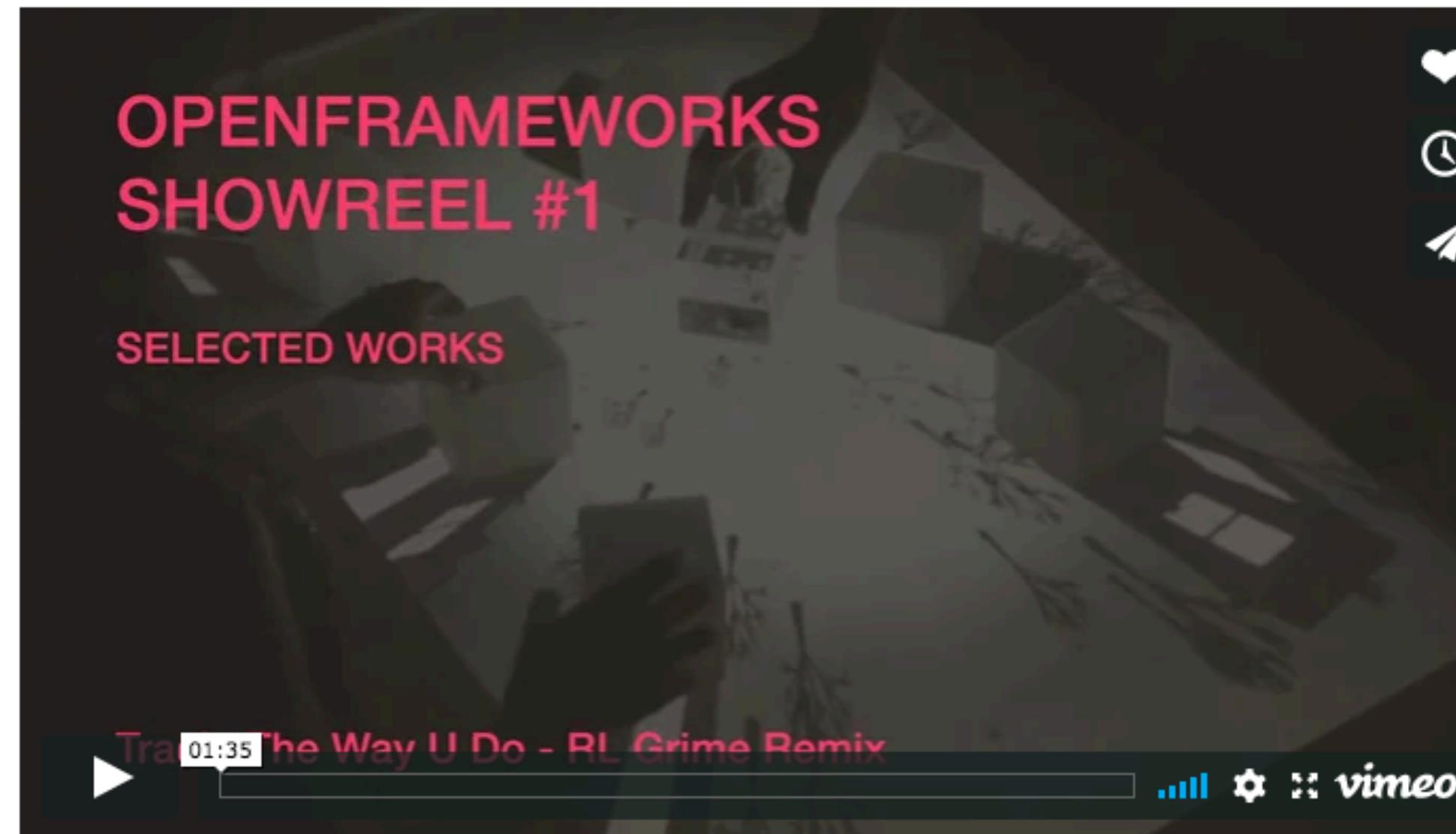
openFrameworks



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openFrameworks is an open source C++ toolkit for creative coding.

download

Grab the most recent release (0.9.8) and follow the setup guide to get openFrameworks running.

documentation

Reference for openFrameworks classes, functions and addons. You can also check the tutorials section.

forum

The forum is a place to meet other people working with openFrameworks. It's a place to share your work, or find help solving problems.



OF Showreel

Recommended

Autoplay next video

Cinder



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Cinder is a C++ library for programming with aesthetic intent - the sort of development often called *creative coding*. This includes domains like graphics, audio, video, and computational geometry. Cinder is cross-platform, with official support for macOS, Windows, Linux, iOS, and Windows UWP.

Cinder is production-proven, powerful enough to be the primary tool for professionals, but still suitable for learning and experimentation.

Cinder is released under the [2-Clause BSD License](#).

Professional C++ library for creative coding

More robust but less beginner-friendly



STANDALONE APPLICATIONS

Platform-native windowing and event handling

SCREENSAVERS

Native macOS and Windows screensavers

INTERNET I/O

Load media via HTTP and FTP natively

PLATFORM-SPECIFIC APIs

Convenient access to power management, display and network adapter iteration

XML & JSON PARSERS

Built-in object oriented XML & JSON parsing API

FULL I/O ABSTRACTION

Seamless I/O from flat files, memory, resources and networks

C++ CORE

Designed around idiomatic C++11 features such as `shared_ptr`

UI EVENTS

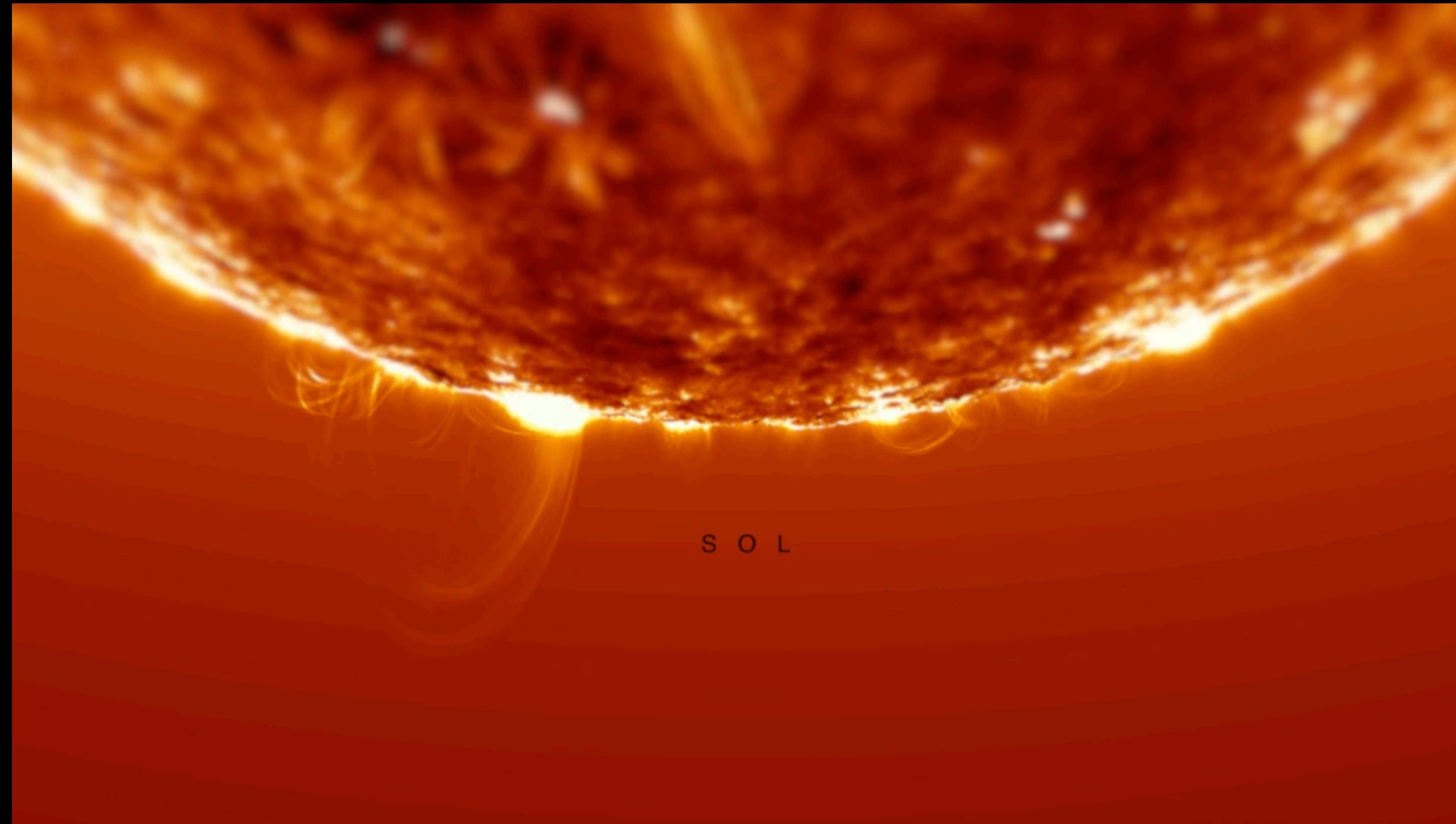
Full keyboard, mouse (including scroll wheel), window, and file drag and drop

MULTITOUCH

Consistent multitouch APIs for Windows 7+, iOS and macOS

COMMUNICATION APIs

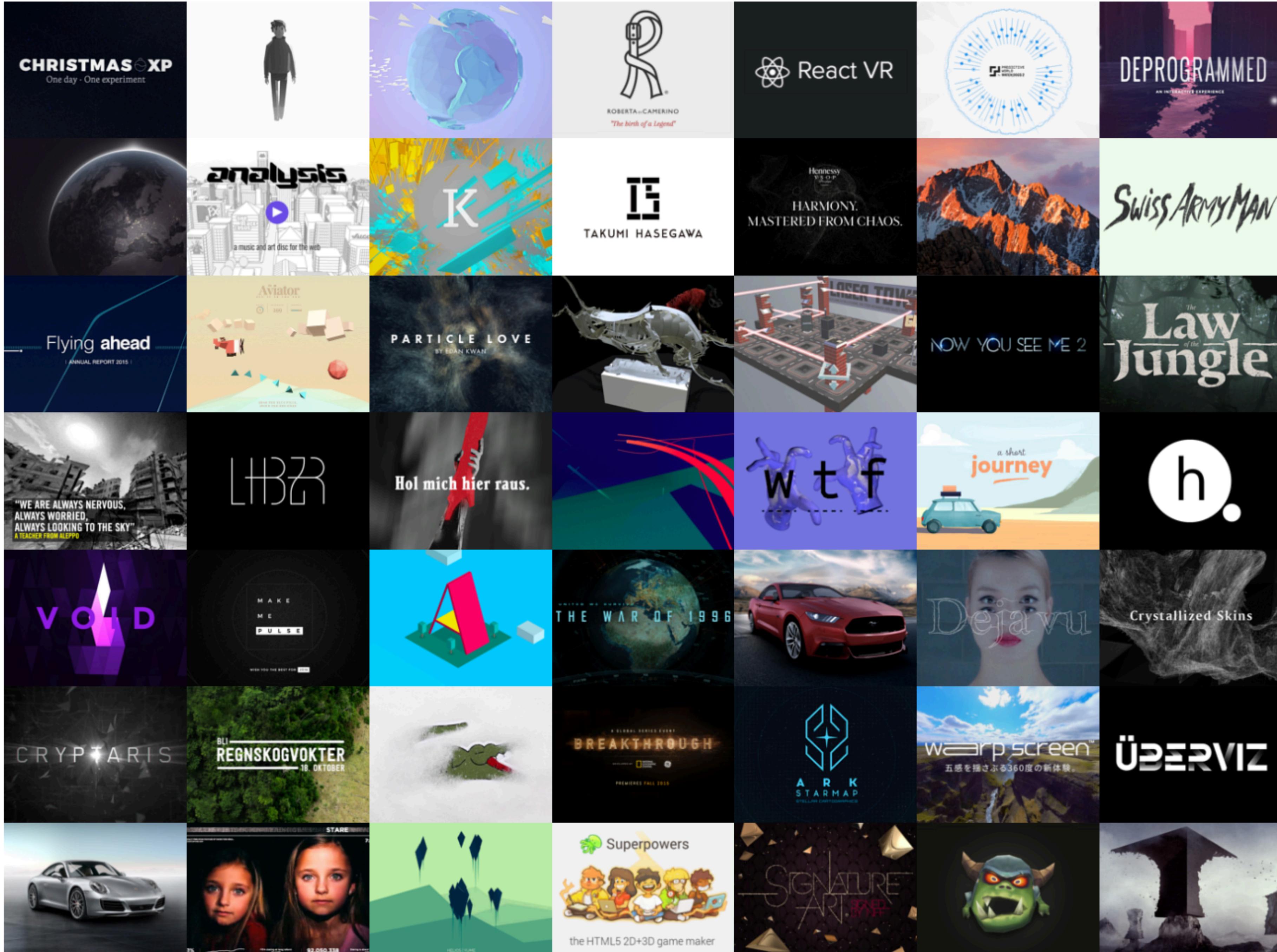
Serial port (enabling Arduino applications), OSC and TUIO



Reactive Data Visualization at One World Observatory, NYC



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Close X

Importers Exporters

- 1 USA
- 2 Japan
- 3 China
- 4 Germany
- 5 Rep. of Korea
- 6 India
- 7 Italy
- 8 France
- 9 Netherlands
- 10 Spain

1st biggest importer in 2005

USA

Net weight

532,738,032,233 kg

Import value

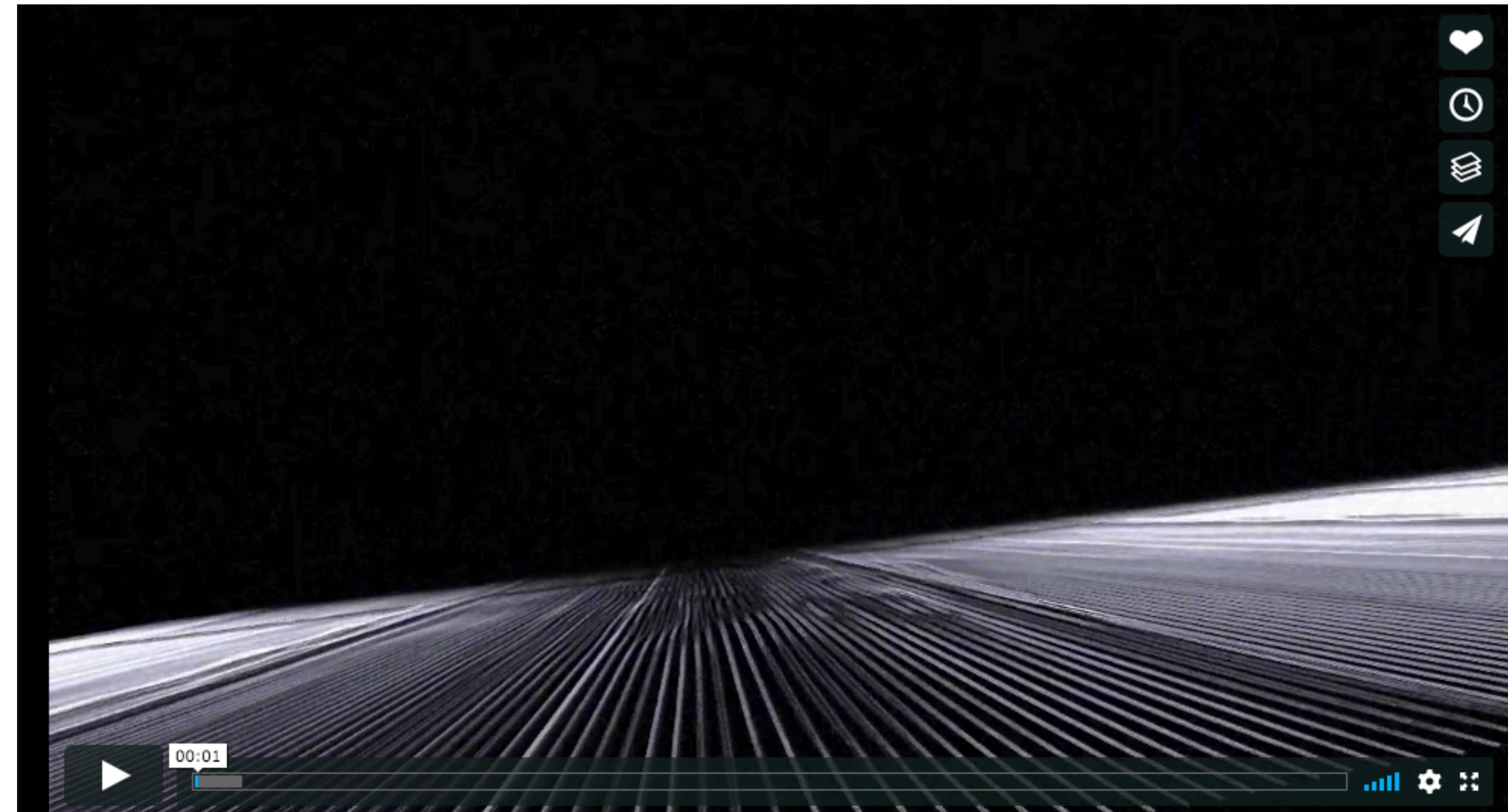
\$ 190,390,298,485



TouchDesigner

Realtime visual
development platform

Projection mapping, live
music visuals, user
interfaces, lights



Houdini

Standard VFX tool

Node-based procedural 3D
engine

