When A.I. makes art, is it still Art?

University of San Francisco
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Intelligence is not Artificial

Why the Singularity is not coming any time soon and other Meditations on the Post-Human Condition and the Future of Intelligence

piero scaruffi

Thinking about Thought

the structure of life and the meaning of matter

BRAIN

Volume 1
In the "Thinking about Thought" series

piero scaruffi

A History of Silicon Valley
1900-2015

Almost a third edition 2015 update

Olivetti AI Center, 1987
Piero Scaruffi

- Cultural Historian
- Cognitive Scientist
- Blogger
- Poet
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This is Part 10

- See http://www.scaruffi.com/singular for the index of this Powerpoint presentation and links to the other parts

1. Classic A.I. - The Age of Expert Systems
2. The A.I. Winter and the Return of Connectionism
3. Theory: Knowledge-based Systems and Neural Networks
4. Robots
5. Bionics
6. Singularity
7. Critique
8. The Future
9. Applications
10. Machine Art
11. The Age of Deep Learning
12. Natural Language Processing
A Simplified History of the Visual Arts from 1916 to 2016
This is an Artwork

- Paul Strand

“Abstraction, Twin Lakes, Connecticut” (1916)
This is an Artwork

- Marcel Duchamp

“Fountain” (1917)
This is an Artwork

- Kazimir Malevich

“White on White” (1918)
This is an Artwork

• Man Ray

“The Enigma of Isidore Ducasse” (1920), a sewing machine wrapped in an army blanket.
This is an Artwork

- Josef Albers

“The City” (1928)
This is an Artwork

- Paul Klee

“Ad Parnassum” (1932)
This is an Artwork

- Robert Rauschenberg
This is an Artwork

- Franz Kline

“High Street” (1956)
This is an Artwork

- Barnett Newman

Abraham, 1949
This is an Artwork

- Jackson Pollock

“Blue Poles” (1952)
This is an Artwork

- Frank Stella

(1959)
This is an Artwork

• Yves Klein (1928, France)

“Anthropometries of the Blue Period” (1960)
This is an Artwork

- Andy Warhol

“25 Marilyns” (1962)
This is an Artwork

- Shigeko Kubota

“Vagina Painting" (1965)
This is an Artwork

- Bruce Nauman

“Self Portrait as a Fountain” (1966)
This is an Artwork

• Henry Moore

"Oval with Points" (1970)
This is an Artwork

- Christo

The Reichstag (1971)
This is an Artwork

- Lynda Benglis

(Artforum advertisement1, 974)
This is an Artwork

- Marina Abramovic

“Imponderabilia” (1977)
A Short History of Machine Art
Machine Art

- Harold Cohen’s painting machine AARON (1973)
- David Cope’s automatic music composition (1981)
- Peter Todd’s "A Connectionist Approach to Algorithmic Composition" (1989)
- Ken Goldberg's painting machine "Power and Water" (1992)
Machine Art

AARON
Machine Art

- Matthew Stein's online robotic artist PumaPaint (1998)
- David Cope's music composer Emily Howell (2003, that release the albums "From Darkness Light" and "Breathless")
- Pindar Van Arman’s painting robots (2006)
Machine Art

- Harvey Moon's drawing machines (2010)
- Patrick Tresset 's portrait-maker robot Paul (2011)
- The album "Iamus" (2012), that contains four computer-composed compositions for full orchestra performed by the London Symphony Orchestra
Machine Art

- Ken Stanley’s polyphonic arranger MaestroGenesis (2012)
- Oliver Deussen’s painting robot e-David (2013)
- Simon Colton’s program The Painting Fool (2013)
Machine Art

- Supko & Bill Seaman’s program that composes the album "S_traits" (2014, voted by the critics of the New York Times as one of the best recordings of the year)

The New York Times

Classical Critics Pick the Top Music Recordings of 2014

SIBELIUS, THOMAS ADÈS: VIOLIN CONCERTOS
Augustin Hadelich, violinist; Royal Liverpool Philharmonic Orchestra, Hannu Lintu, conductor (Avie). The impressive young violinist Augustin Hadelich partners with the Royal Liverpool Philharmonic Orchestra and the conductor Hannu Lintu for an exciting performance of Thomas Adès’s kaleidoscopic, emotional Violin Concerto “Concentric Paths” (2005) and a passionate rendition of the Sibelius Violin Concerto. VIVIEN SCHWEITZER

‘S_TRAITS’
Bill Seaman, media artist; John Supko, composer (Cotton Goods). This hypnotic disc is derived from more than 110 hours of audio sourced from field recordings, digital noise, documentaries and piano music. A software program developed by the composer John Supko juxtaposed samples from the audio database into multitrack compositions; he and the media artist Bill Seaman then finessed the computer’s handiwork into these often eerily beautiful tracks. VIVIEN SCHWEITZER

TRIO MEDIAEVAL: ‘AQUIILONIS’ (ECM New Series). So varied are the sources — from 12th-century Italian devotional songs to contemporary works by John Zorn and John Luther Adams — that it is hard to find the

TRIO MEDIAEVAL: ‘AQUIILONIS’ (ECM New Series). So varied are the sources — from 12th-century Italian devotional songs to contemporary works by John Zorn and John Luther Adams — that it is hard to find the
Deep Learning Art

• Andrew Zisserman (2014): visualizing what a neural network is learning while it is being trained

Deep Inside Convolutional Networks: Visualising Image Classification Models and Saliency Maps

Karen Simonyan          Andrea Vedaldi          Andrew Zisserman
Visual Geometry Group, University of Oxford
{karen, vedaldi, az}@robots.ox.ac.uk

Abstract
This paper addresses the visualisation of image classification models, learnt using deep Convolutional Networks (ConvNets). We consider two visualisation techniques, based on computing the gradient of the class score with respect to the input image. The first one generates an image, which maximises the class score [3], thus visualising the notion of the class, captured by a ConvNet. The second technique computes a class saliency map, specific to a given image and class. We show that such maps can be employed for weakly supervised object segmentation using classification ConvNets. Finally, we establish the connection between the gradient-based ConvNet visualisation methods and deconvolutional networks [13].
Deep Learning Art

Understanding Deep Image Representations by Inverting Them

Aravindh Mahendran
University of Oxford

Andrea Vedaldi
University of Oxford
Deep Learning Art

Andrea Vedaldi
Visualising deep networks
Is this an Artwork?

Is this an Artwork?

• Alexander Mordvintsev’s "Inceptionism“ (2015)
Is this an Artwork?

• Audun M. Øygard (2015)
Is this an Artwork?

• Gary Boodhoo (2016)
Is this an Artwork?

Leon Gatys and Alexander Ecker’s "A Neural Algorithm of Artistic Style" (2015)

Leonid Afremov  Neural Network
Visually-Aware Fashion Recommendation and Design with Generative Image Models

Wang-Cheng Kang
UC San Diego

Chen Fang
Adobe Research

Zhaowen Wang
Adobe Research

Julian McAuley
UC San Diego

CNN + GAN = Learn a person's favorite style of fashion and generate personalized clothing

(a) Generated Images

Synthesize
New
Clothing

GAN
Is this an Artwork?

• William Anderson used old-fashioned Markov chains (2017)

Using Machine Learning to Make Art

Markov chains are probably best known for powering autocomplete on search engines. Here’s what happened when I applied them to art.
Is this an Artwork?

Is this an Artwork?

- Donya Quick (2015): automated music composition
Is this an Artwork?

USC’s A.I. (2016)

“And from the other side of my apartment/
An empty room behind the inner wall/
A thousand pictures on the kitchen floor/
Talked about a hundred years or more”
Is this an Artwork?

*artnet*news

Google’s ‘Inceptionism’ Art Sells Big at San Francisco Auction

You've never seen 'Starry Night' like this before.
Is this an Artwork?

WaveNet (2016)
Ross Goodwin (2016)
Is this an Artwork?

Stephen Thaler’s DABUS (2017)

DABUS’s output gets progressively more surreal as cognitive flow is reduced
Is this an Artwork?

Maya Ackerman performing music and lyrics composed by algorithms Alysia and Mable (San Jose L.A.S.E.R., 2017)
AI Art

- AI generates new style of art: Ahmed Elgammal (Rutgers)
AI Art

- Mario Klingemann (Google artist in residence 2016)

"Memories of Passersby I" (2018)
AI Art

• GAN artists: Obvious

Obvious
@obv_iou
Edmond de Belamy (2018)
AI Art

- GAN artists: Robbie Barrat
AI Art

• GAN artists: Helena Sarin
AI Art

- GAN artists: Tom White

*Treachery of ImageNet (2017)*

How do modern AI algorithms perceive common objects?

- Machines have their own way of seeing
- We can create art for and by machines
- Through art we can appreciate the ways that machines perceive the world

*Perception Engines (2018)*

10 riso prints

Fails Google Safe Search: extremely “Adult” and “Racy”

Amazon considers this “Explicit Nudity”

Yahoo considers this “NSFW”
AI Art

- GAN artists: Tom White
AI Art

- Robot artist: Ai-Da

Introducing Ai-da, the world's first ultra-realistic humanoid AI robot artist
AI Art

artificial intelligence
THE END OF ART AS WE KNOW IT

the most famous artist

The McLoughlin Gallery

11a - 6p
Tuesday June 27
49 Geary St #200
AI Art

• Refik Anadol: interactive installations

“Melting Memories” (2018)

“Machine Hallucination” (2019)
AI Art

- The AI-Art Boom (2019)
Is This an Artwork?

• Blaise Aguera y Arcas, principal scientist at Google (2016):

"We're on the edge of a new frontier in art and creativity — and it's not human"
Is This an Artwork?

A New AI Can Write Music as Well as a Human Composer

Futurism.com, 2017
Is This an Artwork?

• A poetry book written by Microsoft's chatbot Xiaoice published in May 2017
Is This an Artwork?

• Paris-based art collective Obvious: “Portrait of Edmond Belamy” (2018), made by a neural network trained with a dataset of 15,000 portraits painted between the 14th and 20th centuries, sells at a New York auction for $432,500
Is This an Artwork?

- AICAN (Ahmed Elgammal, Rutgers, 2017): CAN (Creative Adversarial Networks)
Is This an Artwork?

- AICAN (solo exhibition, New York, 2019)
Is This an Artwork?

• OpenAI Jukebox (2020)
Juergen Schmidhuber

FORMAL THEORY OF FUN
& NOVELTY & SURPRISE &
ATTENTION & CREATIVITY &
CURIOSITY & ART & SCIENCE &
HUMOR

http://www.idsia.ch/~juergen/creativity.html
Discussion

• Authorship: Who is the creator of Art?
• Institutionalization: Who decides what is Art?
• Interpretation: What is the meaning/ purpose/ function/ value of Art?
Authorship

- Who should take credit?

Leopardi, “Canto notturno di un pastore errante dell'Asia”
Authorship

• Natural beauty vs constructed beauty? Is any beauty not natural?
Authorship

• What did the art collectors buy at the DeepDreams auction? The output of a neural network is a digital file, which can be copied in a split second. The only way to guarantee that no other copies will be made is to physically destroy the neural network.

Gray Area Foundation for the Arts and Research at Google invite you to join us for a benefit auction and art exhibition of: DeepDream: The art of neural networks a special gallery show of artworks made using artificial neural networks. The entire limited edition collection of works will be auctioned during this special evening.
Institutionalization

- Who decides what is Art?
- Everything is potentially Art
Institutionalization

• What does it take to be called Art?
Institutionalization

• What does it take to be called Art?
Institutionalization

• What does it take to be called Art?
Institutionalization

• Even harder to decide what is Art in “the age of mechanical reproduction”
• Art is what the Pope, the princes, the art critic, the art gallery, the art museum decide that it is Art
• Art is NOT in the eye of the beholder
Institutionalization

- Art is communication, but art is more the noise than the signal (style/content)
- Art is useless
Interpretation

- What is the meaning/function/value of Art?
- Why care?
- Isn't Science enough?
- If an artist creates and never shows it to anyone, is it art?
- Art is a dialog between the artist and society
Interpretation

- What goes into a museum?
  - Michelangelo’s David was commissioned by the Church for a cathedral
  - It was instead placed in a public square (1504)
  - Today the statue is at the Galleria dell'Accademia
  - It has been displayed in the cathedral only once for one day (12 November 2010) and it was a replica
  - A replica stands in the public square
Interpretation

• What goes into a museum?
  – The David?
  – The marble?
  – Michelangelo?
  – ?
Interpretation

- Art is a process
- To understand why something is reputed beautiful by someone you have to understand a whole system, its history, its values, its processes
- Aesthetic experience cannot be reduced to a simple "Like"
Interpretation

• Who appreciates human art? Humans.
• Who appreciates machine art? Humans.

David Hickey  Rosalind Krauss  Lucy Lippard  Brian Sewell  Frank Popper  Arthur Danto  Philippe Daverio
Interpretation

• Can a machine critique its own work of art? Or the work of art of another machine? Or the work of art of a human artist?
Appendix

• For the record…
• Beauty in Science: solving a complex problem in a simple way
Appendix

• The way that a neural network can be “hijacked” to do art may help understand the brain of the artist.
What is Creativity?

• Joy-Paul Guilford: "Creativity" (1950)
• Frank Barron: "Creativity and Psychological Health" (1963)
• Arthur Koestler: "The Act of Creation" (1964)
• Howard Gardner: "Frames of Mind" (1983)
• Margaret Boden: "The Creative Mind" (1990)
Next…

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Intelligence is not Artificial
Expanded Edition
Past, Present and Future of Artificial Intelligence

Why the Singularity is not coming any time soon.
Life in the coming age of incredibly stupid machines.

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