

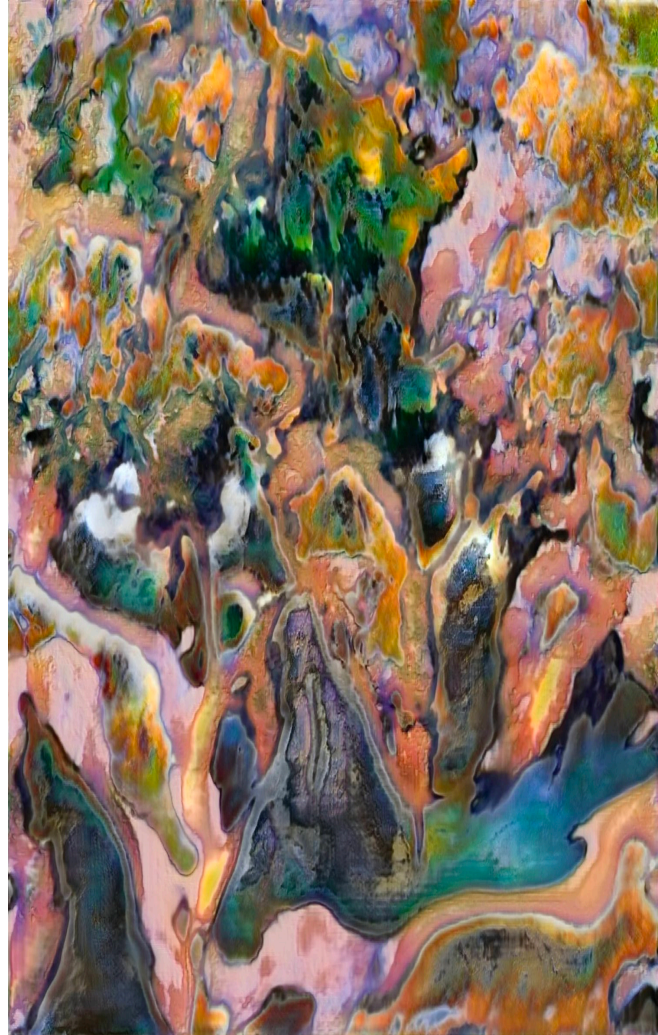
# On the Impact of Machine Learning on Copyright

**Freddy Lecue**

Chief AI Scientist, CortiX, Thales, Montreal – Canada  
Inria, Sophia Antipolis – France

Seoul Copyright Forum  
Seoul, South Korea  
November 20th, 2019

@freddylecue  
freddy.lecue@inria.fr  
<https://tinyurl.com/freddylecue>



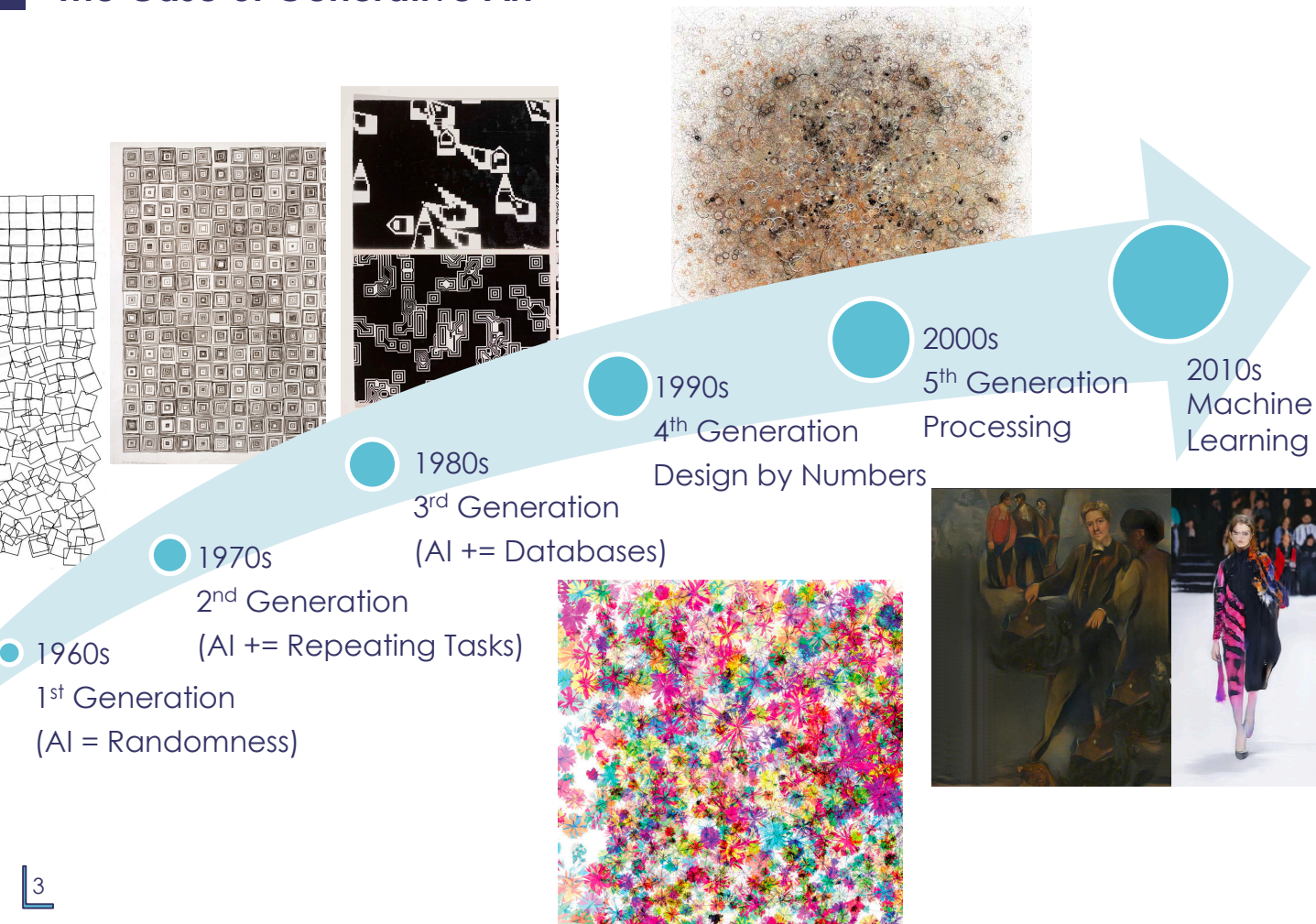
AI Generated Landscape #6 - Robbie Barrat, 2018



# Computers and The Creative Process



# The Case of Generative Art



# AI And Creativity

“Claims that AI is creating art on its own and that machines are somehow entitled to copyright for this art are simply naive or overblown”.

<https://www.artnome.com/news/2019/3/27/why-is-ai-art-copyright-so-complicated>

We are not any close to Artificial General Intelligence.

## AI and Literary Work (Japan)

A Japanese AI program has co-authored a short-form novel that passed the first round of screening for a national literary prize - Hoshi Shinichi Literary Award, contest

### The Day A Computer Writes A Novel

“...I writhed with joy, which I experienced for the first time, and kept writing with excitement. The day a computer wrote a novel. The computer, placing priority on the pursuit of its own joy, stopped working for humans.”

第3回  
日経  
未来小説コンテスト

一般部門  
学生部門  
ジュニア部門

あなたの理系的発想力を存分に発揮して  
読む人の心を刺激する物語を書いてください。  
規定字数：10,000文字以内 賞金110万円

作品募集  
学生部門、  
ジュニア部門  
同時募集  
6月12日  
～9月30日

応募要項や応募先は <http://hoshiaward.nikkei.co.jp/> 未来実業作品は日経ストアで無料ダウンロードできます。 >>> [store.nikkei.com](http://store.nikkei.com)

日本経済新聞社 IHI JBCC TOKYO ELECTRON AMADA NSK

## An and Artwork (The Netherlands)



A portrait entitled The Next Rembrandt, a new artwork generated by a computer that had analyzed thousands of works by the 17th-century Dutch artist Rembrandt Harmenszoon van Rijn

## AI and Music (Worldwide)



Frédéric François Chopin (UK: /'ʃɒpə̃/, US: /ʃou'pæn/, French: [ʃɔpɛ̃], Polish: [ˈʂɔpɛn]; 1 March 1810 – 17 October 1849) was a Polish composer and virtuoso pianist of the Romantic era who wrote primarily for solo piano. He has maintained worldwide renown as a leading musician of his era, one whose "poetic genius was based on a professional technique that was without equal in his generation."

<https://www.radioclassique.fr/magazine/articles/leif-ove-and-snes-joue-chopin/>

[https://en.wikipedia.org/wiki/Fr%C3%A9d%C3%A9ric\\_Chopin](https://en.wikipedia.org/wiki/Fr%C3%A9d%C3%A9ric_Chopin)

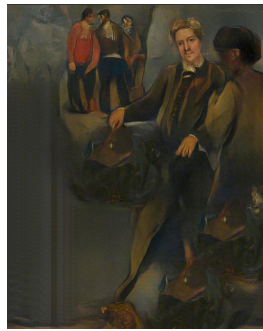
# Implication for Copyright Law

Ramalho, A. (2017). Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems. A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems (June 13, 2017).

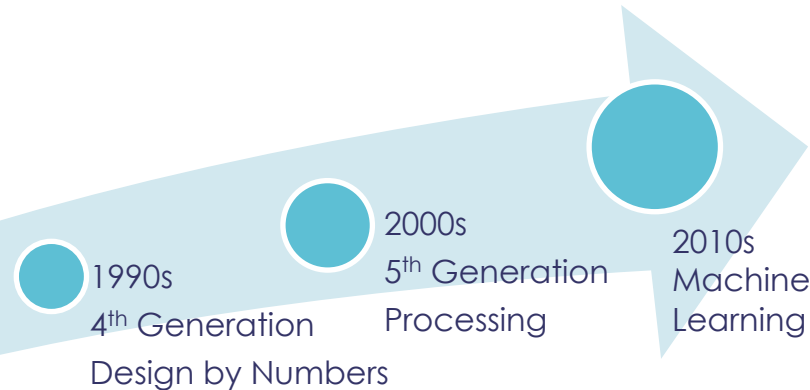
[https://www.wipo.int/wipo\\_magazine/en/2017/05/article\\_0003.html](https://www.wipo.int/wipo_magazine/en/2017/05/article_0003.html)



# Implication for Copyright Law



Volcano Dogs, Danielle Baskin on GANbreeder



1960 - ...

- **Creative works** qualify for copyright protection: **originality** is a must
- In most jurisdictions only works created by a **human** can be protected by copyright

# Implication for Copyright Law

- **Ownership not questioned**
- Program: a tool to support the creative process

1960 - 2010



Volcano Dogs, Danielle Baskin on GANbreeder

1990s

4<sup>th</sup> Generation

Design by Numbers

2000s

5<sup>th</sup> Generation

Processing

2010s

Machine Learning

1960 - ...

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Volcano Dogs, Danielle Baskin on GANbreeder

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2010 - ...

- Computer program **is no longer a tool**
- Some part of creative process is **done by machine**

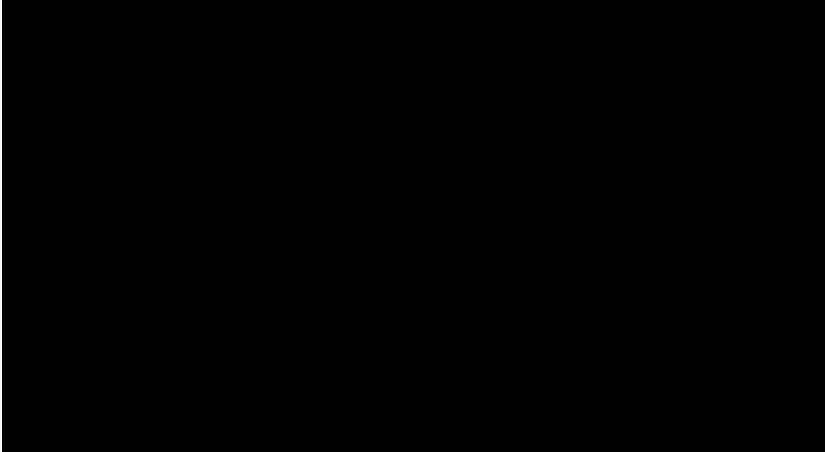
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# Commercial Impact

## Commercial Impact

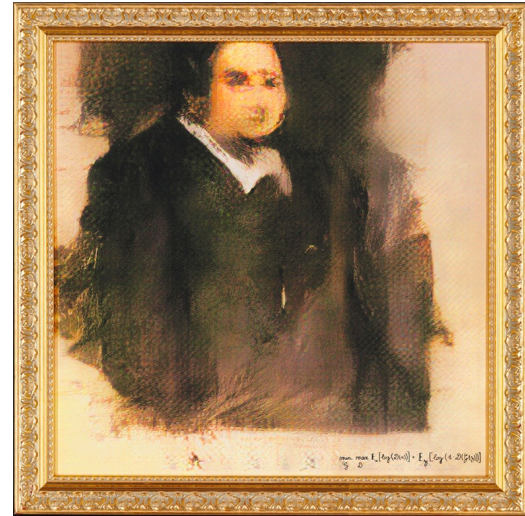
What about Machine Learning systems which are not protected by law and can be used without payment?



**Mario Klingemann**

*MEMORIES OF PASSERSBY I*

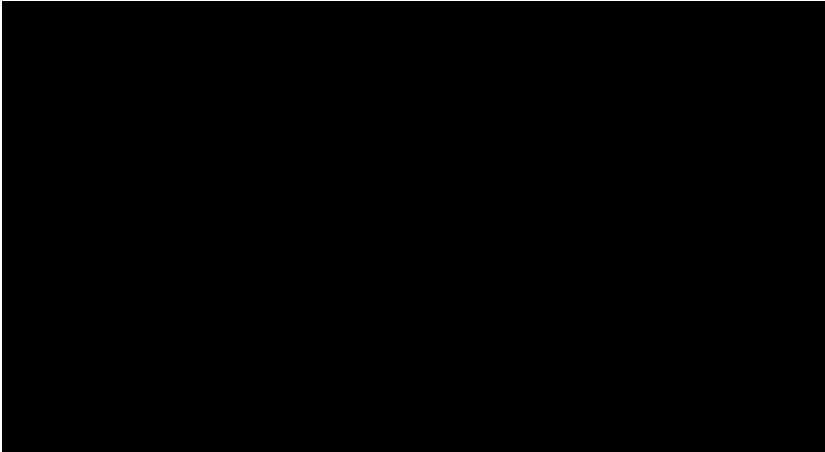
Estimate W € 30,000 — 40,000 GBP ▼ **LOT SOLD. 40,000 GBP**



Portrait of Edmond Belamy, 2018,  
created by GAN (Generative  
Adversarial Network). Sold for \$432,500  
on 25 October at Christie's in New York

## Commercial Impact

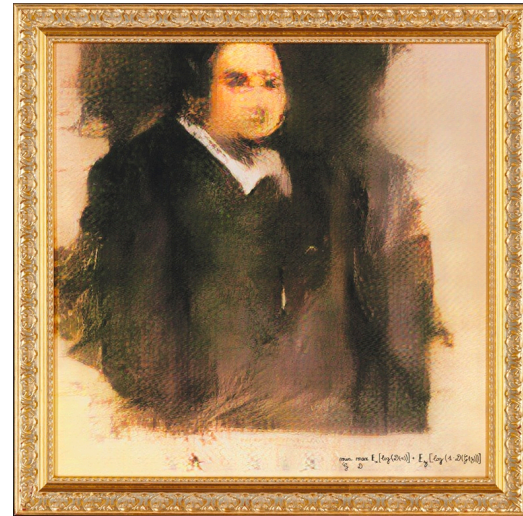
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Main **benefits** of Machine Learning systems are on:

- **Task to achieve:** designed to handle time-consuming work
- Underlying **cost** for achieving the **task**

**Not so much on the output computed / created(?)**

<http://www.sothebys.com/en/auctions/ecatalogue/2019/contemporary-art-day-auction-119021/lot.109.html>

<https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>

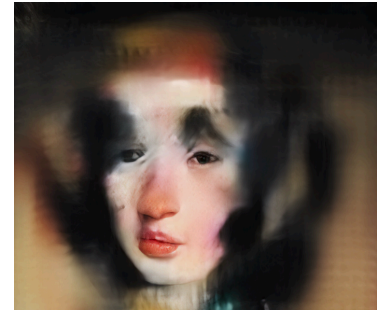


# Legal Options

# Legal Option on Copyright and Authorship

The author in copyright law is necessarily a human being (creator)

Option 1: **Attribute** authorship of works to the creator of the program



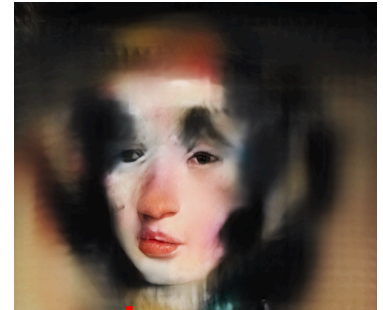
All Rights  
Reserved



# Legal Option on Copyright and Authorship

The author in copyright law is necessarily a human being (creator)

Option 2: **Deny** copyright protection for works that have been generated by a computer

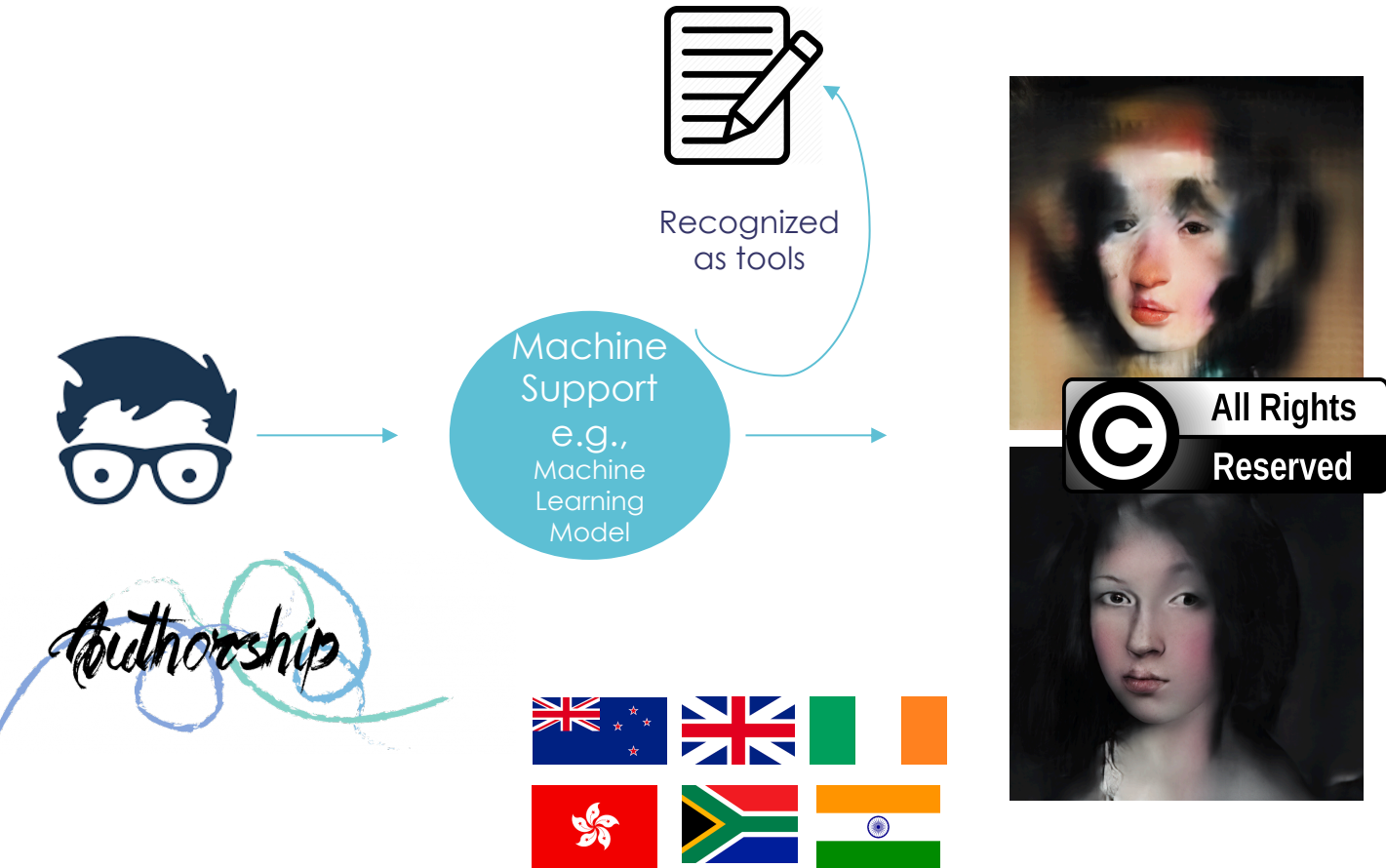


~~Authorship~~

**Why:** The machine would need to be able to achieve legal status similar to humans



# Legal Option on Computer-generated Works



# Legal Option on Computer-generated Works. Open Doors to Ambiguity

Whoever makes the arrangement: programmer, user of the program, person who sells / produces, investor, trainer, software / system team

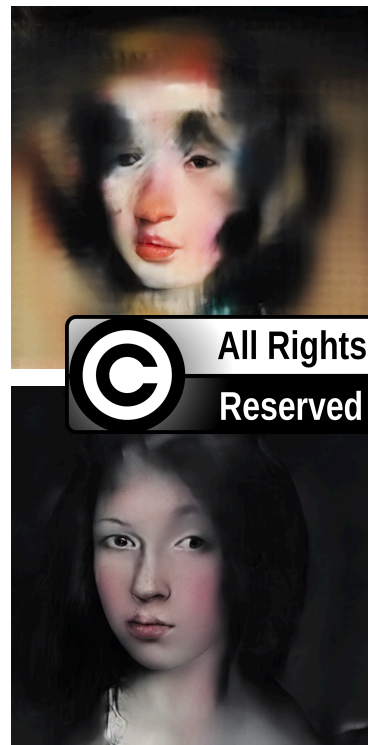


Group  
Authorship



Recognized  
as (sophisticated)  
tools

Machine  
Support  
e.g.,  
Machine  
Learning  
Model



All Rights  
Reserved

# An Illustrative Case

GANbreeder Case in USA



# GANbreeder Case – BigGAN

## BigGAN

A conditional GAN where class indices are inserted into an embedding layer in order to train the generator network to condition on the class index



[https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/biggan\\_generation\\_with\\_tf\\_hub.ipynb](https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/biggan_generation_with_tf_hub.ipynb)

# GANbreeder Case – GANBreeder

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## GANBreeder

Compose an image with genes

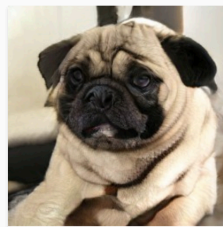
Select new gene

or

Add random gene



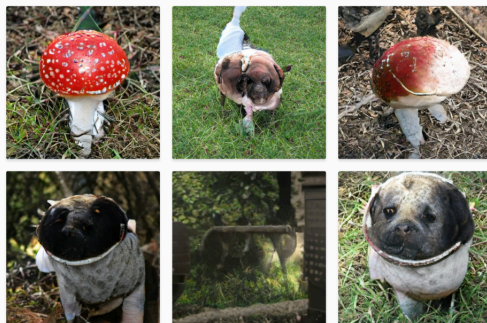
agaric



pug



Create Images



<https://ganbreeder.app/category/random>

# GANbreeder Case – AmalGAN

## BigGAN

A conditional GAN where class indices are inserted into an embedding layer in order to train the generator network to condition on the class index



[https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/biggan\\_generation\\_with\\_tf\\_hub.ipynb](https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/biggan_generation_with_tf_hub.ipynb)

## GANBreeder

Compose an image with genes

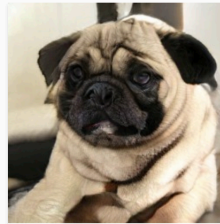
Select new gene

or

Add random gene



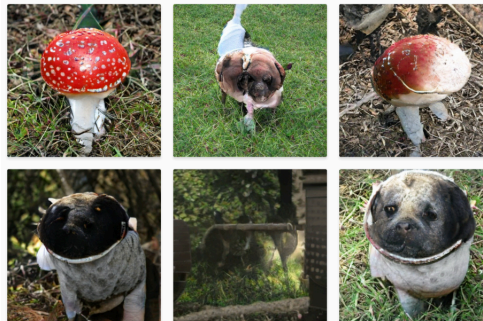
agaric



pug



Create Images



<https://ganbreeder.app/category/random>

@artboffin  
Alexander Reben

## AmalGAN



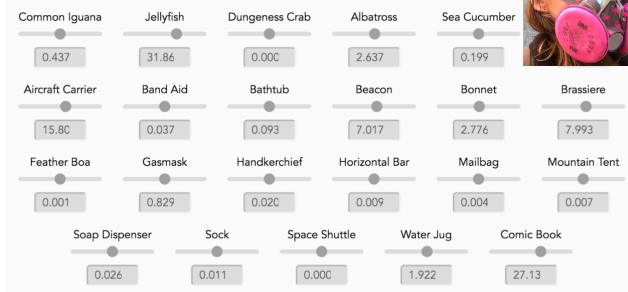
1. an AI combines different words together to generate an image of what it thinks those words look like
2. the AI then produces variants of those images by “breeding” it with other images, creating “child” images
3. another AI shows the artist several “child” images, measuring his brainwaves and body-signals to select which image he likes best
4. step 2 and 3 are repeated until the AI determines it has reached an optimal image
5. another AI increases the resolution of the image by filling in blanks with what it thinks should exist there
6. the result is sent to be painted on canvas by anonymous painters in a Chinese painting village
7. a final AI looks at the image, tries to figure out what is in it, and makes a title

<http://areben.com/project/amalgan/>

# GANbreeder Case – Creation (?)

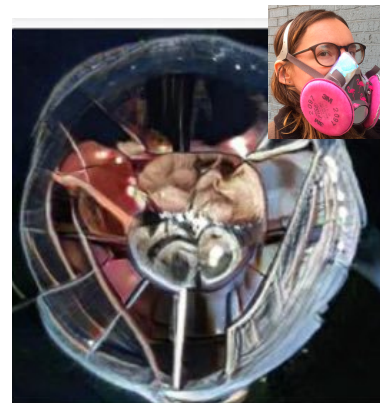
GAN  
Breeder +

@djbasin  
Danielle Baskin



The gene sequence Danielle Baskin used to create the disputed image

=

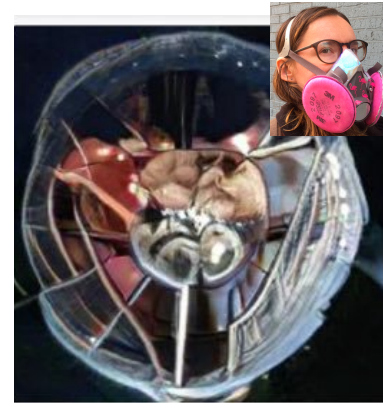


# GANbreeder Case – Another Creation (?)

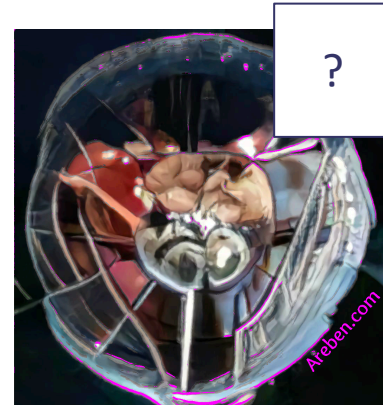
GAN  
Breeder +



The gene sequence Danielle Baskin used to create the disrupted image



+ @artboffin  
Alexander Reben  
**Minor  
Modifications**



# GANbreeder Case – The Devil is in the Details

Encouraging iteration

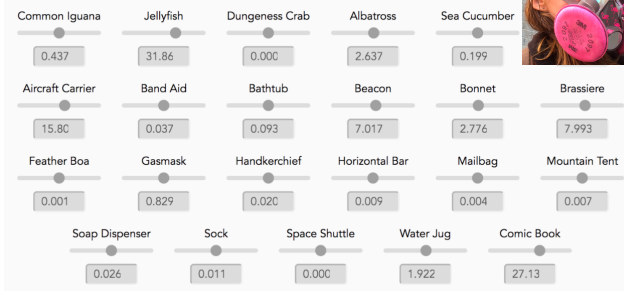
**GAN Breeder**



(Unclear)

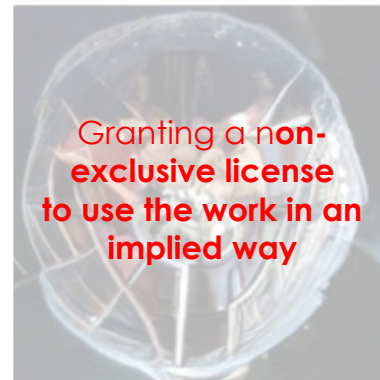
Implied (non-implicit) license

@djbasin  
Danielle Baskin



The gene sequence Danielle Baskin used to create the disputed image

Granting a **non-exclusive license** to use the work in an implied way



@artboffin  
Alexander Reben



A **non-exclusive license** to use the work in an implied way



@artboffin  
Alexander Reben



**Minor Modifications**

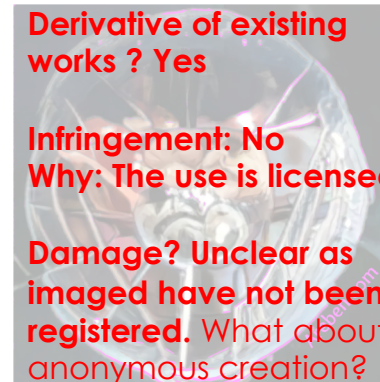
**Fair Use?**

**How transformative the use is?**

**Derivative of existing works ? Yes**

**Infringement: No**  
**Why: The use is licensed**

**Damage? Unclear as imaged have not been registered.** What about anonymous creation?





# The Future

## AI Creations is not yet settled but...

- **Distinguishing** between **human-** and **machine-generated** content will become **more and more complex**
- Even though authorship is central for copyright, **copyright laws have been moving away from originality standards** that reward skill, labour and effort
- **IP laws have changed** and **will change** to balance the commercialization and utilization of new creations that benefit the public interest and facilitate the true objectives of intellectual property law

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- **IP laws have changed** and **will change** to balance the commercialization and utilization of new creations that benefit the public interest and facilitate the true objectives of intellectual property law
- Our society is moving fast

October 25<sup>th</sup>, 2017:  
the robot was  
granted Saudi  
Arabian citizenship,  
becoming the first  
robot ever to have a  
nationality

