Artists and Machine Intelligence

Research at Google

What is Deep Learning?

Artificial Intelligence:

the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

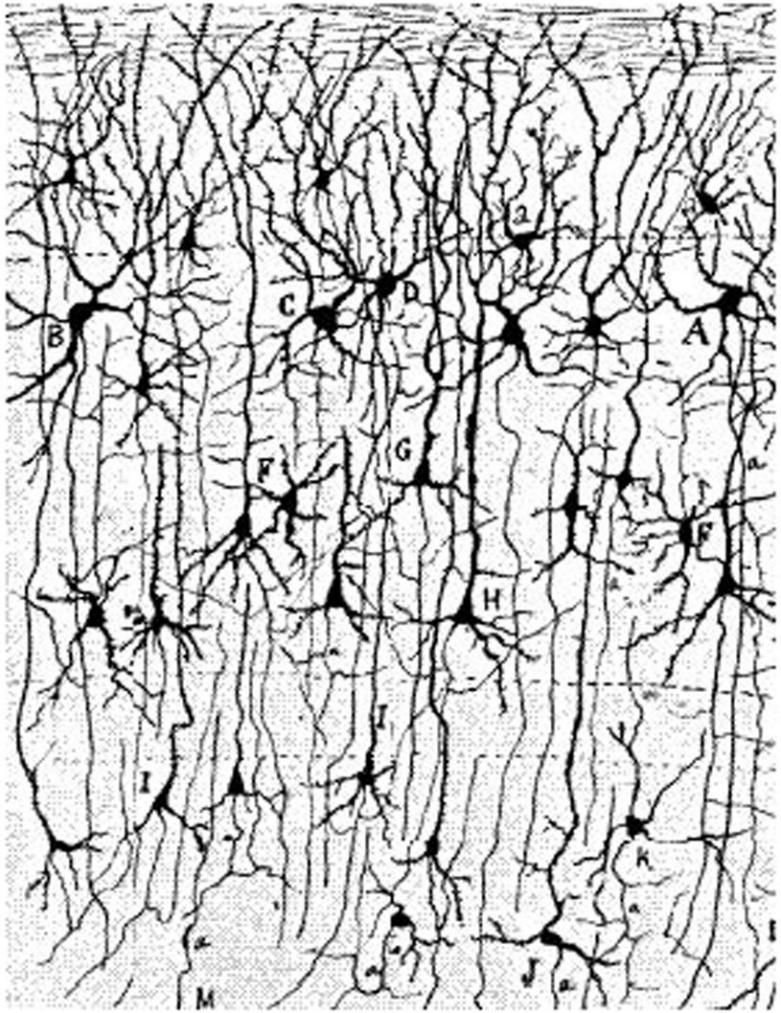
GOFAI:

Good Old-Fashioned AI

(rule-based systems, if this then that)

Neural Nets:

Artificial neural networks (ANNs) or connectionist systems are computing systems inspired by the biological neural networks that constitute animal brains



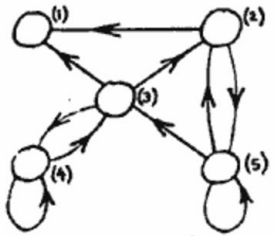
Neurons visualized by Santiago Ramon y Cajal using cell-staining and microscopy ca 1900.

4. Unorganised machines.

So far we have been considering machines which are designed for a definite purpose (though the universal machines are in a sense an exception). We might instead consider what happens when we make up a machine in a comparatively unsystematic way from some kind of standard components. We could consider some particular machine of this nature and find out what sort of things it is likely to do. Machines which are largely random in their construction in this way will be called 'unorganised machines'. This does not pretend to be an accurate term. It is conceivable that the same machine might be regarded by one man as organised and by another as unorganised.

A typical example of an unorganised machine would be as follows. The machine is made up from a rather large number N of similar units. Each unit has two input terminals, and has an output terminal which can be connected to the input terminals of (0 or more) other units. We may imagine that for each integer r, $1 \leqq r \leqq N$ two numbers i(r) and j(r) are chosen at random from 1 ..... N and that we connect the inputs of unit r to the outputs of units i(r) and j(r). All of the units are connected to a central synchronising unit from which synchronising pulses are emitted at more or less equal intervals of time. The times when these pulses arrive will be called 'moments'. Each unit is capable of having two states at each moment. These states may be called 0 and 1. The state is determined by the rule that the states of the units from which the input leads come are to be taken at the previous moment, multiplied together and the result subtracted from 1. An unorganised machine of this character is shown in the diagram below.

r	i(r)	j(r)
1	3	2
2	3	5
3	4	5
4	3	4
5	2	5



A sequence of ~~five~~ six possible consecutive conditions for the whole machine is:

1	1	1	0	0	1	0
2	1	1	1	0	1	0
3	0	1	1	1	1	1
4	0	1	0	1	0	1
5	1	0	1	0	1	0

Neural net theorized by Alan Turing in 1948's *Intelligent Machinery*.

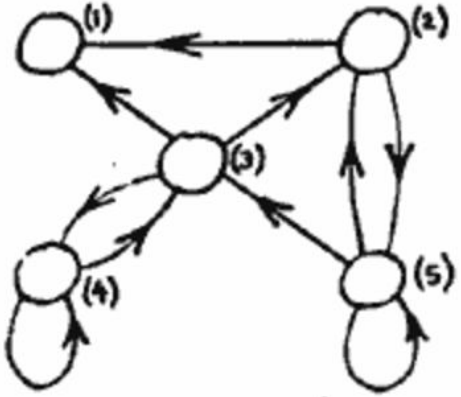
Neural Nets:

Artificial neural networks (ANNs) or connectionist systems are computing systems inspired by the biological neural networks that constitute animal brains

FLOOR
8
SCORE
715900
LIVES
9
HEALTH
89%
AMMO
84

DEFEND
A
DEFEND
B
DEFEND
B
DEFEND
A
ROUND 1
TIED
0
0
FULL-AUTO
50 / 150
VIDEOGAMER.COM

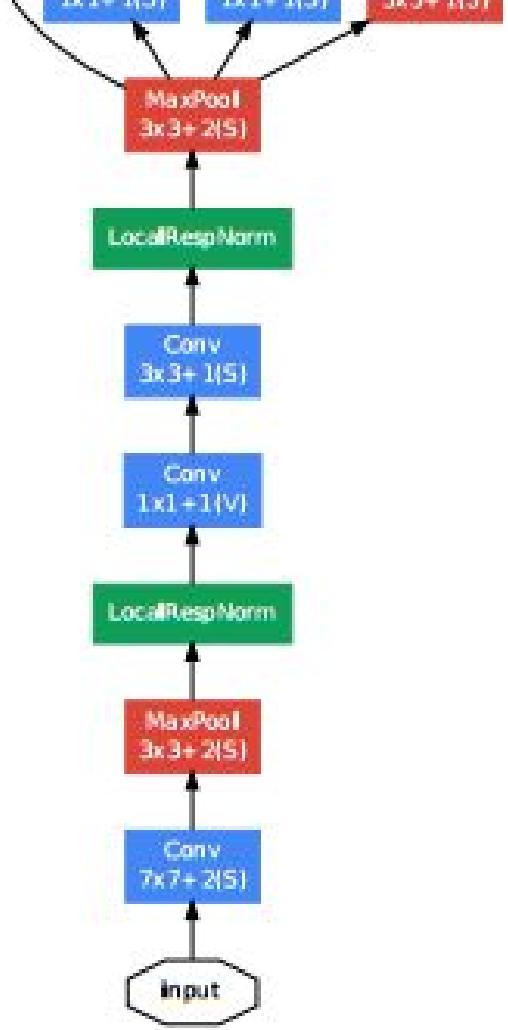
r	i(r)	j(r)
1	3	2
2	3	5
3	4	5
4	3	4
5	2	5



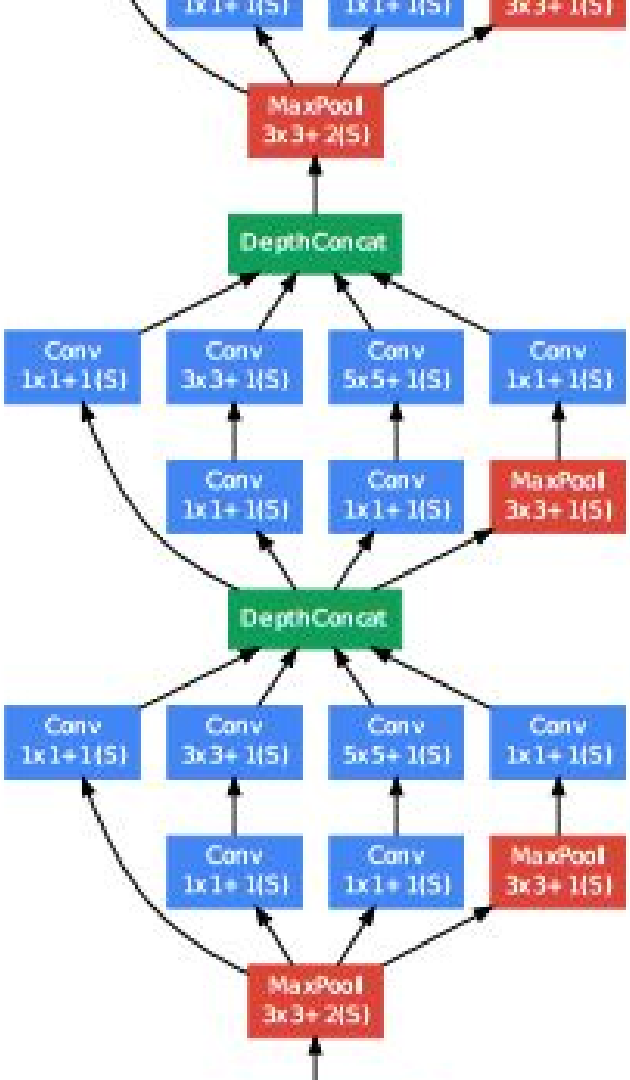
A sequence of ~~five~~ Six possible consecutive conditions for the whole machine is:

1	1	1	0	0	1	0
2	1	1	1	0	1	0
3	0	1	1	1	1	1
4	0	1	0	1	0	1
5	1	0	1	0	1	0

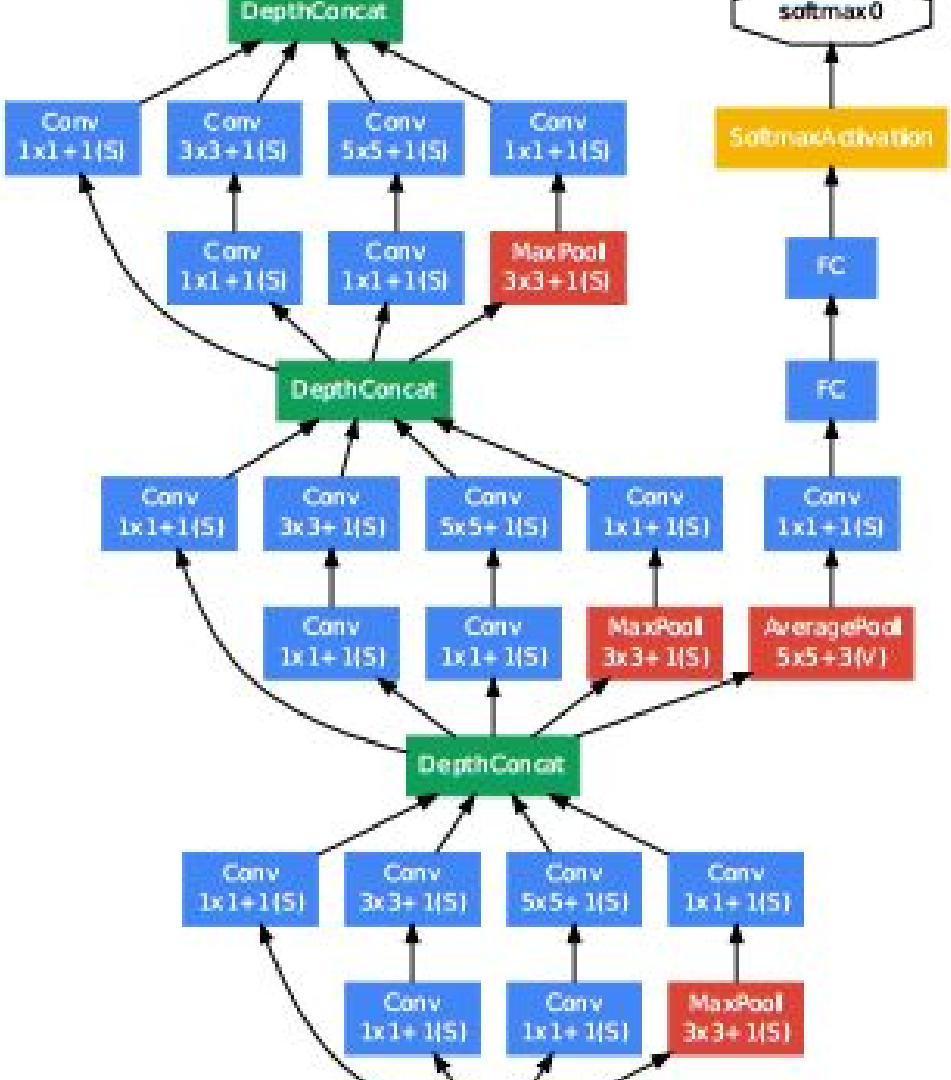
Neural net theorized by Alan Turing in 1948's *Intelligent Machinery*.



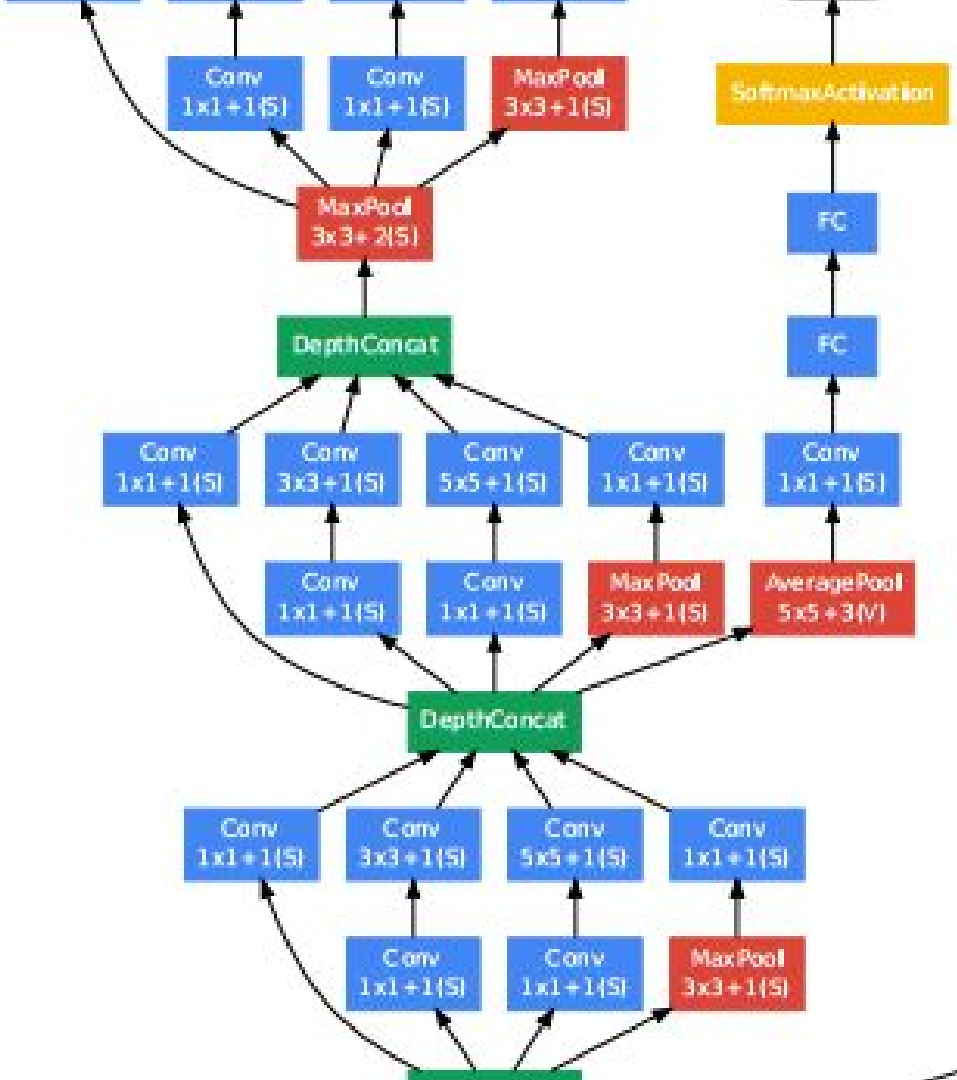
Modern deep neural net diagram



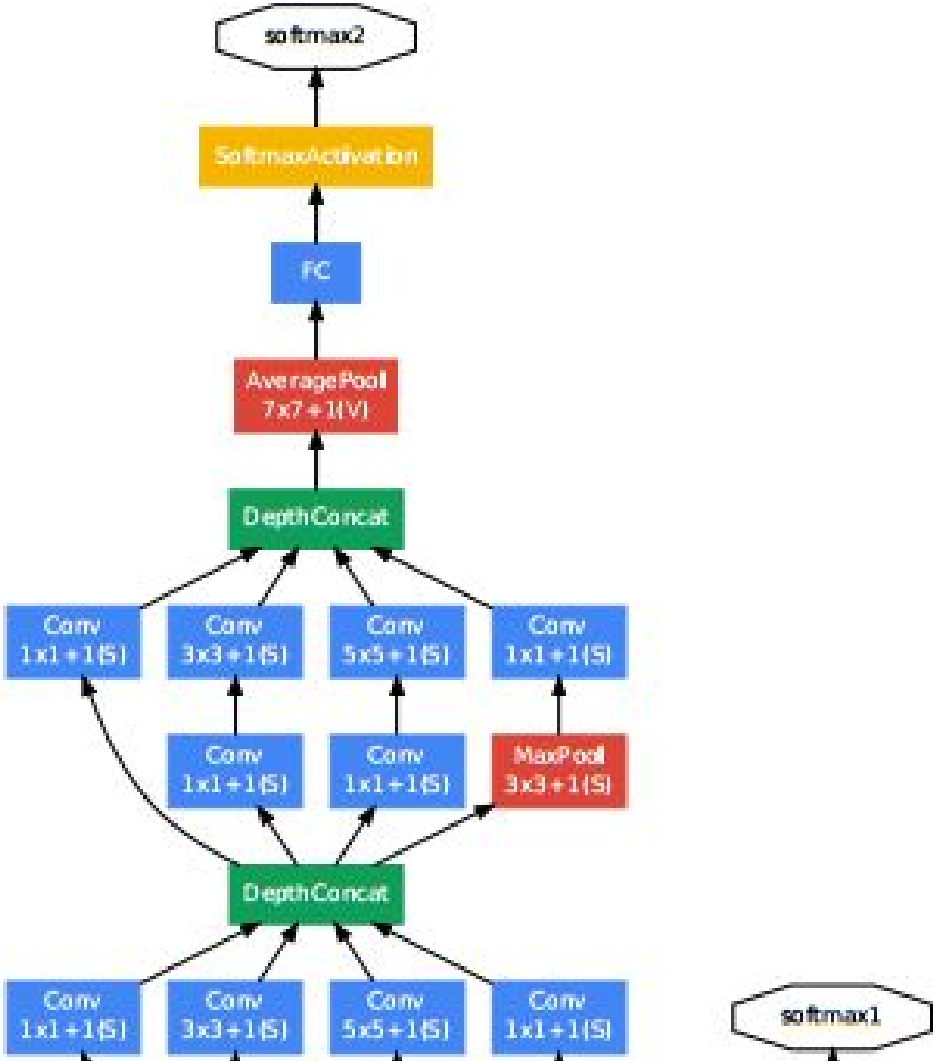
Modern deep neural net diagram



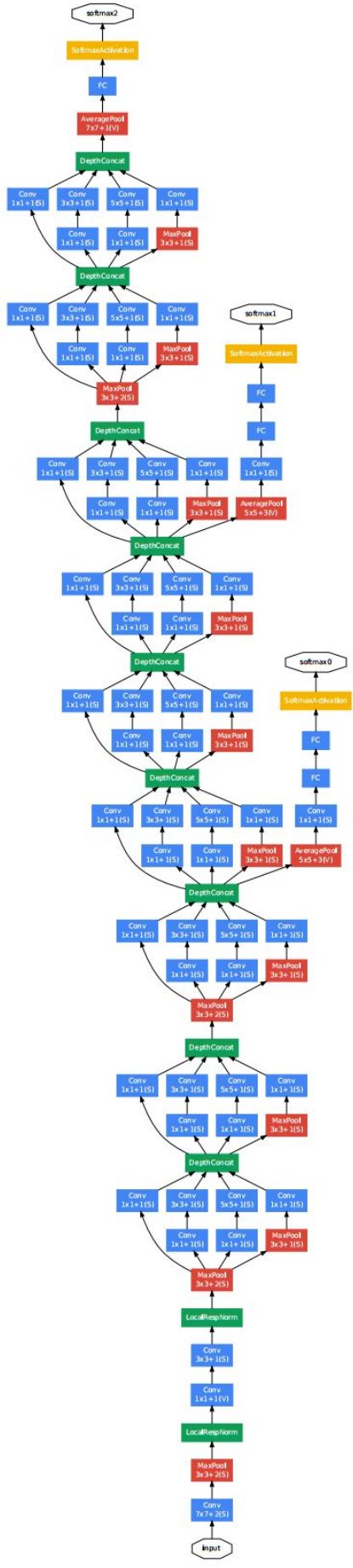
Modern deep neural net diagram

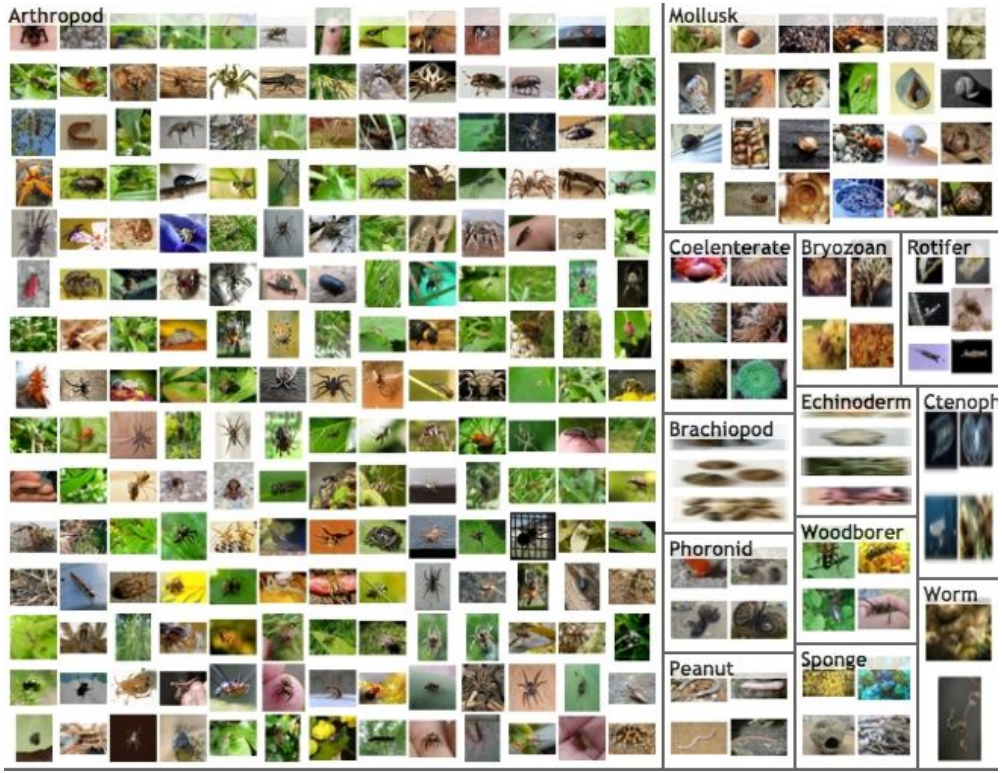


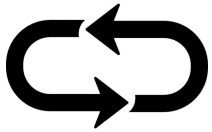
Modern deep neural net diagram

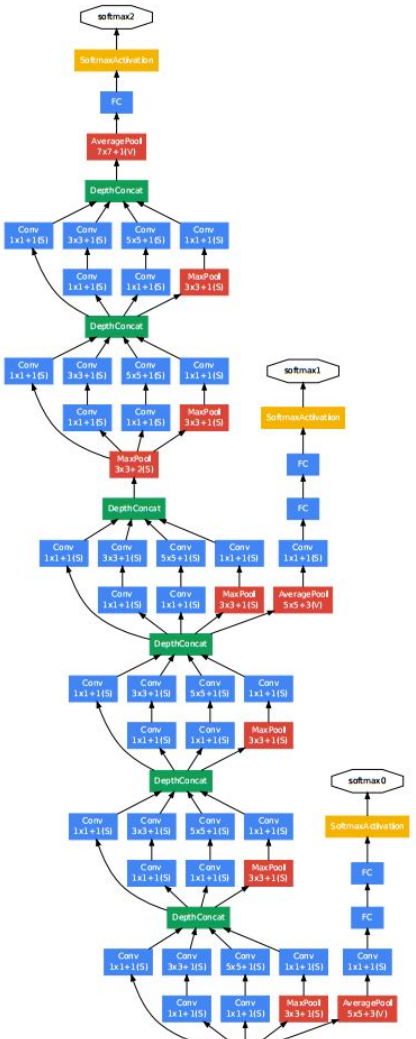


Modern deep neural net diagram

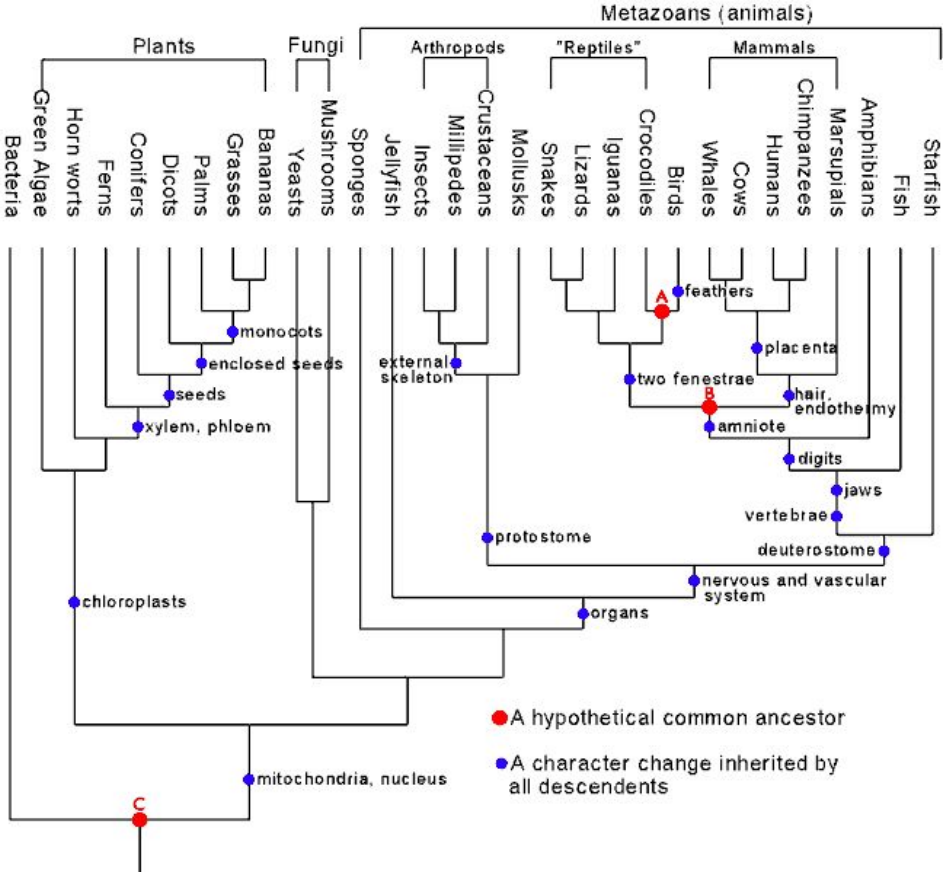

softmax2
SoftmaxActivation
FC
AveragePool 7x7+1(V)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
MaxPool 3x3+2(S)
softmax1
SoftmaxActivation
FC
FC
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
AveragePool 5x5+3(V)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
DepthConcat
softmax0
SoftmaxActivation
FC
FC
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
AveragePool 5x5+3(V)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
MaxPool 3x3+2(S)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
Conv 1x1+1(S)
MaxPool 3x3+1(S)
MaxPool 3x3+2(S)
LocalRespNorm
Conv 3x3+1(S)
Conv 1x1+1(V)
LocalRespNorm
MaxPool 3x3+2(S)
Conv 7x7+2(S)
input

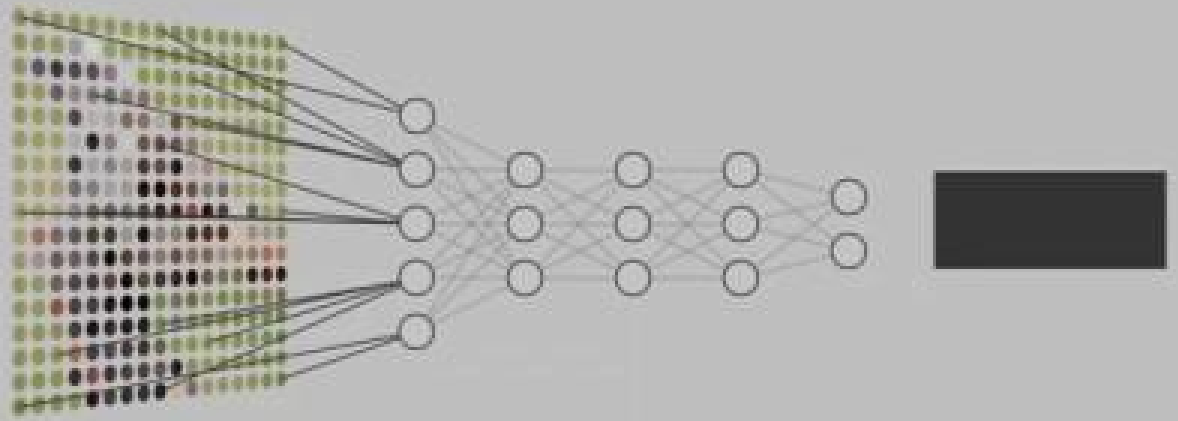

Arthropod
Mollusk
Coelenterate
Bryozoan
Rotifer
Brachiopod
Echinoderm
Ctenoph
Phoronid
Woodborer
Worm
Peanut
Sponge




softmax2
SoftmaxActivation
FC
AveragePool 7x7+1(V)
DepthConcat
Conv 1x1+1(S)
Conv 3x3+1(S)
Conv 5x5+1(S)
MaxPool 3x3+1(S)
softmax1
AveragePool 5x5+3(V)
softmax0

Coelenterate
Bryozoan
Rotifer
Echinoderm
Ctenoph
Brachiopod
Woodborer
Phoronid
Worm
Peanut
Sponge


Metazoans (animals)
Plants
Fungi
Arthropods
"Reptiles"
Mammals
Bacteria
Green Algae
Horn worts
Ferns
Conifers
Dicots
Palms
Grasses
Bananas
Yeasts
Mushrooms
Sponges
Jellyfish
Insects
Millipedes
Crustaceans
Mollusks
Snakes
Lizards
Iguanas
Crocodiles
Birds
Whales
Cows
Humans
Chimpanzees
Marsupials
Amphibians
Fish
Starfish
A
feathers
monocots
enclosed seeds
seeds
xylem, phloem
external skeleton
placenta
two fenestrae
B
hair, endothermy
amniote
digits
jaws
vertebrae
deuterostome
protostome
nervous and vascular system
organs
chloroplasts
mitochondria, nucleus
C
A hypothetical common ancestor
A character change inherited by all descendents



Neural nets

Compress epistemologies into numbers to

Classify sense data and

Automate decision-making

Artists and Machine Intelligence

Research at Google

Hand-axe, 300,000 years-old

“The results of our imaging studies on stone toolmaking led us to propose that neural circuits, including the inferior frontal gyrus, underwent changes to adapt to the demands of Paleolithic toolmaking and then were co-opted to support primitive forms of communication using gestures and, perhaps, vocalizations.”

Dietrich Stout, Professor of Anthropology, Emory University, quoted in Scientific American magazine

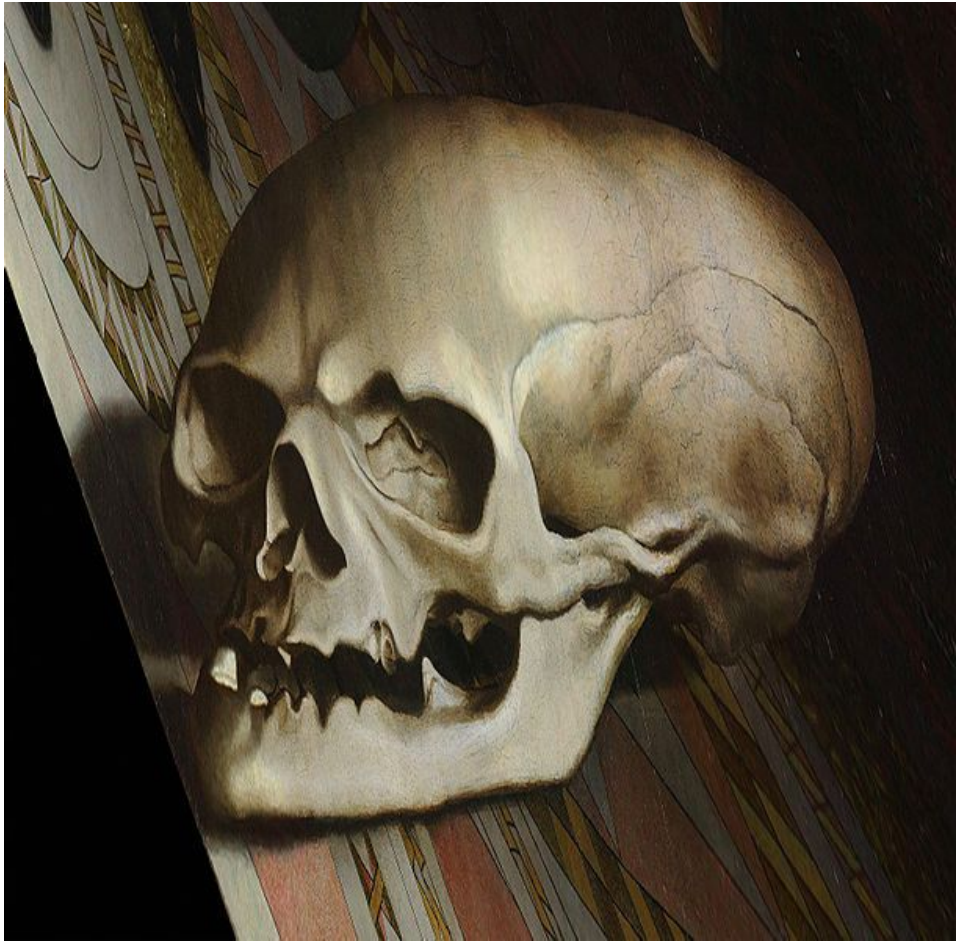
New Tools that Generate

New Languages that Reveal

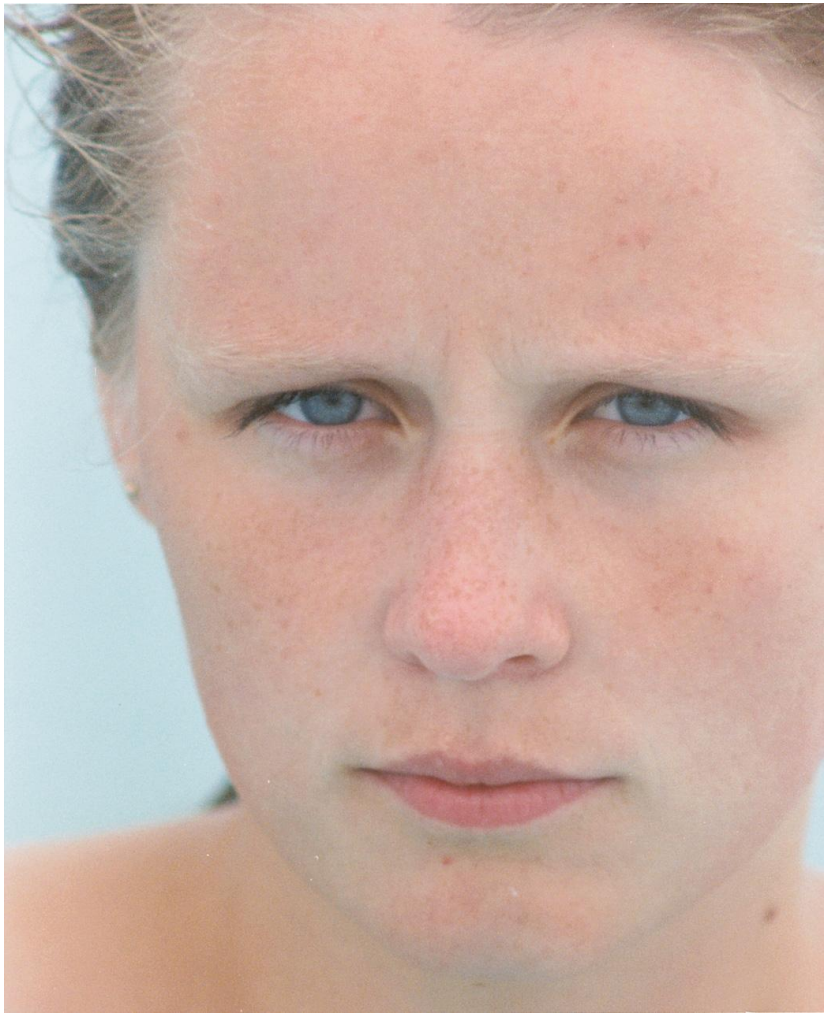
New Relations that Require

New Contracts based on

New Ontology



Digitally reprojected image of the anamorphic skull in Hans Holbein the Younger's 1553 painting *The Ambassadors*. More.



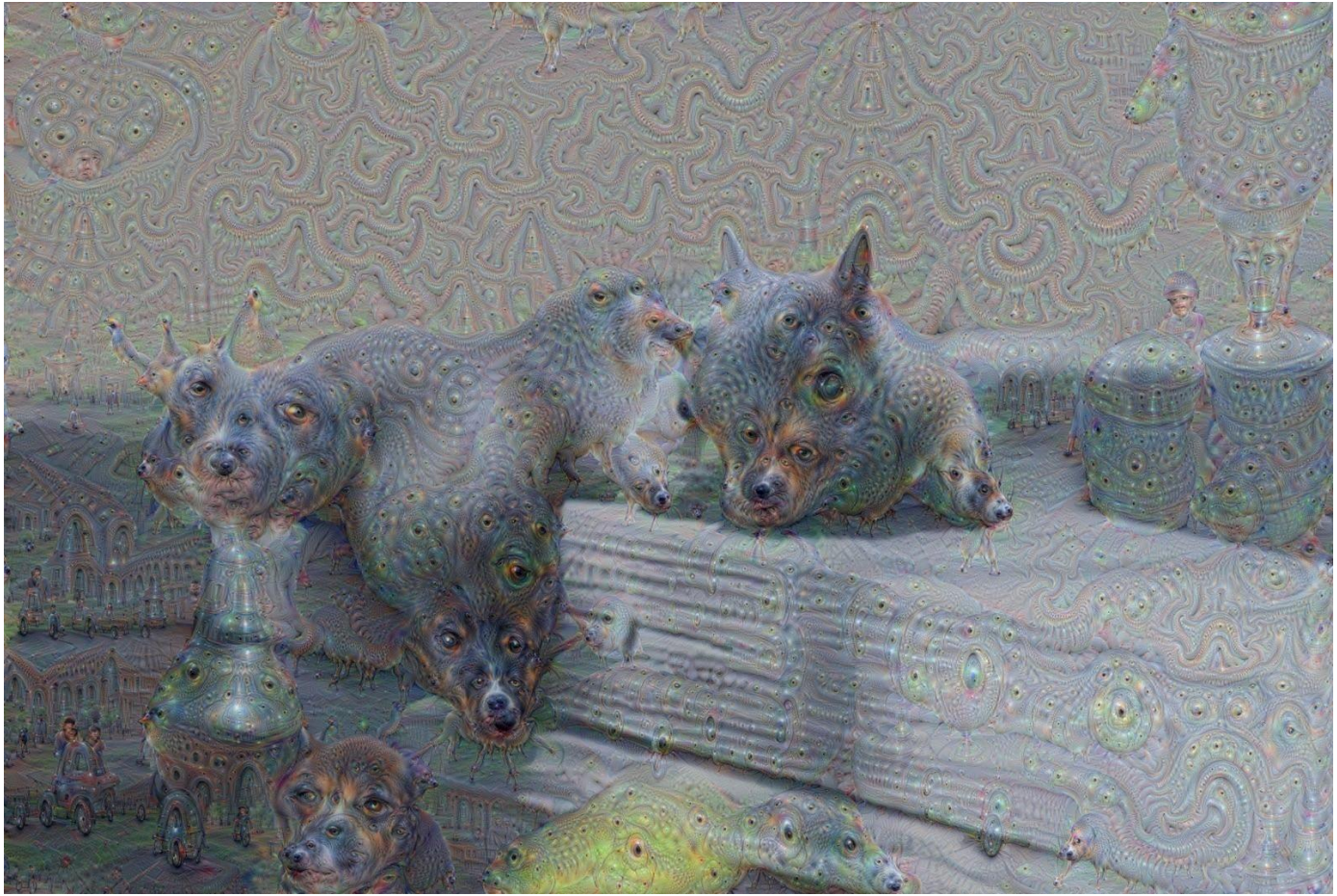
Hand — Lens ... CCD — Big data archive — Neural net...

Tools create modes of cognition and change neural structures.

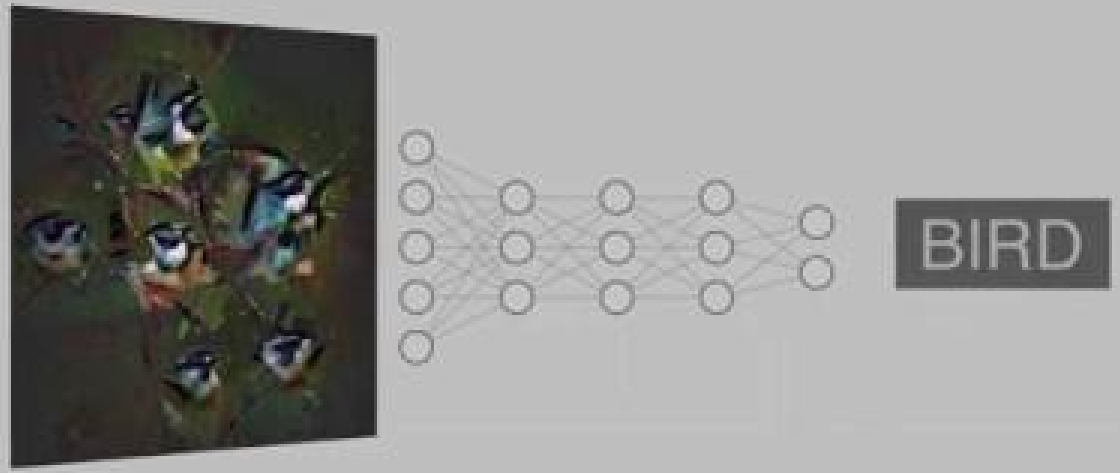
Representational tools increase in depth and complexity.
I.e. hand, lens, plotter, CCD, big data archive, neural net

AI representations are highly multi-dimensional.

What new language does AI art produce?



trippysquirrel.jpg, June 2015


BIRD

Hartebeest

Measuring Cup

Ant

Starfish

Anemone Fish

Banana

Parachute

Screw

DeepDream

Google Research Blog

The latest news from Research at Google

Inceptionism: Going Deeper into Neural Networks

Wednesday, June 17, 2015

Posted by Alexander Mordvintsev, Software Engineer, Christopher Olah, Software Engineering Intern and Mike Tyka, Software Engineer

Update - 13/07/2015

Images in this blog post are licensed by Google Inc. under a Creative Commons Attribution 4.0 International License. However, images based on places by MIT Computer Science and AI Laboratory require additional permissions from MIT for use.

Artificial Neural Networks have spurred remarkable recent progress in image classification and speech recognition. But even though these are very useful tools based on well-known mathematical methods, we actually understand surprisingly little of why certain models work and others don't. So let's take a look at some simple techniques for peeking inside these networks.

We train an artificial neural network by showing it millions of training examples and gradually adjusting the network parameters until it gives the classifications we want. The network typically consists of 10-30 stacked layers of artificial neurons. Each image is fed into the input layer, which

GIZMODO

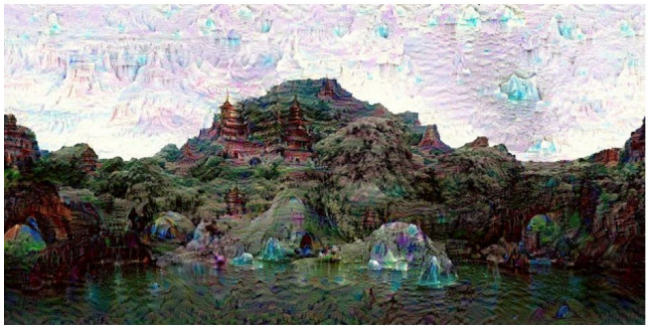
Log in / Sign up

Google's Dream Robot Is Running Wild Across the Internet

Maddie Stone

7/05/15 1:00pm · Filed to: NEURAL NETWORKS

707.2K 306 72



Remember a few weeks back, when we learned that Google's artificial neural network was having creepy daydreams, turning buildings into acid trips and landscapes into Magic Eye pictures? Well, prepare to never sleep again, because last week, Google made its "inceptionism" algorithm available to the public, and the nightmarish images are cropping up everywhere.

The "Deep Dream" system essentially feeds an image through a layer of artificial neurons, asking an AI to enhance and build on certain features, such as edges. Over time, pictures can become so distorted that they morph into

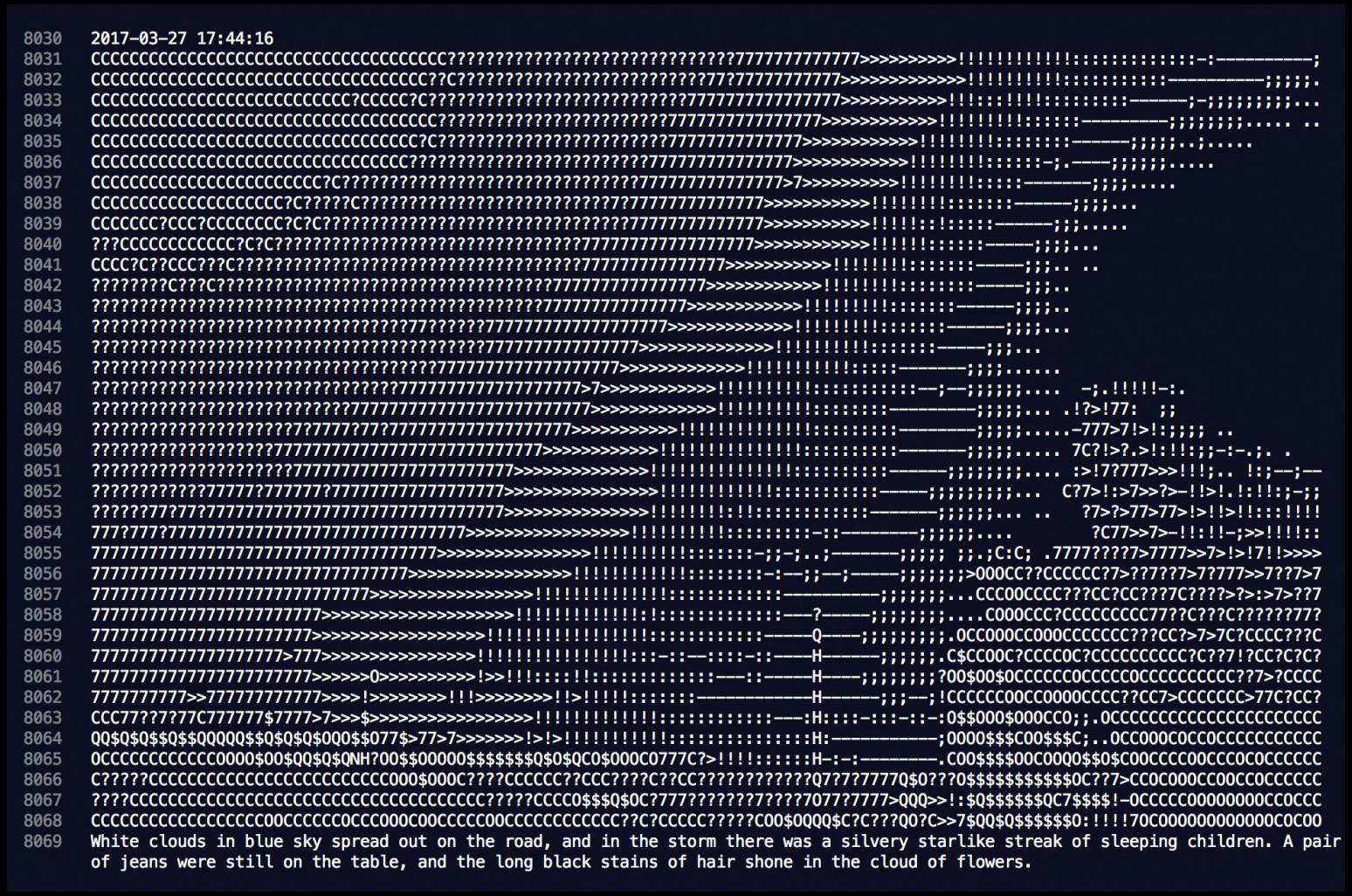
New Tools that Generate

New Languages that Reveal

New Relations that Require

New Contracts based on

New Ontology



2017-03-27 17:44:16

White clouds in blue sky spread out on the road, and in the storm there was a silvery starlike streak of sleeping children. A pair of jeans were still on the table, and the long black stains of hair shone in the cloud of flowers.

Wordcar

DEPS

2017-03-27 01:33:42
Red and white flags and the stars were like a curtain of paper like a broad stream of flowers.

```
7506
7507    2017-03-27 13:40:16
7508    Hard Rock Hotel & Casino Biloxi: a hotel in Biloxie, a high
        fisherman with a starry face, and a stub of a coat on his face and
        his shirt looking boldly across his mouth.
7509
```

Tech was at the center of the journey, as a synchronic key, as the “literary” engine, and as Ross put it, a substitute for mind-altering substances.

AI Poetry Hits the Road
Kenric McDowell

zero books

ANGELA NAGLE

KILL ALL NORMIES

ONLINE CULTURE WARS FROM 4CHAN AND TUMBLR TO TRUMP AND THE ALT-RIGHT

New Tools that Generate

New Languages that Reveal

New Relations that Require

New Contracts based on

New Ontology

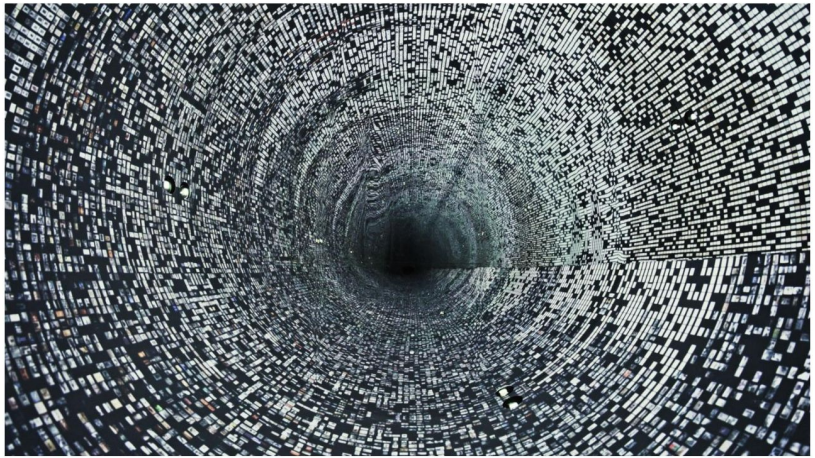
Refik Anadol

SALT Museum

INSTALLATIONS

1.7 Million Documents Become an Explorable 'Library of Babel'

KH KEVIN HOLMES
May 25 2017, 4:40pm

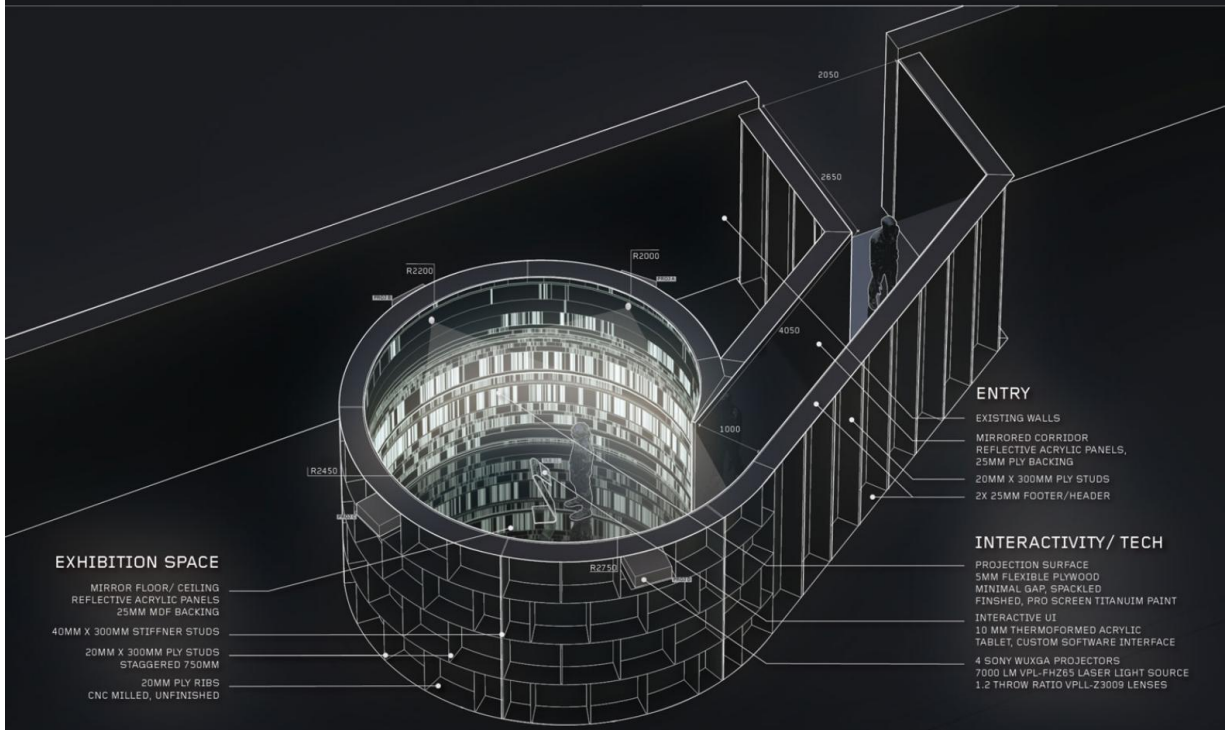


Images courtesy of the artist.

Using AI and machine learning, artist Refik Anadol has turned 1.7 million digital documents from a Turkish museum into a massive nod to Jorge Luis Borges.

ARCHIVE DREAMING

DATA UNIVERSE OF SALT.ARCHIVE | EXHIBITION DESIGN | MACHINE INTELLIGENCE | 1.735.278 DOCUMENTS



ENTRY

EXISTING WALLS

MIRRORED CORRIDOR
REFLECTIVE ACRYLIC PANELS,
25MM PLY BACKING

20MM X 300MM PLY STUDS

2X 25MM FOOTER/HEADER

INTERACTIVITY/ TECH

PROJECTION SURFACE
5MM FLEXIBLE PLYWOOD
MINIMAL GAP, SPACKLED
FINISHED, PRO SCREEN TITANUIM PAINT

INTERACTIVE UI
10 MM THERMOFORMED ACRYLIC
TABLET, CUSTOM SOFTWARE INTERFACE

4 SONY WUXGA PROJECTORS
7000 LM VPL-FHZ65 LASER LIGHT SOURCE
1.2 THROW RATIO VPLL-Z3009 LENSES

EXHIBITION SPACE

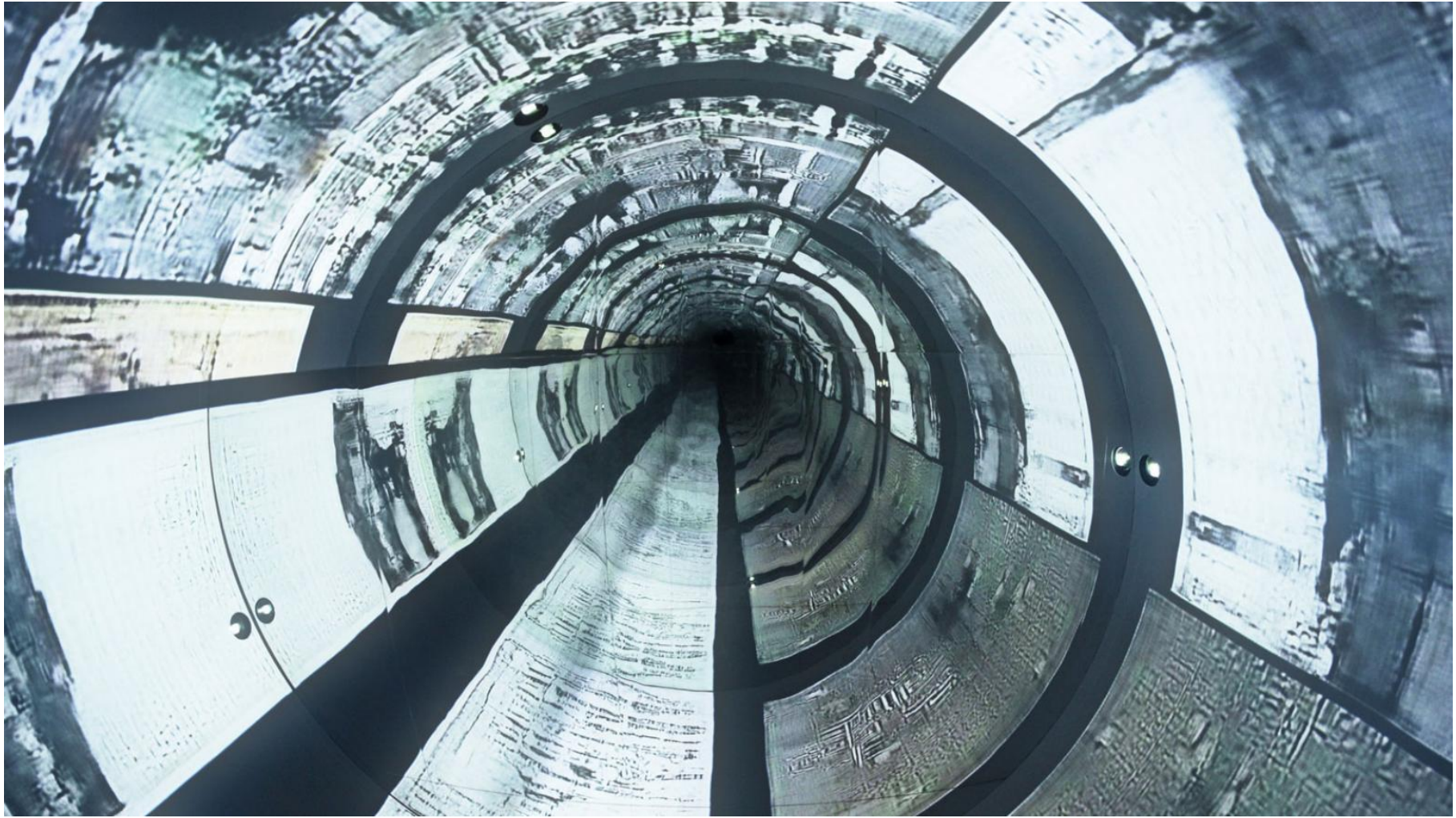
MIRROR FLOOR/ CEILING
REFLECTIVE ACRYLIC PANELS
25MM MDF BACKING

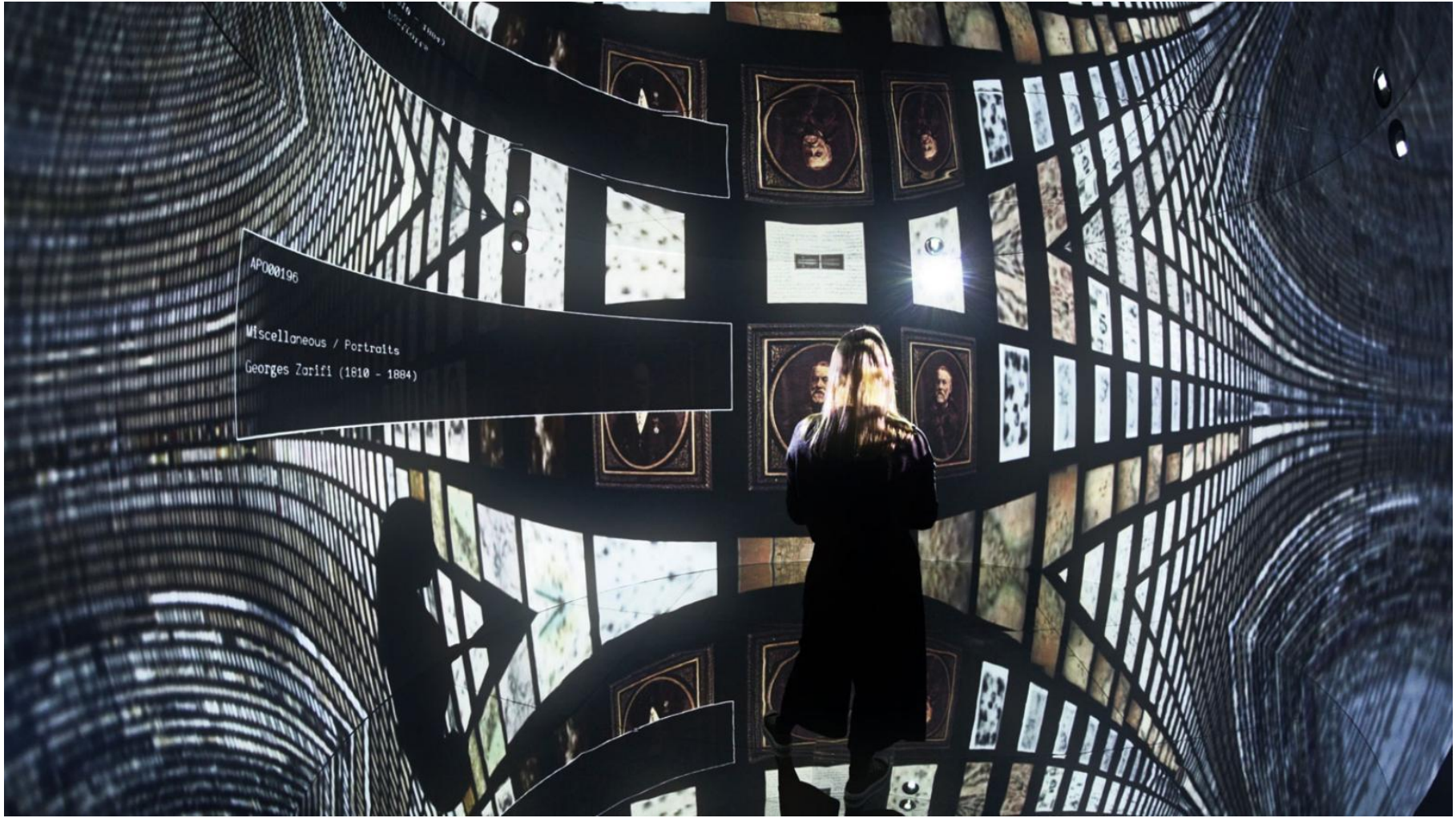
40MM X 300MM STIFFNER STUDS

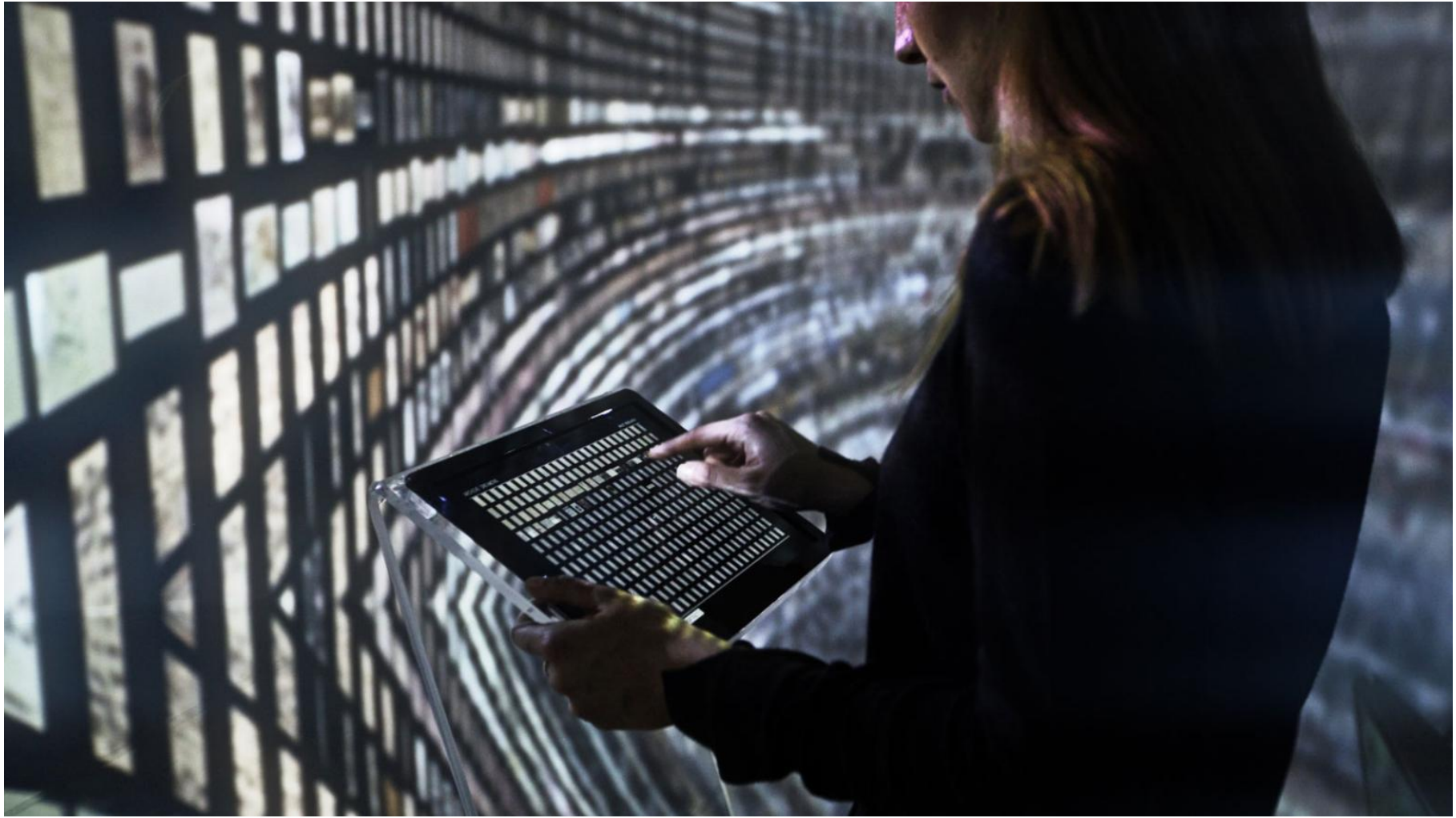
20MM X 300MM PLY STUDS
STAGGERED 750MM

20MM PLY RIBS
CNC MILLED, UNFINISHED

SALT RESEARCH | l'internationale | AMI | Google CULTURAL INSTITUTE

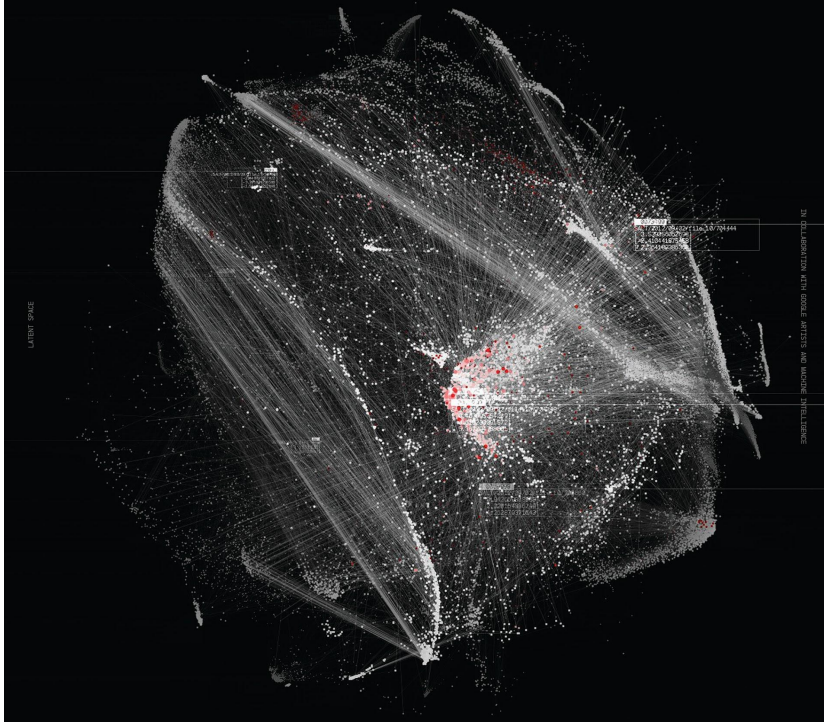



AP000196
Miscellaneous / Portraits
Georges Zarifi (1810 - 1884)



ARCHIVE DREAMING

DATA UNIVERSE OF SALT.ARCHIVE T-SNE PERPLEXITY : 50 ARCHIVE SIZE : 1.735.270

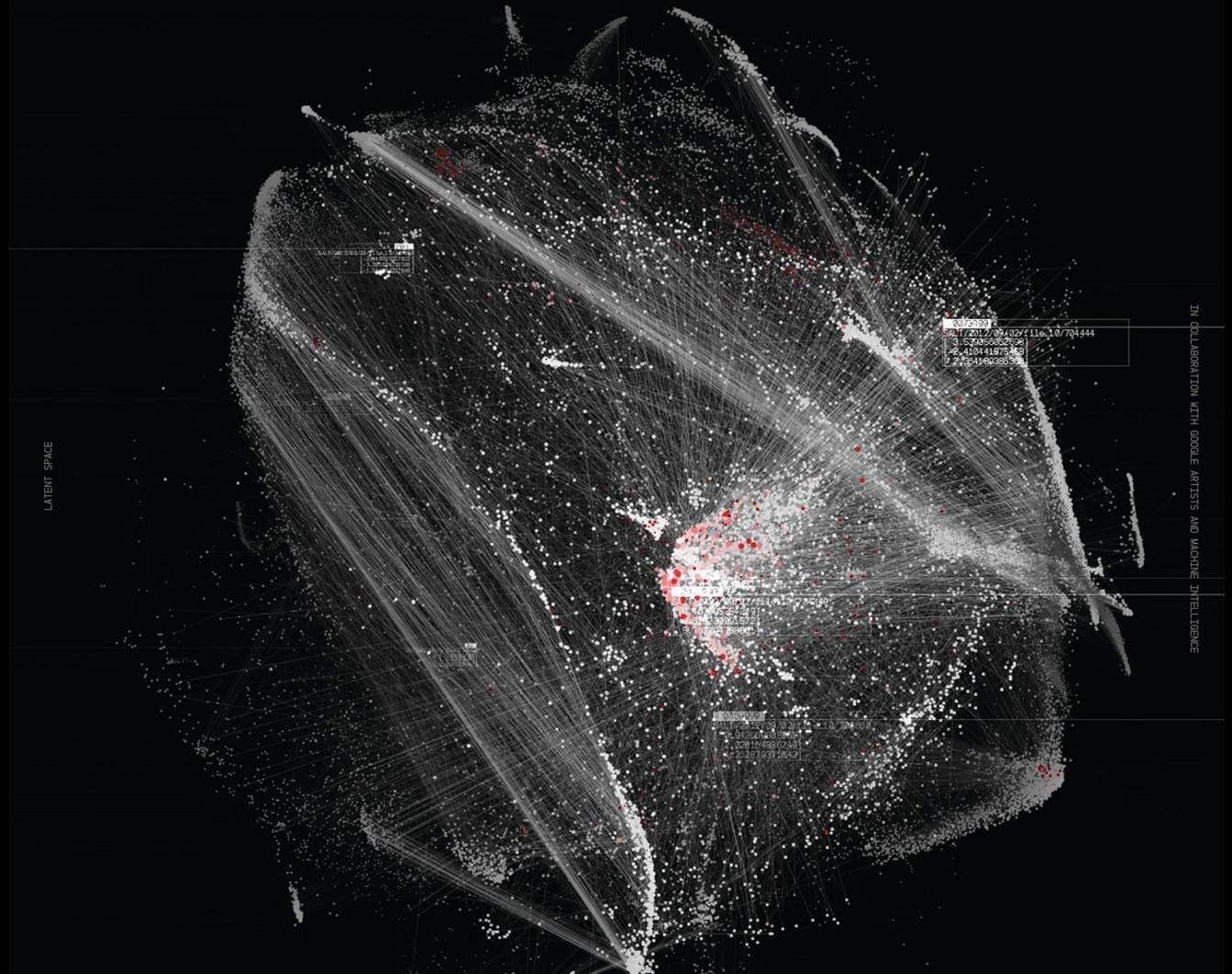


LATENT SPACE

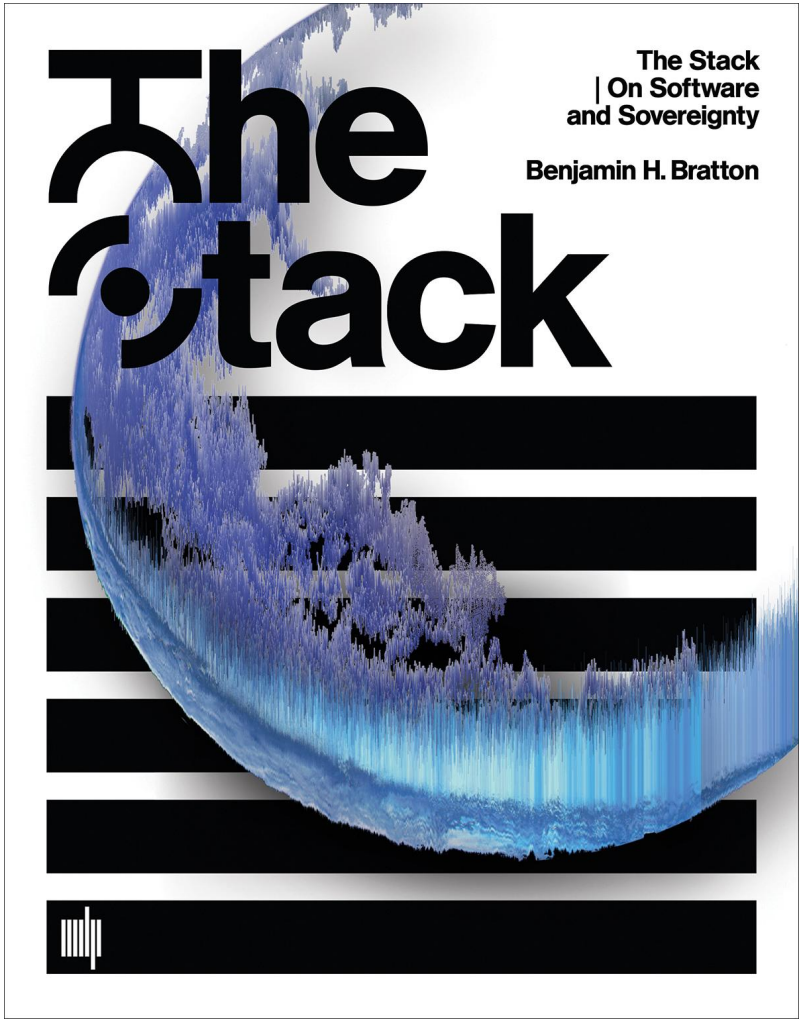
IN COLLABORATION WITH GOOGLE ARTISTS AND MACHINE INTELLIGENCE

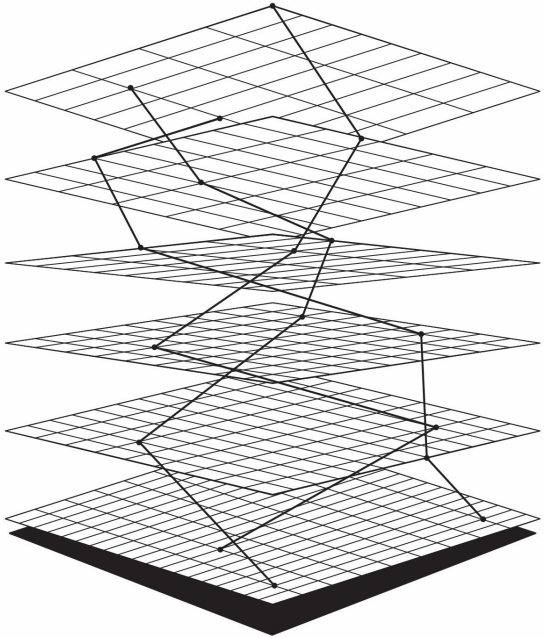
SALT RESEARCH

l'internationale


LATENT SPACE
IN COLLABORATION WITH GOOGLE ARTISTS AND MACHINE INTELLIGENCE

E57D6834
6B142500C8D8
SALT ARCHIVE, ISTANBUL
FEATURE_EXTRACTION
6DFE1C





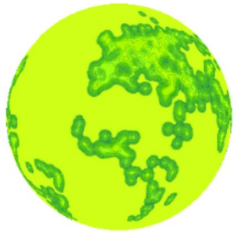
User
Interface
Address
City
Cloud
Earth

Keller Easterling

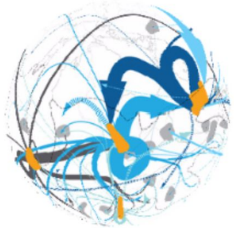
Extrastatecraft: The Power of infrastructure space

ZONE

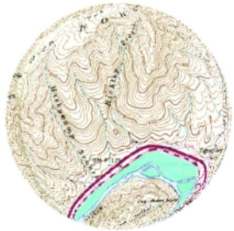
CABLE



QUALITY



DISRUPT



INTERSTATE

YASUNÍ-ITT

EXTRA STATE CRAFT

GLOBAL INFRASTRUCTURE AS A MEDIUM OF POLITY . . .

Login

New Tools that Generate

New Languages that Reveal

New Relations that Require

New Contracts based on

New Ontology

China seeks glimpse of citizens' future with crime-predicting AI

Companies and police develop technology to stop criminals before they act

© Bloomberg

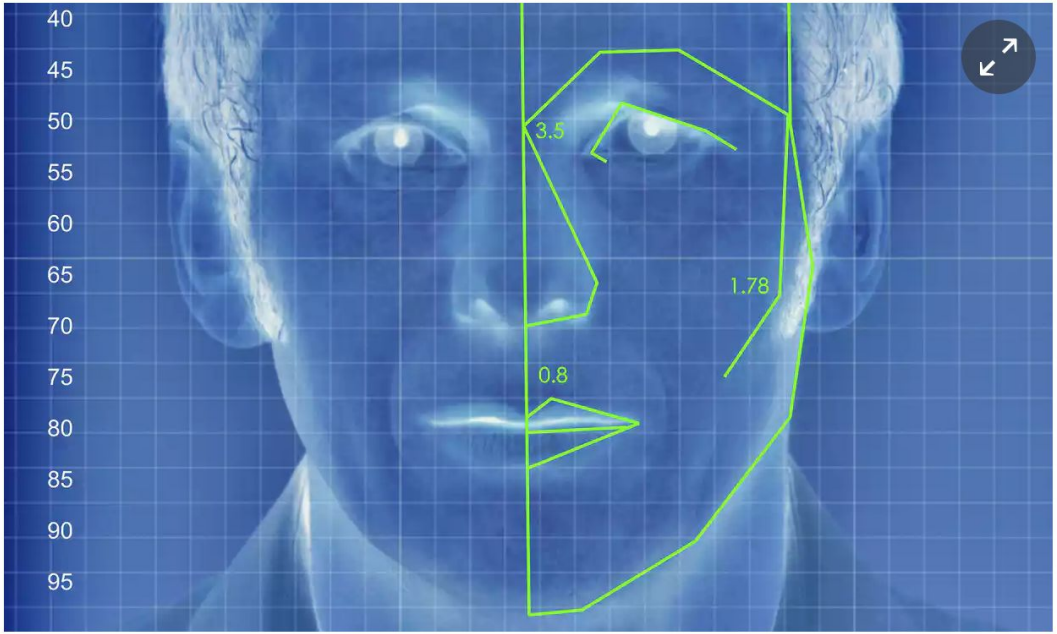
35 Save to myFT

JULY 23, 2017 by: **Yuan Yang**, Yingzhi Yang and Sherry Fei Ju in Beijing

China, a surveillance state where authorities have unchecked access to citizens' histories, is seeking to look into their future with technology designed to predict and prevent crime.

New AI can guess whether you're gay or straight from a photograph

An algorithm deduced the sexuality of people on a dating site with up to 91% accuracy, raising tricky ethical questions



An illustrated depiction of facial analysis technology similar to that used in the experiment. Illustration: Alamy

a little gender and identity study

(weekend project by blaisea)

Setup

65 question survey

Takes ~2.5 minutes to complete

Focusing on gender, sexuality, identity and presentation

Goal: quantitative insight into the ontology of gendered identity

Administered on Mechanical Turk to ~3000 subjects at $0.35 each

Responses complete in a few hours

(Not done on Google’s dime)

Questions

Body

Presentation

Attraction

Identity

Questions*

Body

Presentation

Attraction

Identity

*In the actual survey the questions are not grouped into sections. Also, lines between “nature”, “culture”, and “choice” are not always distinct, and in some cases contentious or ambiguous. This applies to “innate” orientation vs. behavior, race vs. ethnicity, and physical traits that can be surgically altered.

Questions

Body

Presentation

Attraction

Identity

2 numeric,
5 yes/no

Age
Height
Do you menstruate?
Have you ever menstruated?
Do you have a penis?
Do you have a vagina?
Have you ever been pregnant?

Questions

Body

Presentation

Attraction

Identity

41 yes/no

Do you have long hair?
Do you wear dresses / skirts?
Do you wear pants?
Do you ever wear a bra?
Do you have long nails?
Do you ever paint your nails?
Do you have an ear piercing?
Do you ever wear stockings?
Do you ever wear high heels?
Do you ever wear ties?
Do you sometimes wear your hair in a ponytail?
Do you like football?
Do you attend a book club?
Do you cook?
Do you wash the dishes?
Do you bake?
Do you have a beard or moustache?
Do you ever use makeup?
Do you ever use colored lipstick?
Do you get manicures?
Do you get pedicures?
Do you wax?
Do you have callouses on your hands?
Do you sometimes wear work boots?
Do you ride a motorcycle?
Do you play shooter video games?
Do you ever wear boxer shorts?
Do you ever wear panties?
Do you shave your legs?
Do you shave your armpits?
Do you shave your face?
Have you ever been in a fistfight?
Do you use the men's bathroom?
Do you use the women's bathroom?
Do you do household repairs?
Do you wear colorful clothes?
On paper, do people assume from your name that you are female?
On paper, do people assume from your name that you are male?
Are you married?
Do you own a gun?
Do you hunt?

Spoilers

There are no rules for identity.

We see the gender binary.

We see the gender “spectrum”.

We see that sex-gender-sexuality-orientation is in fact higher-dimensional.

Presentation predicts identity more strongly than body data does.

Body and behavior are strong predictors of gender identity, weaker predictors of other identities.

More people are intersex, trans, or gender nonconforming than you probably think.

Same-sex sexual attraction is more common than same-sex romantic attraction.

Same-sex attraction among women is extremely common.

Young people are increasingly nonconformant to either old identities or gender/sexuality binaries.

Attempts to validate identity with a body correlate will fail and do harm (cf. women and the Olympics).

III. Gender as an emergent binary, spectrum, and vector space

Questions

Body — 2 numeric, 5 yes/no

Presentation

Attraction

Identity

Age

Height

Do you menstruate?

Have you ever menstruated?

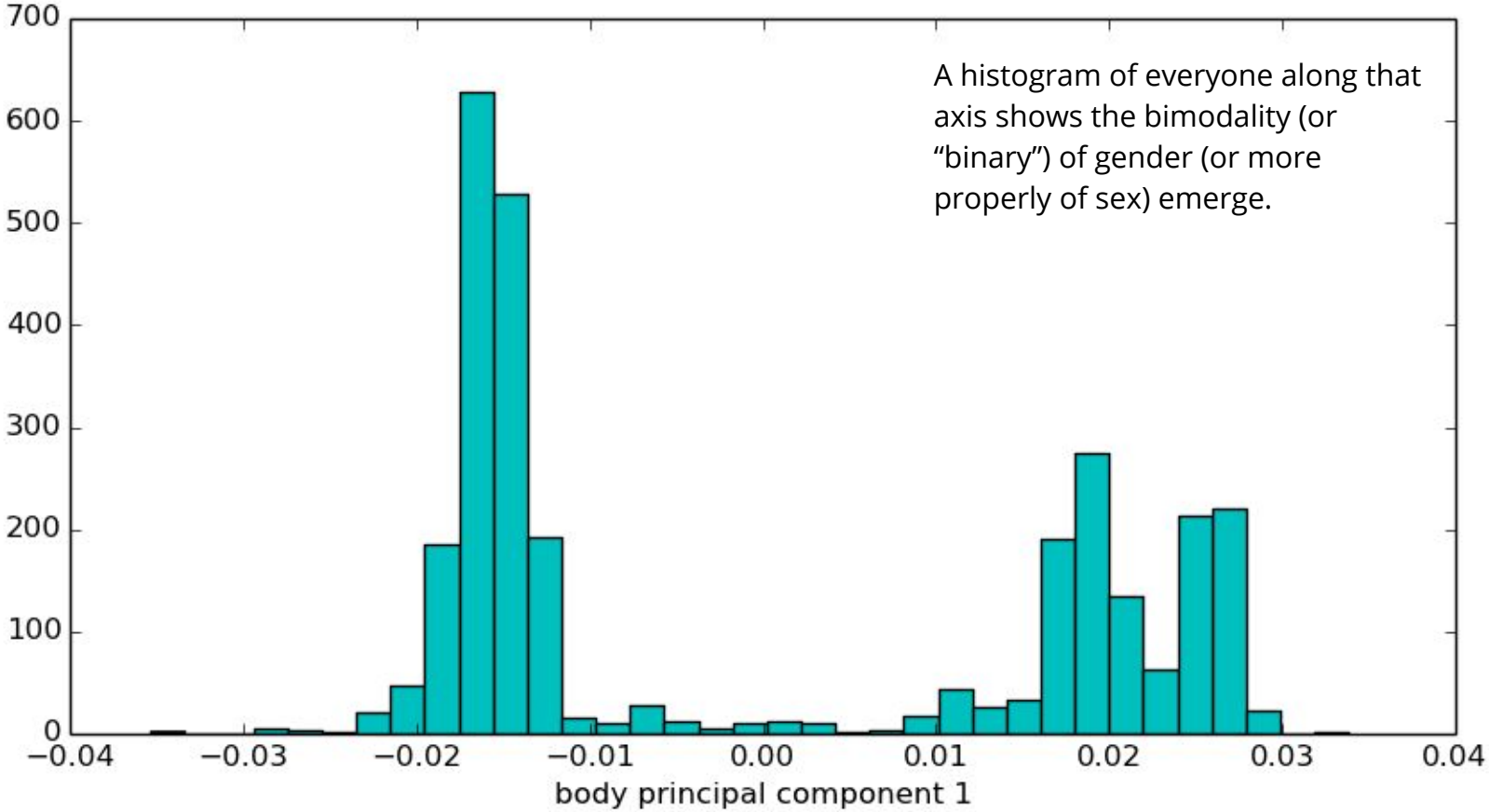
Do you have a penis?

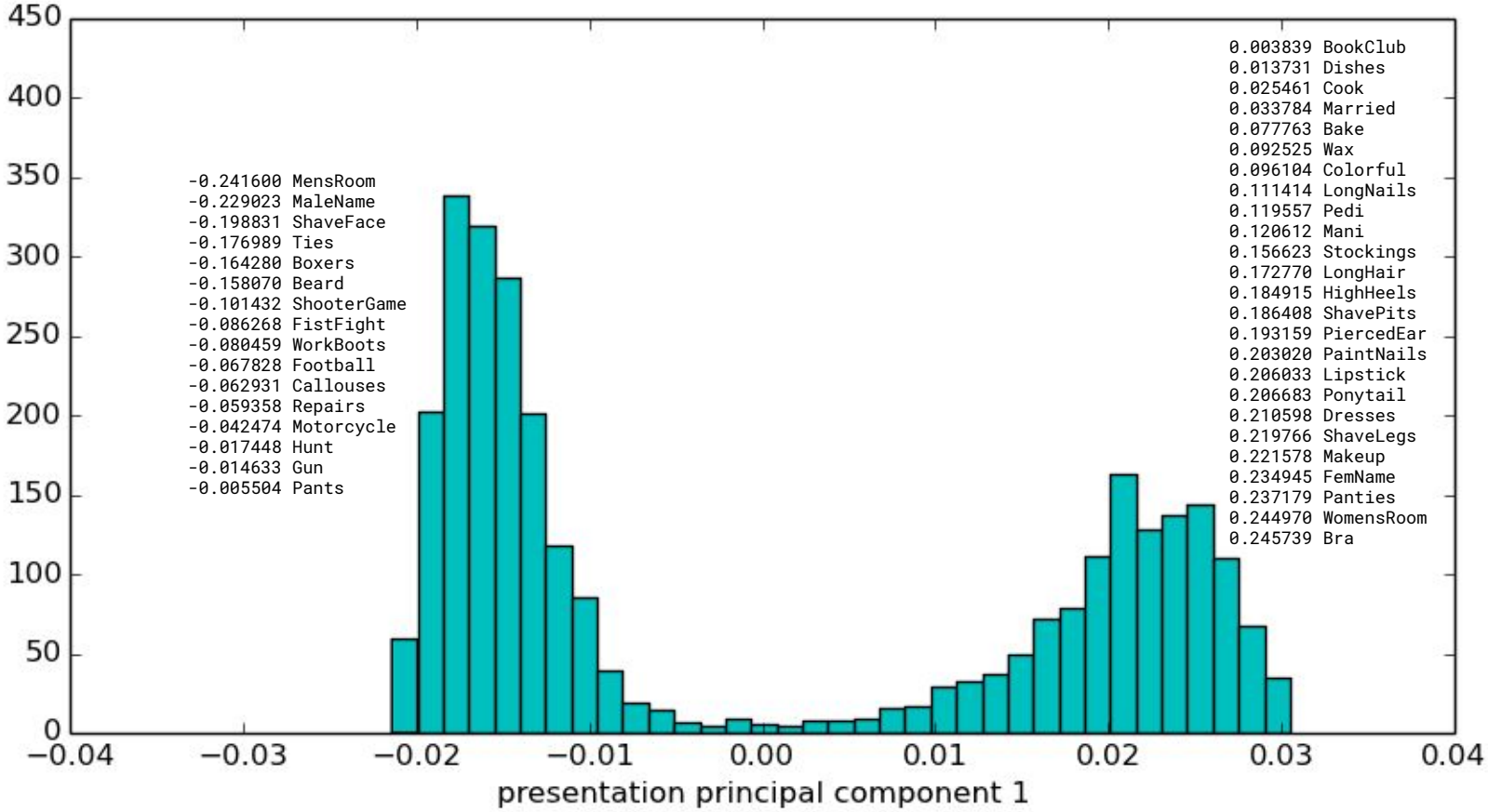
Do you have a vagina?

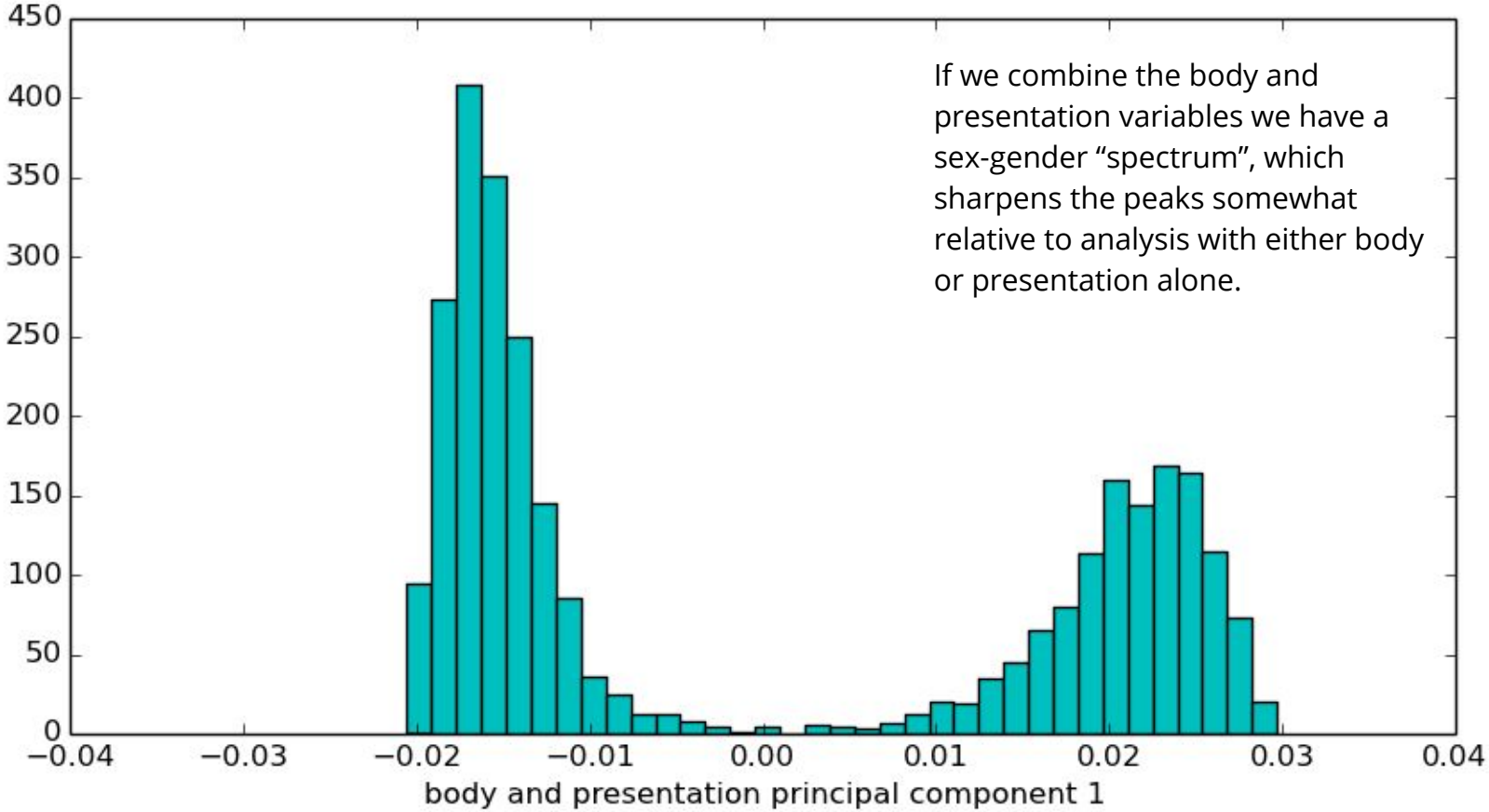
Have you ever been pregnant?

Taking the Singular Value Decomposition (SVD) we get a leading mode that looks like it pulls out gender as the dominant dimension:

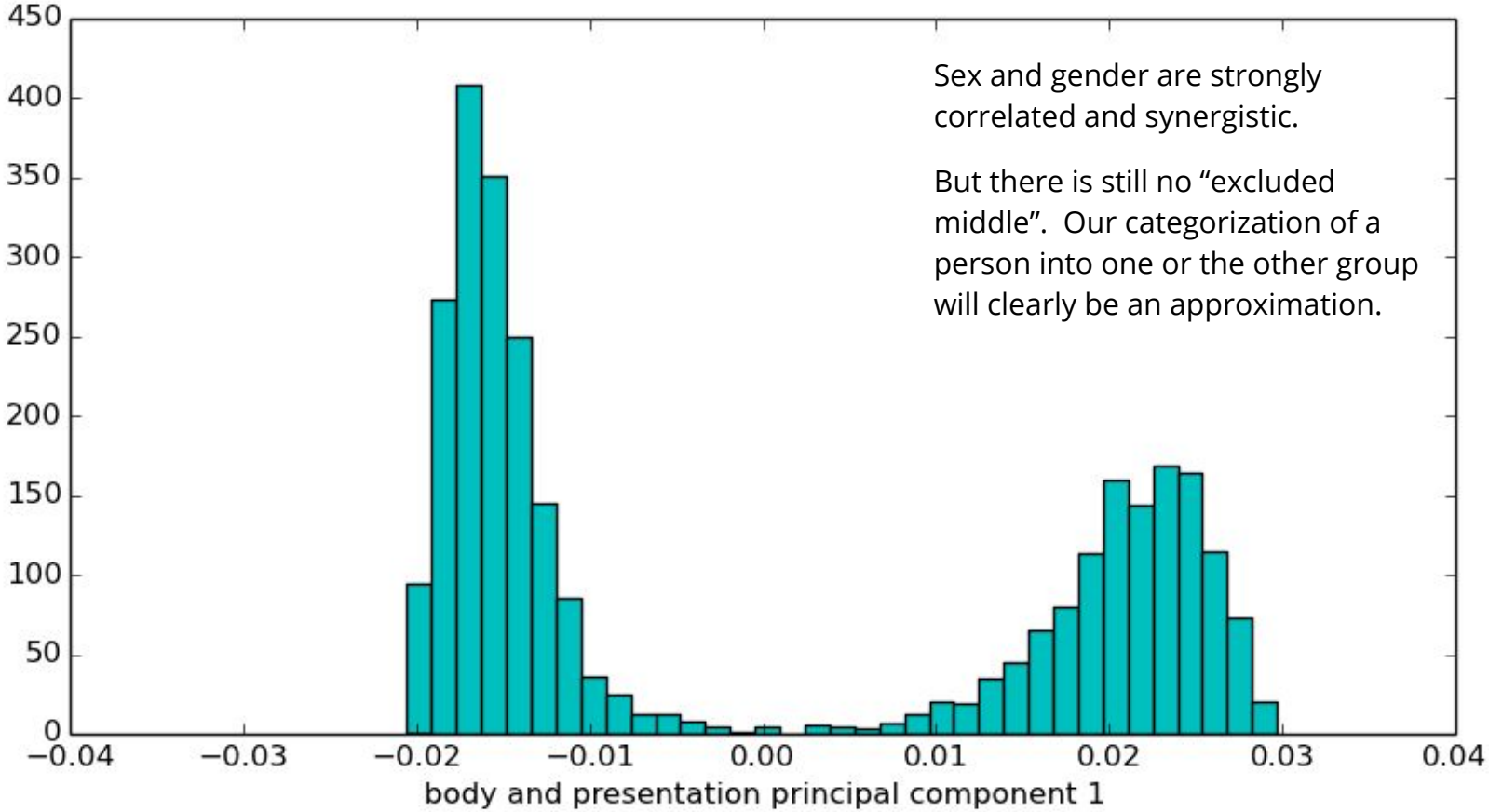
```
-0.463768 Penis
-0.327008 HeightGt5ft6
 0.277065 BeenPregnant
 0.414318 Menstruate
 0.460653 Menstruated
 0.466218 Vagina
```


700
600
500
400
300
200
100
0
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04
body principal component 1
A histogram of everyone along that axis shows the bimodality (or “binary”) of gender (or more properly of sex) emerge.


-0.241600 MensRoom
-0.229023 MaleName
-0.198831 ShaveFace
-0.176989 Ties
-0.164280 Boxers
-0.158070 Beard
-0.101432 ShooterGame
-0.086268 FistFight
-0.080459 WorkBoots
-0.067828 Football
-0.062931 Callouses
-0.059358 Repairs
-0.042474 Motorcycle
-0.017448 Hunt
-0.014633 Gun
-0.005504 Pants
0.003839 BookClub
0.013731 Dishes
0.025461 Cook
0.033784 Married
0.077763 Bake
0.092525 Wax
0.096104 Colorful
0.111414 LongNails
0.119557 Pedi
0.120612 Mani
0.156623 Stockings
0.172770 LongHair
0.184915 HighHeels
0.186408 ShavePits
0.193159 PiercedEar
0.203020 PaintNails
0.206033 Lipstick
0.206683 Ponytail
0.210598 Dresses
0.219766 ShaveLegs
0.221578 Makeup
0.234945 FemName
0.237179 Panties
0.244970 WomensRoom
0.245739 Bra
450
400
350
300
250
200
150
100
50
0
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04
presentation principal component 1

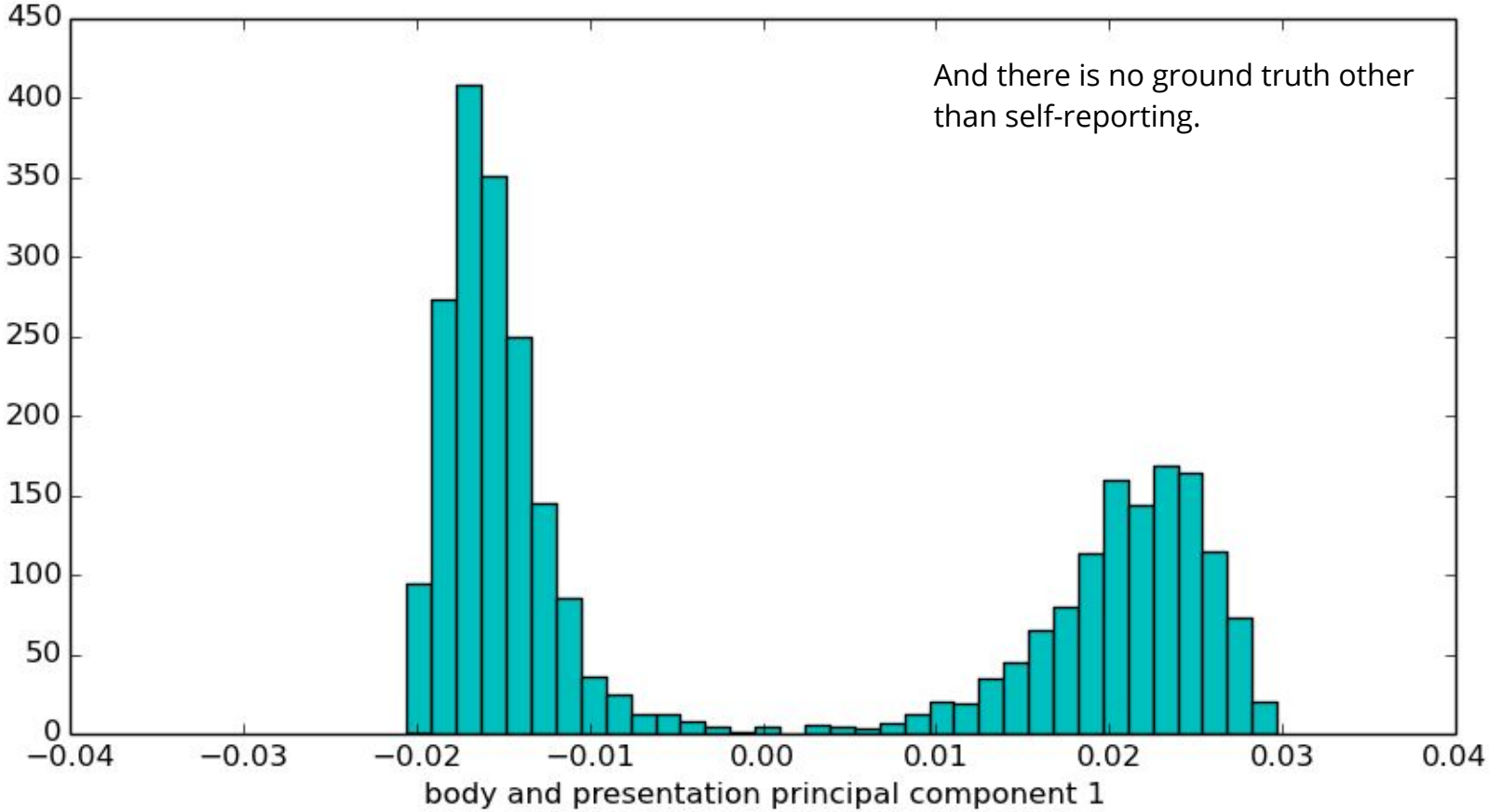


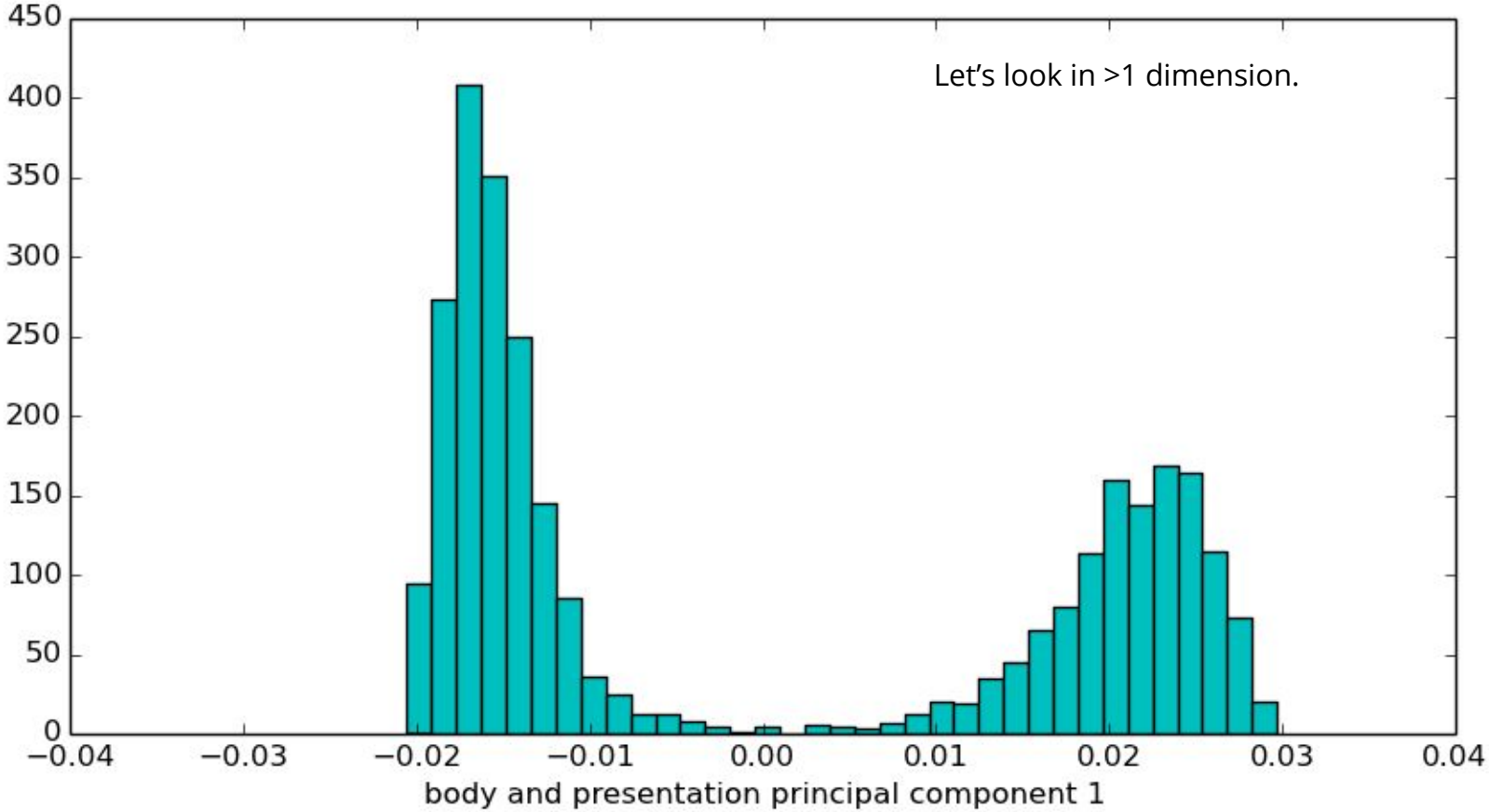
If we combine the body and presentation variables we have a sex-gender “spectrum”, which sharpens the peaks somewhat relative to analysis with either body or presentation alone.

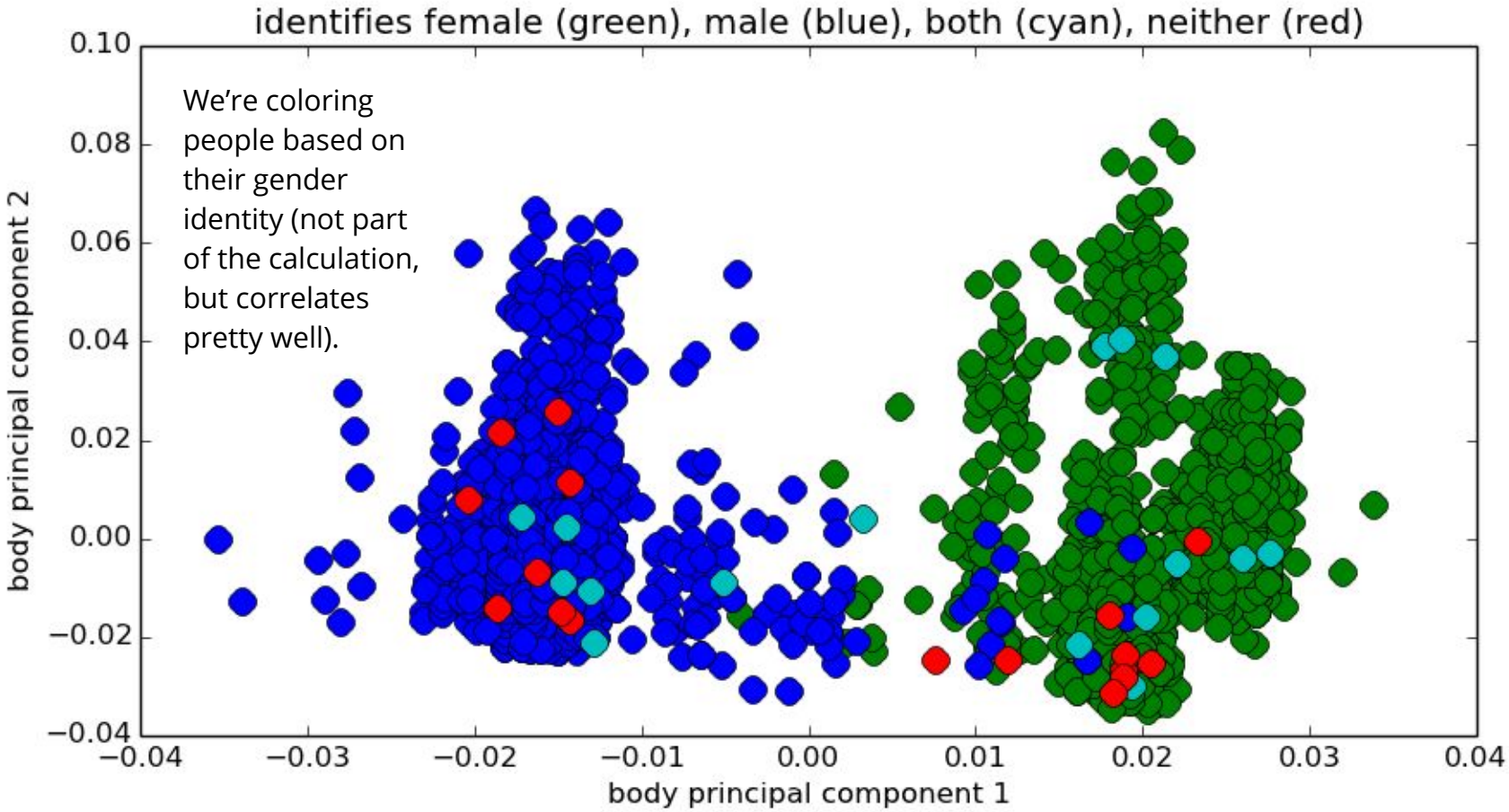


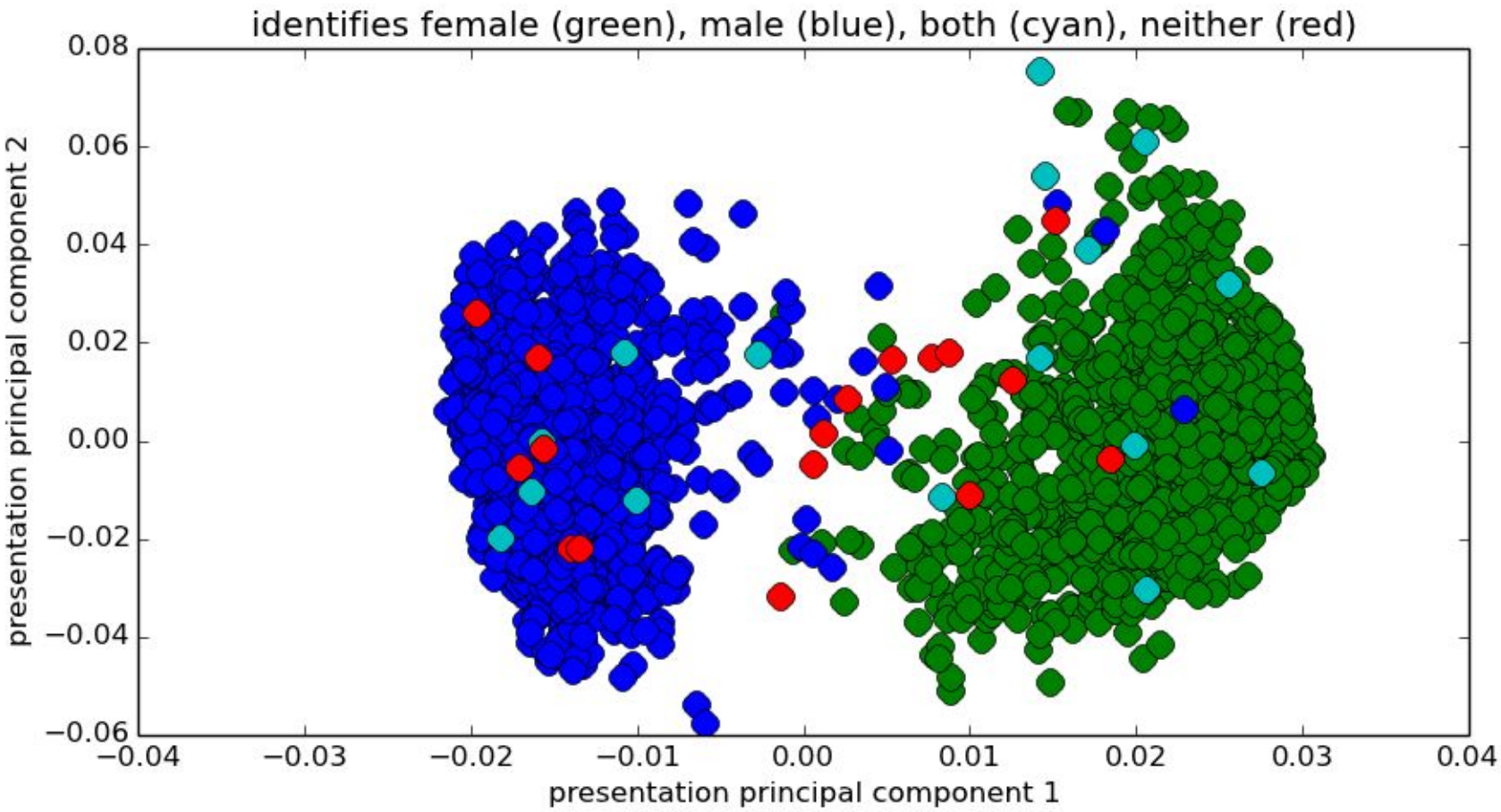
Sex and gender are strongly correlated and synergistic.

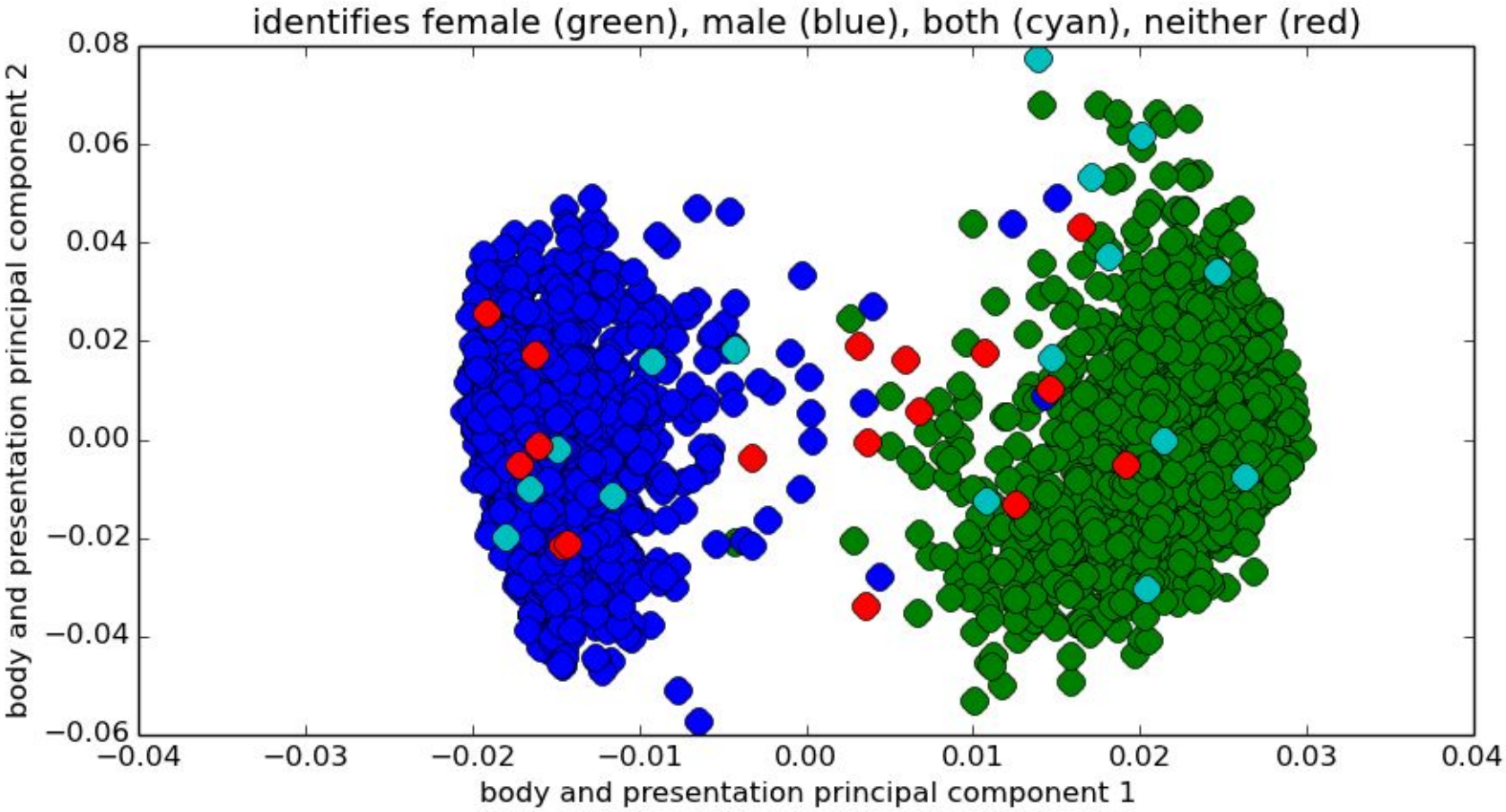
But there is still no “excluded middle”. Our categorization of a person into one or the other group will clearly be an approximation.

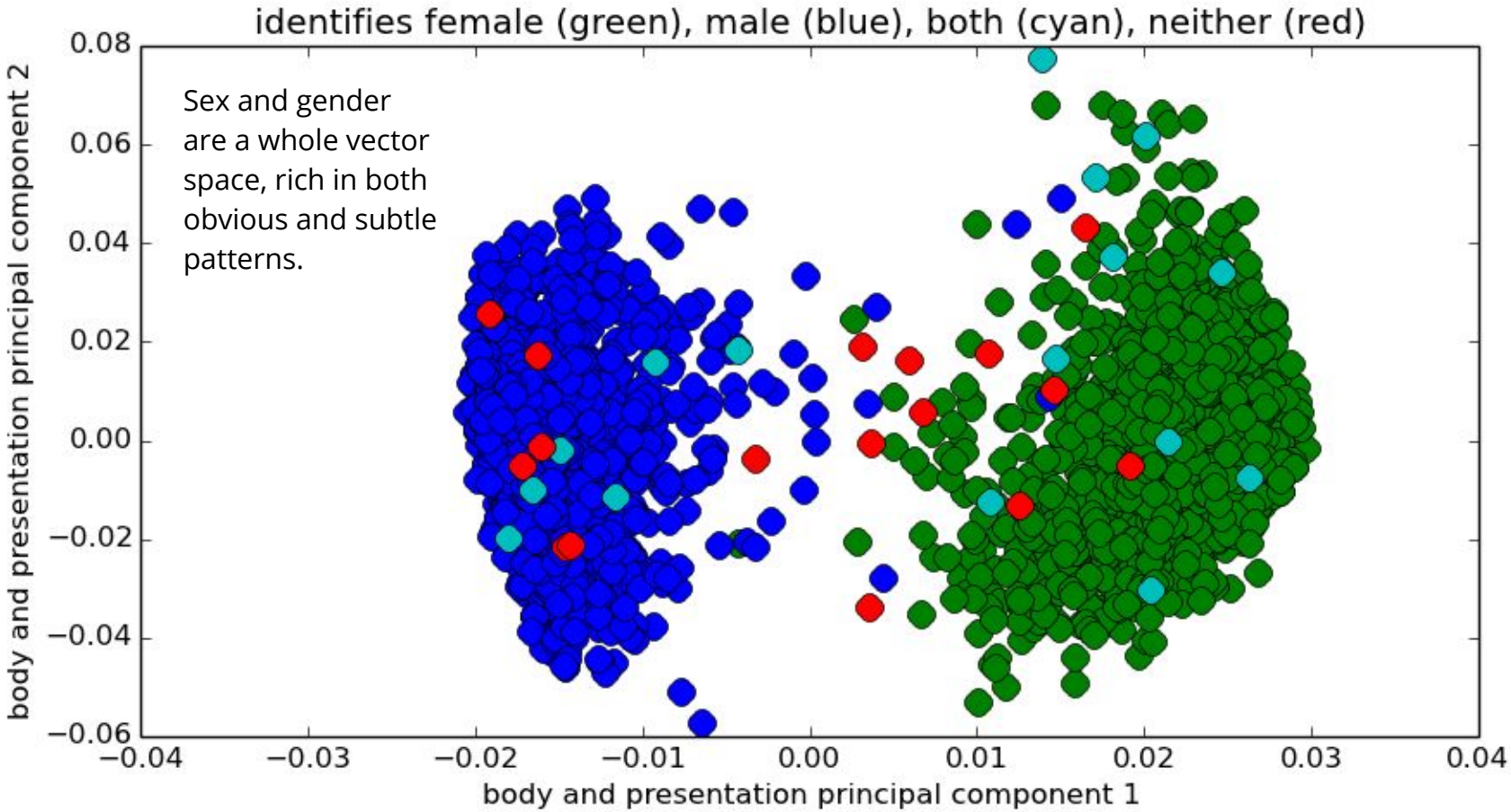

And there is no ground truth other than self-reporting.
450
400
350
300
250
200
150
100
50
0
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04
body and presentation principal component 1

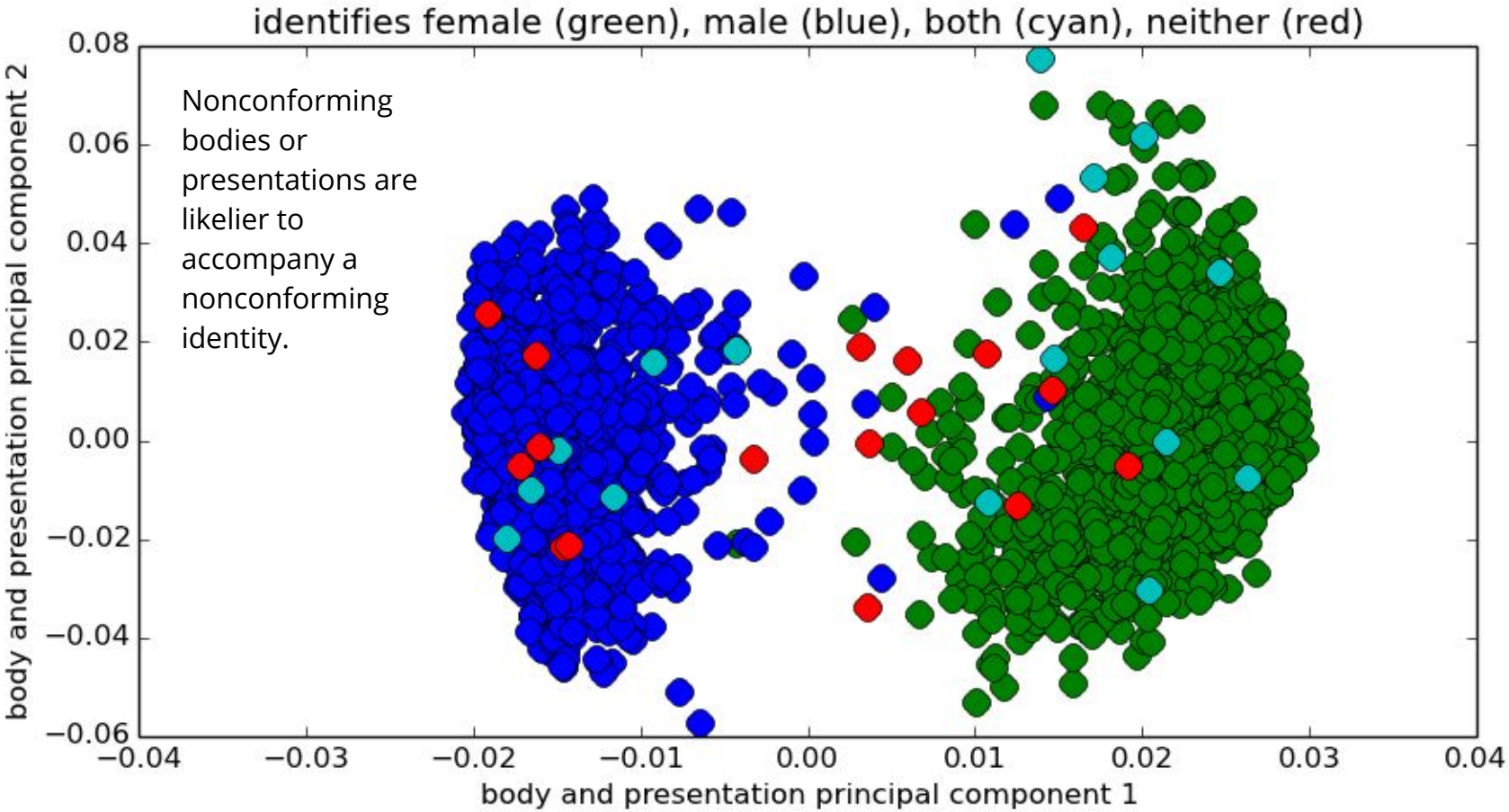

Let’s look in >1 dimension.
450
400
350
300
250
200
150
100
50
0
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04
body and presentation principal component 1

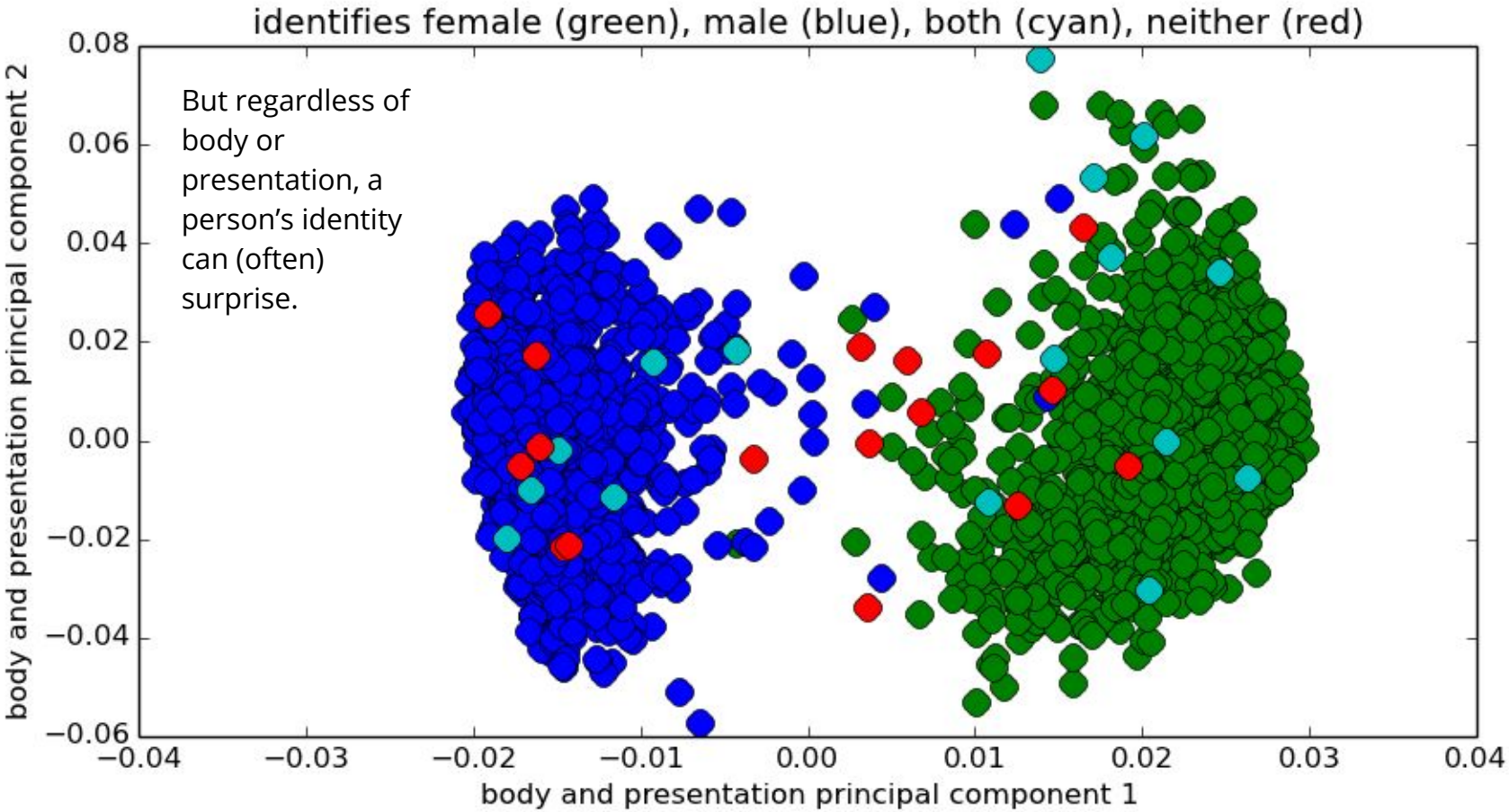

identifies female (green), male (blue), both (cyan), neither (red)
We're coloring people based on their gender identity (not part of the calculation, but correlates pretty well).
body principal component 2
body principal component 1
0.10
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04


identifies female (green), male (blue), both (cyan), neither (red)
presentation principal component 2
presentation principal component 1
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04


identifies female (green), male (blue), both (cyan), neither (red)
body and presentation principal component 2
body and presentation principal component 1
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04


identifies female (green), male (blue), both (cyan), neither (red)
Sex and gender are a whole vector space, rich in both obvious and subtle patterns.
body and presentation principal component 2
body and presentation principal component 1
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04


identifies female (green), male (blue), both (cyan), neither (red)
Nonconforming bodies or presentations are likelier to accompany a nonconforming identity.
body and presentation principal component 2
body and presentation principal component 1
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04


identifies female (green), male (blue), both (cyan), neither (red)
But regardless of body or presentation, a person's identity can (often) surprise.
body and presentation principal component 2
body and presentation principal component 1
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.04
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
0.04

So again:

There are no rules for identity.

We see the gender binary.

We see the gender “spectrum”.

We see that sex-gender-sexuality-orientation is in fact higher-dimensional.

Presentation predicts identity more strongly than body data does.

Body and behavior are strong predictors of gender identity, weaker predictors of other identities.

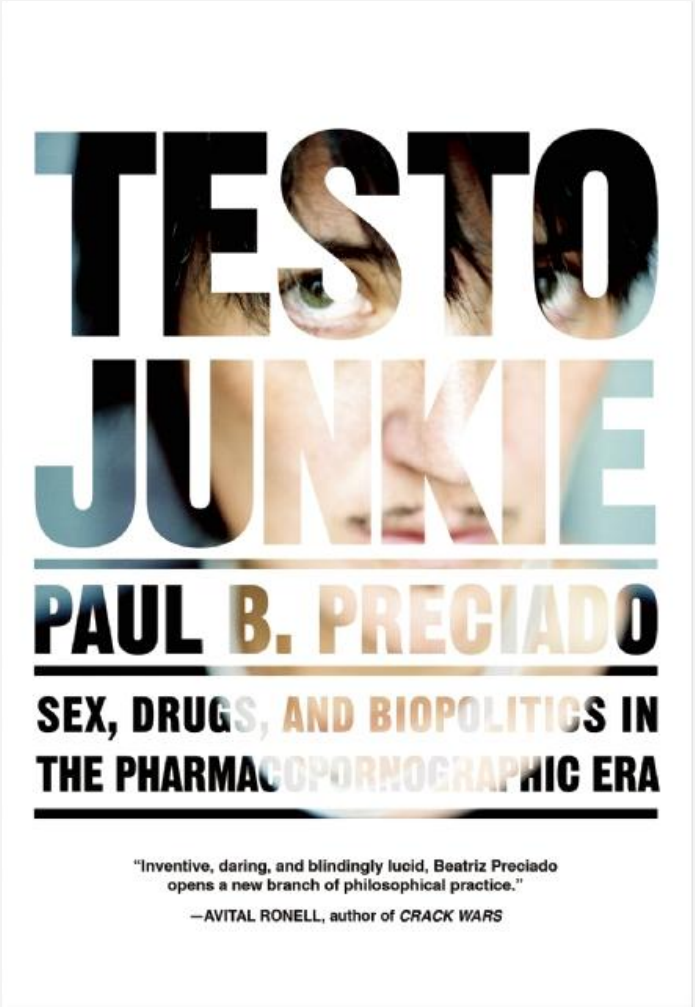
More people are intersex, trans, or gender nonconforming than you probably think.

Same-sex sexual attraction is more common than same-sex romantic attraction.

Same-sex attraction among women is extremely common.

Young people are increasingly nonconformant to either old identities or gender/sexuality binaries.

Attempts to validate identity with a body correlate will fail and do harm (cf. sex testing in the Olympics).


TESTO
JUNKIE
PAUL B. PRECIADO
SEX, DRUGS, AND BIOPOLITICS IN
THE PHARMACOPORNOGRAPHIC ERA
"Inventive, daring, and blindingly lucid, Beatriz Preciado
opens a new branch of philosophical practice."
—AVITAL RONELL, author of CRACK WARS

XF

XENOFEMINISM

A Politics for Alienation

Laboria Cuboniks

New Tools that Generate

New Languages that Reveal

New Relations that Require

New Contracts based on

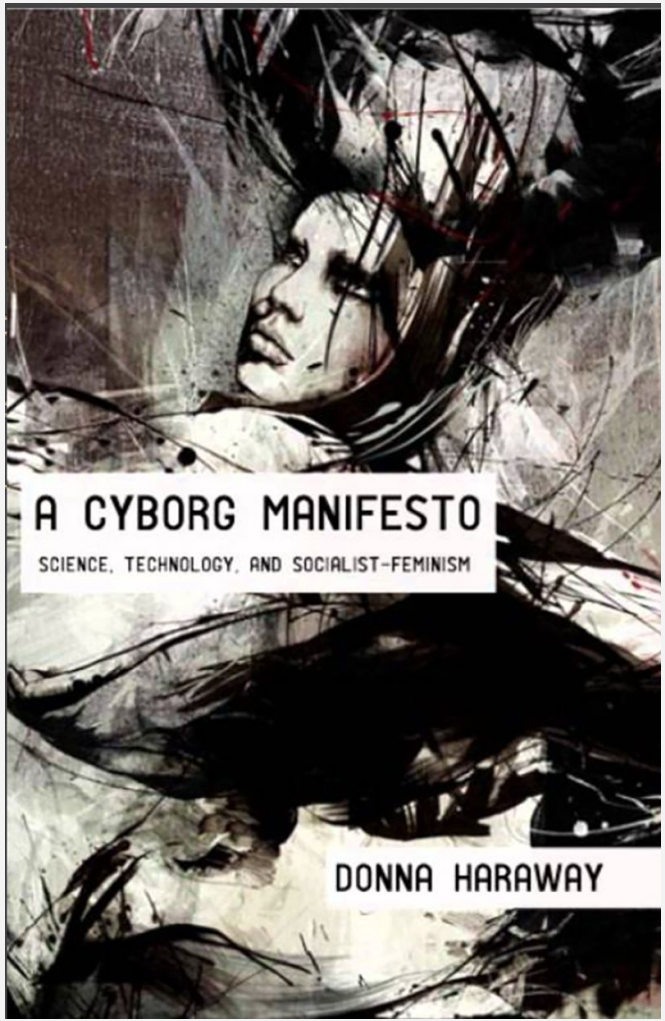
New Ontology

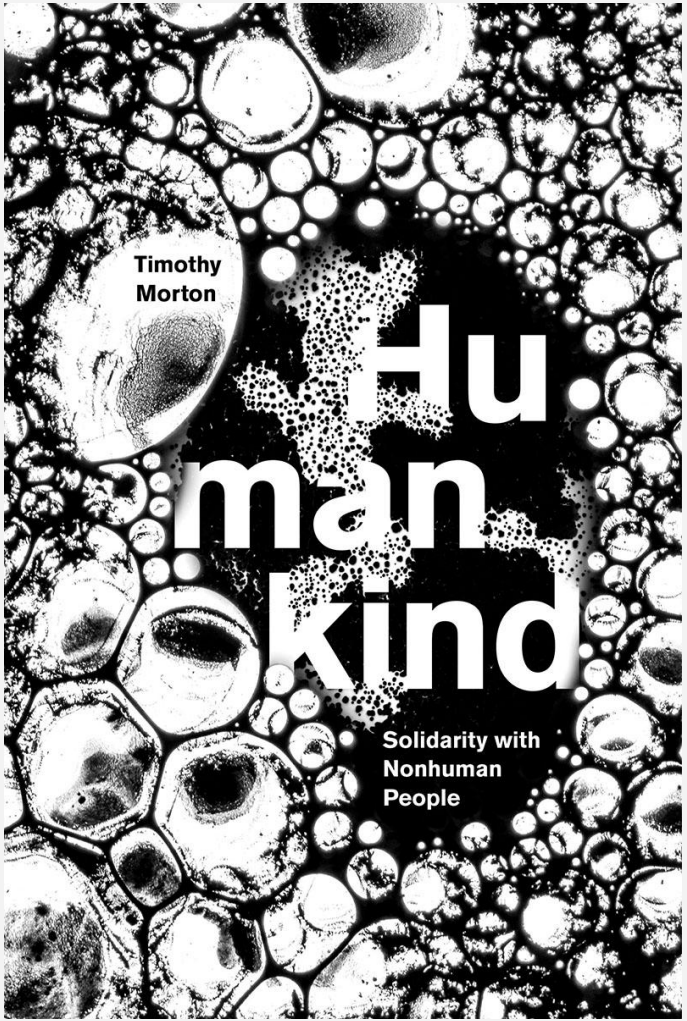
Ideology:

a system of ideas and ideals, especially one which forms the basis of economic or political theory and policy.

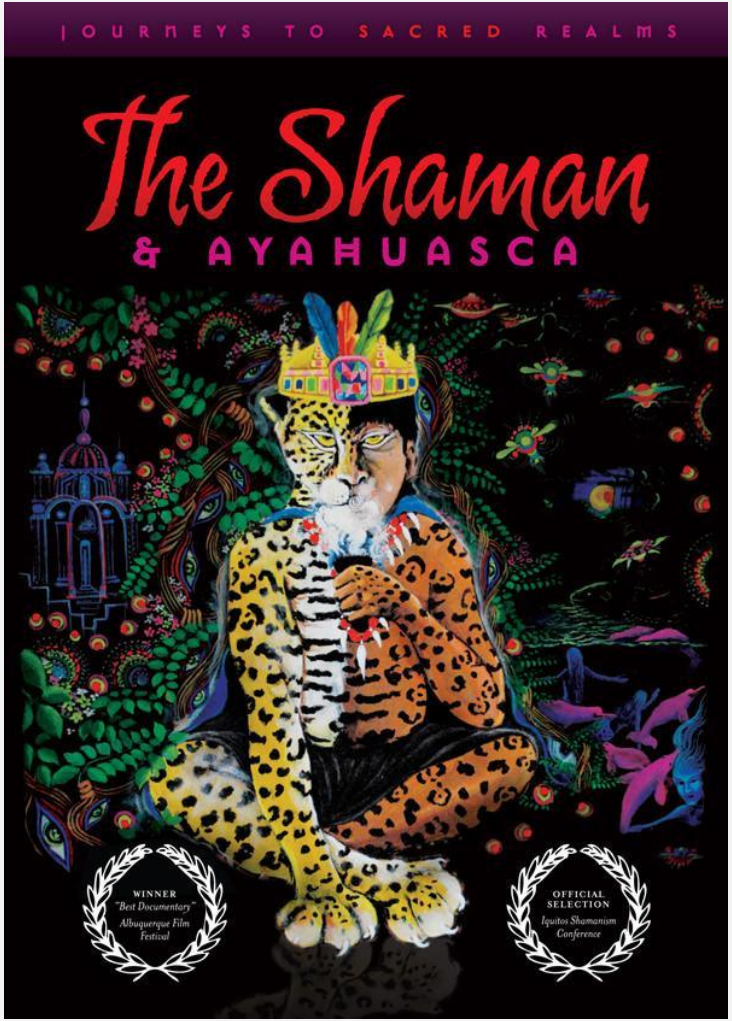
Ontology:

the branch of metaphysics dealing with the nature of being.


A CYBORG MANIFESTO
SCIENCE, TECHNOLOGY, AND SOCIALIST-FEMINISM
DONNA HARAWAY


Timothy
Morton
Hu
man
kind
Solidarity with
Nonhuman
People

POLICE


JOURNEYS TO SACRED REALMS
The Shaman
& AYAHUASCA
WINNER
"Best Documentary"
Albuquerque Film Festival
OFFICIAL SELECTION
Iquitos Shamanism Conference

Artists and Machine Intelligence

@artwithMI
@kenricmcdowell