



**HOW CAN MACHINES
INTERPRET ART ?**

RESEARCH
REPORT

Eleni
Xynogala

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CATHY WILKES
LA BIENNALE DI VENEZIA

BRITISH COUNCIL
VENICE FELLOWSHIPS PROGRAMME

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INTRODUCTION

The purpose of this research is to explore different ways of collaboration between human and machine entities through the generation of art interpretations applied to Cathy Wilkes's exhibition in the British Pavilion for the 58th International Art Exhibition - La Biennale di Venezia.

This report is based on primary research that conducted during British Council's Venice Fellowships programme that offer me the opportunity to spend a month at the Biennale in Cathy Wilkes's exhibition. I specifically, intrigued by the fact that Wilkes has intentionally left the exhibition untitled and without interpretation. Human beings, because of their nature and their need to know the "right" context, have the tendency to look for definitions and meanings behind art. Zoe Whitley, Curator of the British Pavilion 2019, states "*Wilkes appeals for our courage to reject the notion that knowledge is always something we can possess*" (Wilkes and Whitley, 2019).

Biennale's theme "May You Live in Interesting Times" reveals Ralph Rugoff's curatorial statement that "*the meaning of artworks are not embedded principally in objects but in conversations - first between artist and artwork, and then between artwork and audience*" (Rugoff, 2019). Art can raise conversation about inaccessible subjects and feelings which human are not familiar with, broadening people's horizons and changing the way we see the world, allowing the audience to take the exhibition's experience out of the exhibition place. Motivated by this, I talked with different visitors regarding their interpretations and feelings about the exhibition. Also, I observed their behaviour and reactions and interviewed them as well as my colleagues aiming to collect and note their observations and stories. In addition, a secondary research for written pieces (magazines, exhibition catalogue and brochure, etc.) regarding Cathy's work .

My goal was to examine and as a second step establish, a new artistic practice methodology of feeding multiple machines with data such as, photos from the exhibition, ideas and symbolisms, aiming to discover whether they are able to generate their own interpretations of what they "see". The complex processes of image recognition, classification, analysis, etc along with storytelling conducted by robots make people attribute robots with human features such as creativity,

My research interest relies on the curiosity to experiment with and mix all the different stories produced both by people and machines. By applying the methodology of Design Research through Practice, in which "*The interesting thing is to explore an issue, to figure out how to turn it into a project, how to turn the project into some design ideas, how to materialise those design ideas as prototypes, and finally, how to disseminate them through exhibitions or publications*" (Koskinen et al., 2012), I am trying to open up space for discussion and speculations about equal relations between robots and human performers. The design outcome will be a performance from human and machine entities that raise questions such as:

RESEARCH QUESTIONS

How can machines interpret art?

How humans can be inspired by them?

How human and machines can productively collaborate and co-create?

CONTENT

CATHY WILKES'S EXHIBITION REFLECTION

Cathy uses objects as poets use words. The audience has the opportunity to approach the honesty of her work openly, connecting the objects in various ways so as to make their own stories and interpretations. There is no dogmatic and ultimate truth. Instead of long text and descriptive explanations there is an experiential scenery that call us to become part of it.

Entering the green door of the British Pavilion I feel the atmosphere of an intimate memory, the tactile sense of fragility and vulnerability, like a place of loss, but still calm and quiet.

At the beginning, (Figure 1) I come across with a place that is hard to understand. It is like a tomb surrounded of some short figures. Their heads have vague facial characteristics, neither male nor female and their bodies are simple

rectangle poles covered with fabric with a characteristic belly, that make them look like pregnant. Different objects are around and atop the "tomb" - dried roses, a coin and a hair band like a goodbye to the material world. It radiates a feeling of pain, specifically of losing someone important for you. Even the simplest objects of this person are now precious for you. The living and the dead co-exist around the "tomb". I sensed a collective grief, but at the same time the new life that is about to rise. There is a fragile balance between stages of life: dried flowers and a green plant, a picture of happy children taking a shower and figures in grief. A dark and a lighted painting are hanging on the wall, the contrast of life, the sunrise and the sunset.

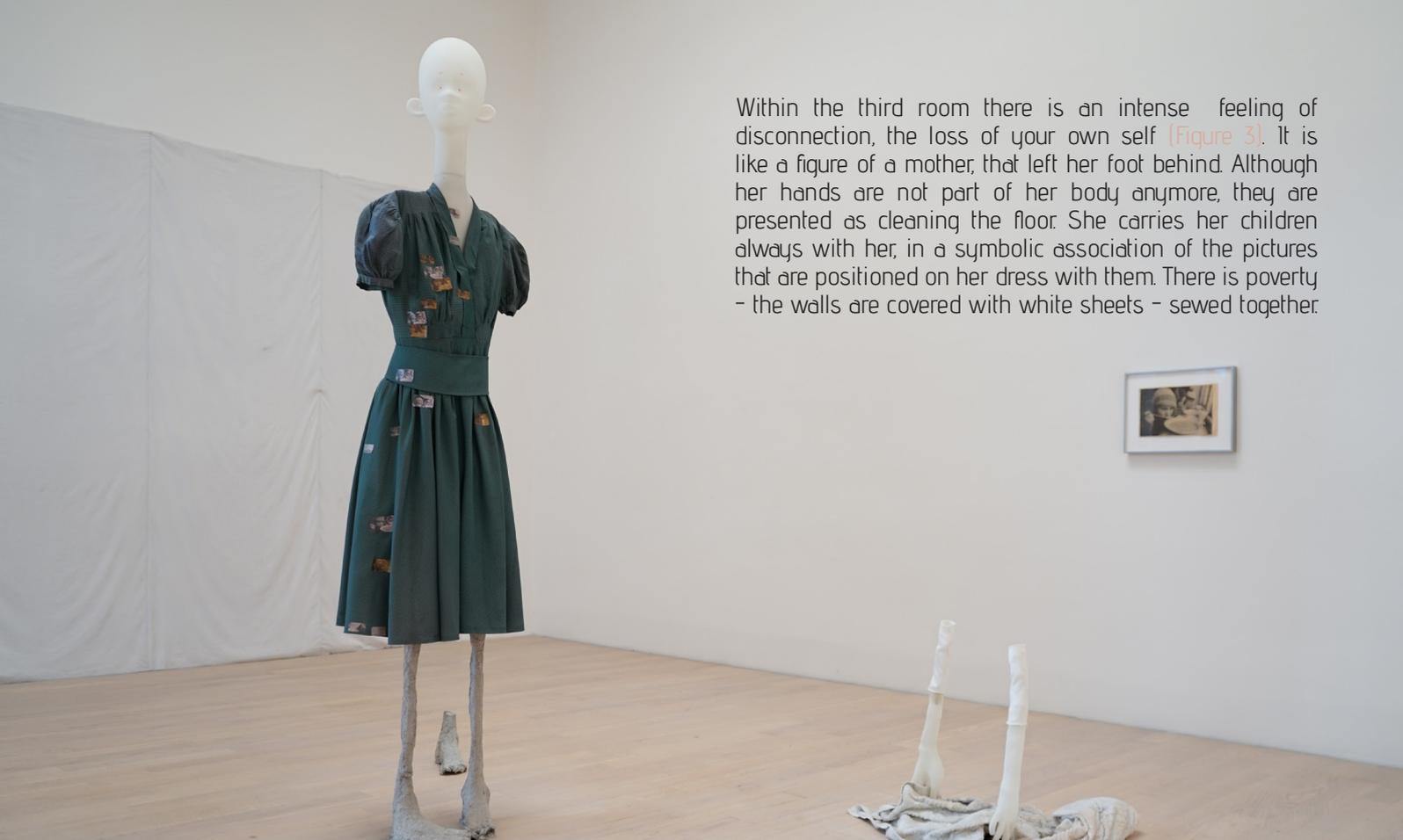


Figure 1: Cathy Wilkes, Room 1, British Pavilion, La Biennale di Venezia, 2019

The second room depicts a mysterious scene (Figure 2) A structure made of glass, wood and fabric. A hand clean the red spots on the floor. There is a belly covered with a fabric that is lying on the floor and a picture of a flower hanged in the wall. Is it the labour of housework, the hand of the creator, the act of giving birth or the loss of a child?



Figure 2: Cathy Wilkes, Room 2, British Pavilion, La Biennale di Venezia, 2019



Within the third room there is an intense feeling of disconnection, the loss of your own self (Figure 3). It is like a figure of a mother, that left her foot behind. Although her hands are not part of her body anymore, they are presented as cleaning the floor. She carries her children always with her, in a symbolic association of the pictures that are positioned on her dress with them. There is poverty - the walls are covered with white sheets - sewed together.

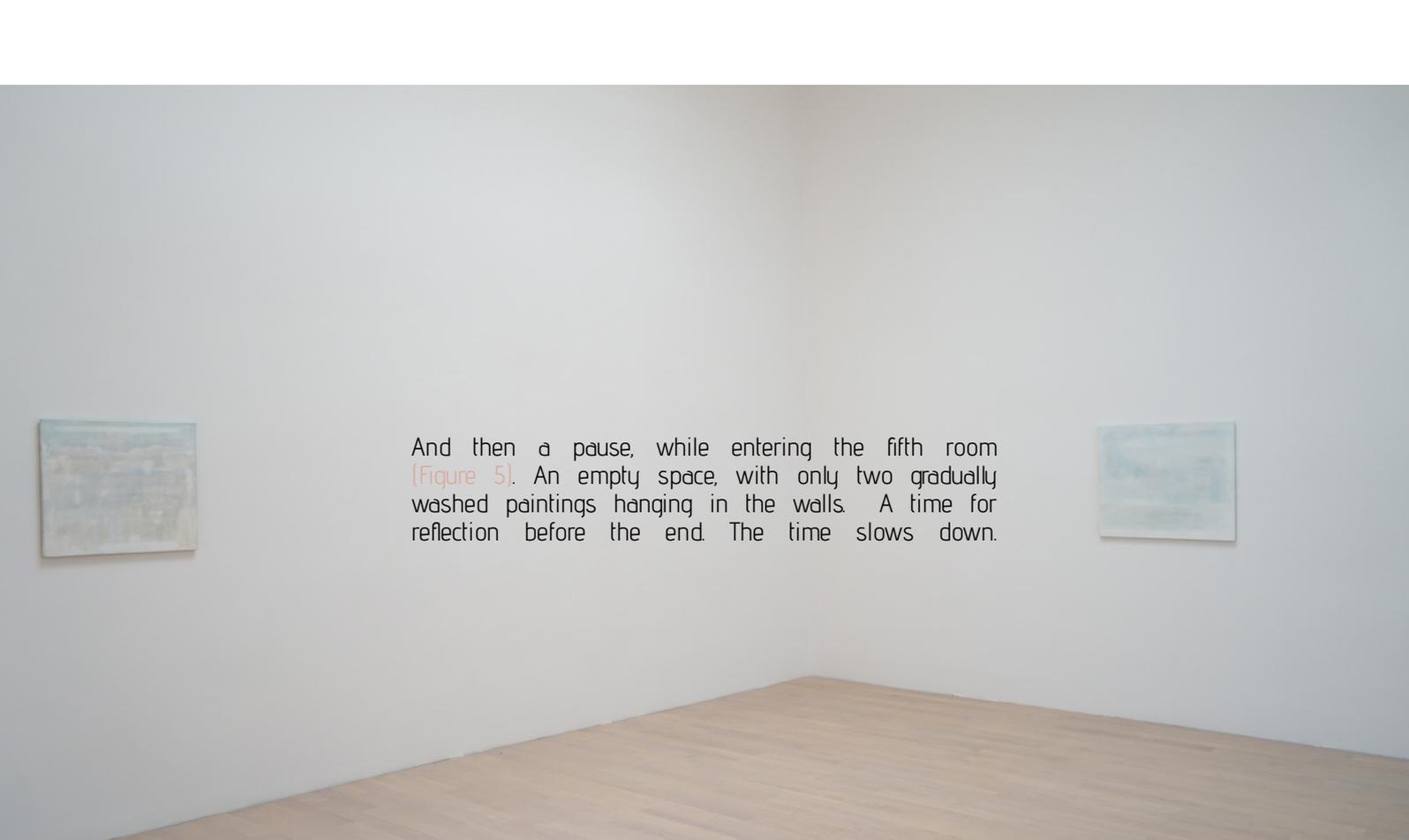
Figure 3: Cathy Wilkes, Room 3, British Pavilion, La Biennale di Venezia, 2019

As step into the fourth room the whole atmosphere changes (Figure 4). The light comes from the windows and create shapes in the floor passing through the glass shelves on the wall. Porcelains are hung from the wall, a tea table

with an old-fashioned decorated fabric and some glass domestic objects cover the room, making it look like a memory from the childhood. A papier-mâché doll with a cone shaped body seems to be an unfinished work.

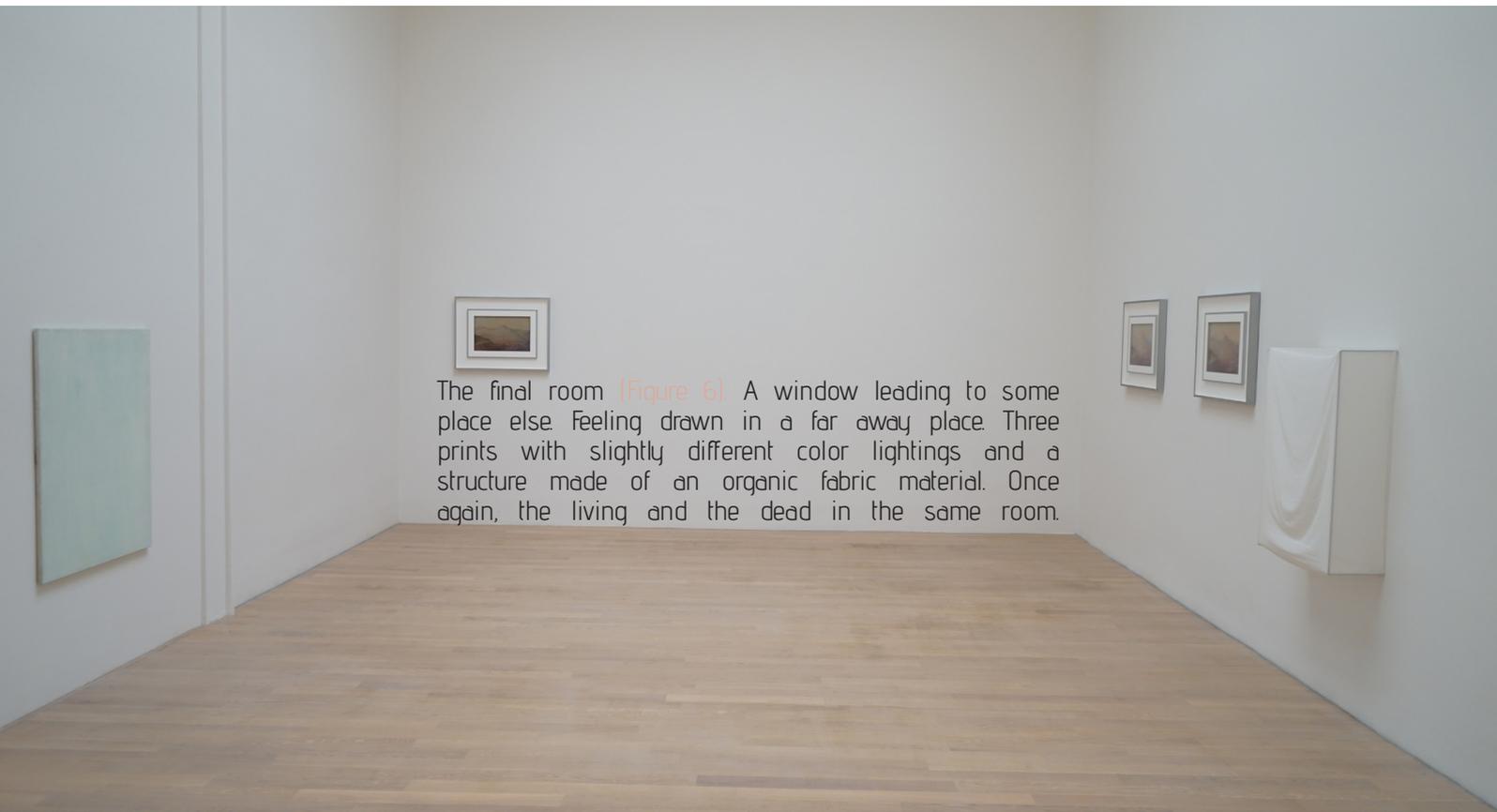


Figure 4: Cathy Wilkes, Room 4, British Pavilion, La Biennale di Venezia, 2019

A photograph of an empty gallery room with two abstract paintings on the walls. The room has white walls and a light-colored wooden floor. The paintings are small, square, and feature soft, blended colors of blue, green, and white. The text is centered in the middle of the image.

And then a pause, while entering the fifth room (Figure 5). An empty space, with only two gradually washed paintings hanging in the walls. A time for reflection before the end. The time slows down.

Figure 5: Cathy Wilkes, Room 5, British Pavilion, La Biennale di Venezia, 2019



The final room (Figure 6). A window leading to some place else. Feeling drawn in a far away place. Three prints with slightly different color lightings and a structure made of an organic fabric material. Once again, the living and the dead in the same room.

Figure 6: Cathy Wilkes, Room 6, British Pavilion, La Biennale di Venezia, 2019

The visitors need to connect the pieces and fill the gaps, in a pathway where they are called to portray their own meaning of something they never saw, felt or sensed before. The objects are placed lower than the eye level of an adult leading them to lean down for the details, putting the observer in child point of view.

I tried to collect different interpretations from the visitors of the British Pavilion. For many of them there is a nostalgic sensation, like a memory from the childhood, with the figures to provoke emotions such as, people from the past. Other people described a woman, the maternity, the pregnancy or the abortion. Some individuals feel something calm and private like a dream from which you still remember objects and figures "here and there", but you cannot really recall what is all about. The delicate objects create tactile sensations and the need to feel the textures and come closer to the hidden poetry. It is fully anthropocentric work, very personal and complicated but still universal. At the same time though it is threatening, creating the sensation of a trauma, loss, pain, death and poverty.

BACKGROUND

ART BY ALGORITHMS

Neural networks are a classification methodology which has its beginnings in the 40s, when people started thinking about the brain as a computer and thinking about how it might work. One of those people was Alan Turing, who proposed a machine, which would be at first unorganised and then through training it would organise itself. People have built these machines in 20th century and the last years have been an incredible revival of neural networks in the field of machine learning (Tjyka, 2015)

In this characteristic example of image classification (Figure 7), we need to train the network, showing thousands of pictures, in this case cats and dogs, in order to distinguish subjects. Now we need to consider that If we have a system that knows everything about what a cat is like, it should be able to produce new pictures that look like cats or dogs. We can also train a neuron network on text generation and music composition. These kinds of technologies can be used by artists to create new interesting works.

Almost everyday machines outmatch humans on many tasks like facial recognition and place identification. However we shouldn't anthropomorphise these systems. They are just algorithms that can extract patterns from a very large amount of data.

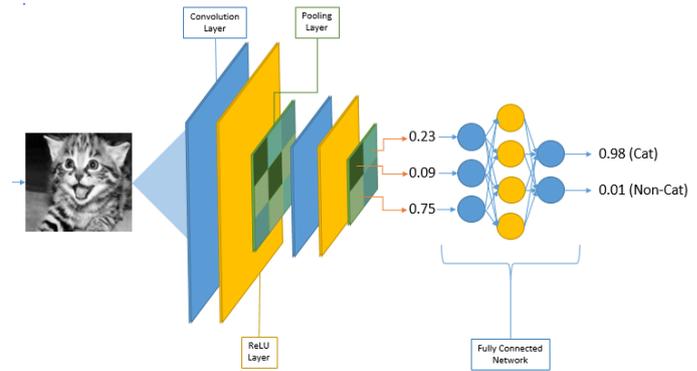


Figure 7: Image Classification by Artificial Neural Network

CONCEPT

Machines are noticing things that do not necessarily exist. For human beings the ability to see is the ability to know. When something seems absent from vision there is still an underlying presences that feels or listens and tries to explain and understand. This project will be developed as a process for human and machine to interpret each other work. The machines will try to interpret Cathy's work generating visual representations or text. Then, a human performer - painter need to design with a drawing to describe the representations generated by the machines. These multi actor transformations associated with the idea of "a message lost in translation", that is connected with human's pursuit to find the "right" interpretation of an artwork and the different perspectives to decode it.



Figure 8: Sougwen Chung, Omnia per Omnia, 2018



INSPIRATION

Omnia per omnia (Figure 8) by Sougwen Chung is a painting performance by the artist and a robotic swarm. She collaborates with a swarm of custom-designed drawing robots, creating a drawing collaborative performance with multiple agencies of a human and machines. The robots acts like respect their human partner and vice versa. In this way, they create a harmonic co-performance as an equal creative duet.

IMPLEMENTATION

FROM TEXT TO IMAGE

In the first case I experimented with an Attentional Generative Adversarial Network (AttnGAN) that allows fine-grained text-to-image synthesis (Xu et al., 2013). I used quotes from Cathy Wilkes or from the literature that is included in exhibition catalogue (Wilkes and Whitley, 2019) and seems to be relative with different symbolisms of her work, such as death, grief, birth, motherhood, pregnancy, childhood, suffering and faith. Below are presented interesting abstract image generations from the AttnGAN, a pre-trained model provided in runwayml.com:



Figure 9

*We **die** with the dying, See, they depart, and we go with them.*

(TS Eliot, The Waste Land)

Figure 10

We are **born** with tile dead
See, they return, and
bring us with them.

(TS Eliot, Little Gidding)

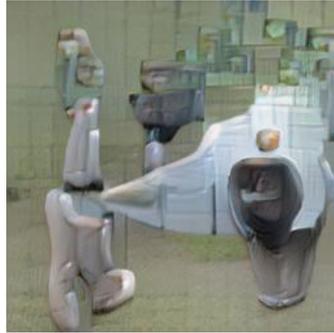


Figure 11

If I could disappear, the
people I see before me will
become perfect in **beauty**.

(Cathy Wilkes, 2019)



Figure 12

In the beginning was
the Mediation and the
Mediation was with **God**
and the Mediation was God.

(Cathy Wilkes, 2019)



Figure 13

There is a place where
children live together
before they are born where
children are in their souls

(Leif Zern, The Luminous
Darkness:)



Figure 14

In Omoa I saw a **woman** in the road, covered in the red and yellow glazes, in the midst of a tempest of wind and water

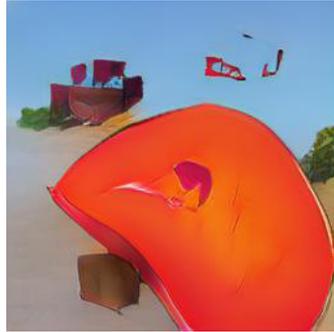


Figure 15

In this delusion, this **dream**, visual accuracy and sensitivity became a form of cosmic measuring; divine and aged.



Figure 16

It proposes that relations both intimate and social become 'objects' in the unconscious mind that are internalised to become part of one's **inner world**.



Figure 17

I learned from my **children**; they were mediating with their pictures and their little objects. They relived things and sometimes they rehearsed for the fulfilment of wishes or for **loss**:



(Cathy Wilkes, 2019)

Figure 18

A **doll** is an idea of a being. A sculpture is like a doll - an idea of something in my inner world - a connection with an idea. All sculpture is conceptual, even an imaginary object is like a doll.

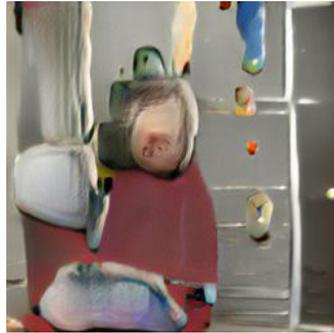


Figure 19

The smallest particle of **suffering** is the object, and I, the subject who acts upon the object, am every atom unfolding from the womb. An atom here among us and another atom in a far away galaxy are inseparable epitomes of the same.



Figure 20

I solemnise and dignify the **ghosts** of interference which proceed from their origin and whip themselves up before me. I observe, they nucleate and propagate. If I could disappear, how fluid, how graceful and unending, how undisturbed and unpredictable would be the changing patterns thereabout.

Figure 21

On both the left and on the right there is nothing worth seeing and nothing worth hearing. I return **home** to wait in place and draw forth what is yet to come.



(Cathy Wilkes, 2019)

The outcomes of this process are fascinating. How this machine interpret these phrases and different meanings that hide behind Cathy's work, such as death and birth, god, children, inner world and suffering? Is the atmosphere of these results close to Cathy's work? The abstract figures of the children and the doll that are generated from the machine (Figures 13, 17 and 18) have vague characteristics. The idea of the inner world seem to be visualised also like a natural place (Figure 16), in the same way that Cathy chose the mountain prints in the last room. Another observation is the stereotypical representation of the God, whom the machine visualised him as a man (Figure 10). Last but not least, the house (Figure 21) is visualized as a park that people feel comfortable.

FROM IMAGE TO TEXT

Then I decided to generate captions by the exhibitions' photos using the im2txt model that is trained in one million captioned photographs (Ordonez et al., 2011) and can be found in Runwayml.com:

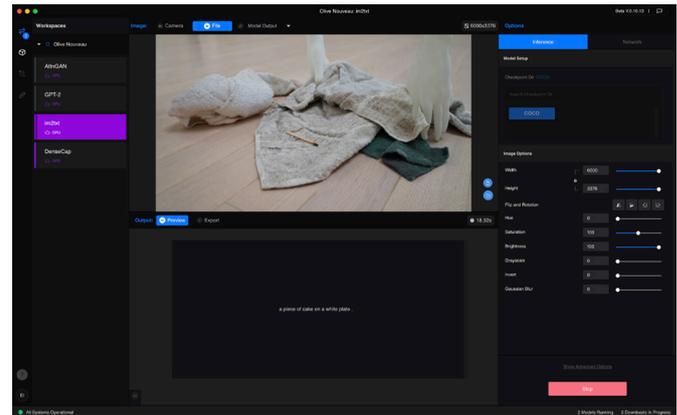


Figure 22: im2txt pre-trained model generates captions to Cathy Wilkes's exhibition photos



Figure 23: Machine-Written:
a wooden **bench** sitting on top of a wooden floor.



Figure 24: Machine-Written:
a view of a **snowy** mountain from the window



Figure 25: Machine-Written:
a small **toy elephant** is sitting on the floor



Figure 26: Machine-Written:
white **cat** sitting on a window sill



Figure 27: Machine-Written:
a close up of a person holding a **hot dog**



Figure 28: Machine-Written:
pair of **scissors** sitting on top of a table



Figure 29: Machine-Written:
a close up of a **vase** with flowers in it



Figure 30: Machine-Written:
white toilet sitting next to a **window**



Figure 31: Machine-Written:
a room with a **bed** and a vase of flowers



Figure 32: Machine-Written:
a close up of a **cake** on a table



Figure 33: Machine-Written:
white **bird** standing on top of a wooden table



Figure 34: Machine-Written:
woman standing in front of a vase with flowers



Figure 35: Machine-Written:
a close up of a person wearing a **suit and tie**



Figure 36: Machine-Written:
black and white **dog** standing on a skateboard



Figure 37: Machine-Written:
view of a **mountain** range



Figure 38: Machine-Written:
a vase with flowers in it sitting on a **table**



Figure 39: Machine-Written:
a **kitchen** with a sink and a refrigerator



Figure 40: Machine-Written:
a **living room** filled with furniture and a fireplace

The model recognises the sepulchral structure as a bench (Figure 23), a bed (Figure 31) or a window (Figure 30) – not far from human interpretations. It recognises the woman figure (Figure 36) but not the short ones that recognise them as vase with flowers (Figure 29 and 38). It “sees” the mountain (Figure 37) in the print and a winter theme (Figure 24) in one painting that can be relevant with the atmosphere of the exhibition, but it fails to recognise some objects that human can easily categorise, such as, the notebook (Figure 28), the dress (Figure 35) and the porcelains (Figure 39). However, the machine successfully characterises the domestic environment (Figure 39 and 40).

Another intriguing dense captioning technique which I came across with was developed using a Fully Convolutional Localization Network (FCLN) which separate different regions in the photo and create captions for all of them (Johnson et al., 2015). Running this model in the runwayml.com I took the presented results:



Figure 41: Machine-Captions

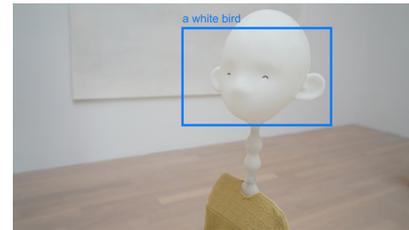


Figure 42: Machine-Captions

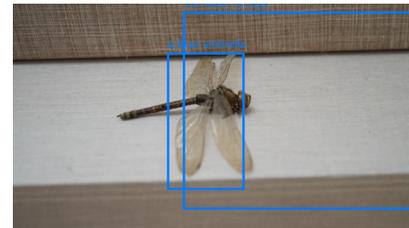


Figure 43: Machine-Captions

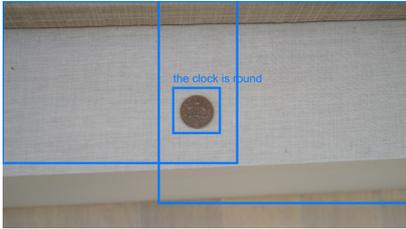


Figure 44: Machine-Captions

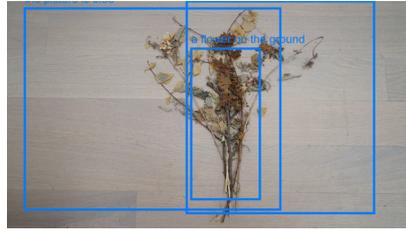


Figure 45: Machine-Captions

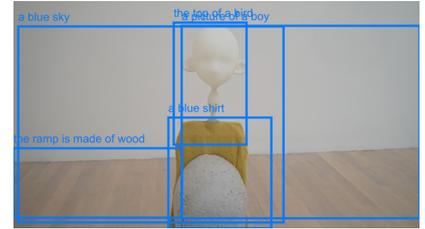


Figure 46: Machine-Captions

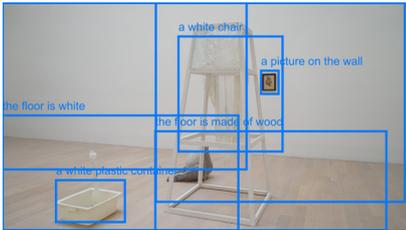


Figure 47: Machine-Captions

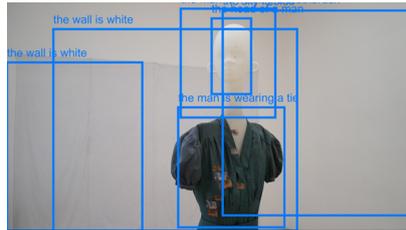


Figure 48: Machine-Captions

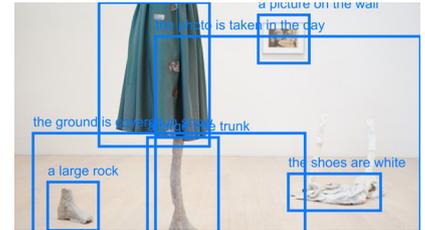


Figure 49: Machine-Captions



Figure 50: Machine-Captions

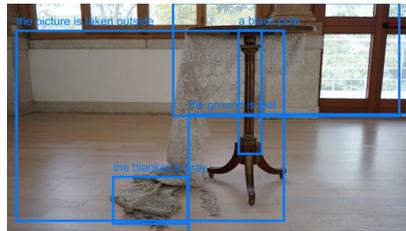


Figure 51: Machine-Captions

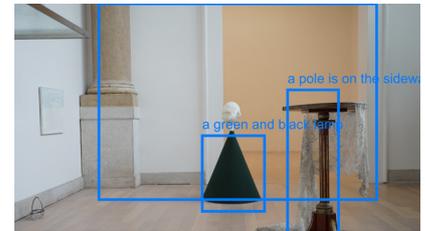


Figure 52: Machine-Captions

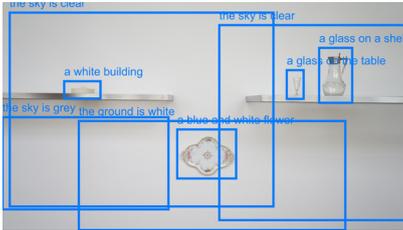


Figure 53: Machine-Captions

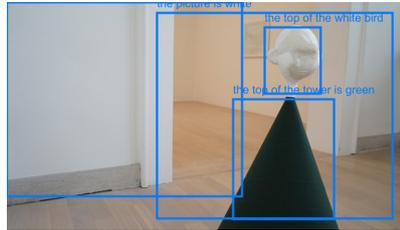


Figure 54: Machine-Captions

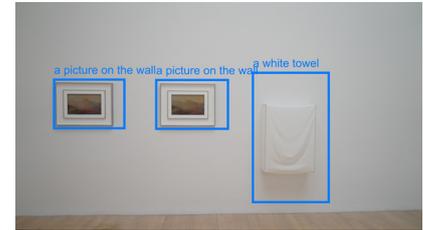


Figure 55: Machine-Captions

FROM TEXT TO STORY

This model seems to recognise the short figures as a bird (Figures 43 and 54), lamp (Figure 52), bottle (Figure 41), pole (Figure 41) or a boy (Figure 46). It also distinguishes the glass (Figure 53), some fabrics (Figures 51 and 55), the container (Figure 47) and the flowers (Figure 45). However, it seems that if someone had never seen the exhibition before and follow these descriptions would make a completely different mind trying to aestheticize it.

The GPT-2 model is trained in a large-scale unsupervised language model which generates coherent paragraphs of text (OpenAI, 2020). I gave the system as an input, few words with different interpretations that are written and said regarding Cathy's work. The system has been trained, on data drawn from the internet, to predict the next words of the passage. As a result the Artificial Intelligent (AI) model provided in Talktotransformer.com turned some these into short stories:

Cathy's recent works are pictures of stillness and dormancy.

(Wilkes and Whitley, 2019)

Feeling drawn into a far away place.

*(Notes from Cathy Wilkes guided tour around the pavilion on 6 May
2019)*

*The work suggests the Assumption, the burial of the body
(the subject) when it leaves a slate of personal definition
and the ascent of the soul into Heaven when it joins the
infinite (the object).*

What does an artwork such as this mediate?

(Wilkes and Whitley, 2019)

Traces of raw and impetuous passion for life linger. We live, without hate, in the light of despair.

Anyone can see that we are so close to **death**. The water is breaking, it flows in waves, as it has to do here, in this crisis. Stages of decline, rapid death are met. But we remember that life is here and we don't want it to disappear. We want to save it.

But we will only see that which is there. All things will pass away, the starfish, the cicadas, the mountains, and the vastness of the universe. There is not enough time for each individual to grasp it.

(Machine-written)

A warm spring day with all the trees and flowers in full bloom. Maybe one of the tallest **mountains** you have ever seen. Somewhere else entirely.

(Machine-written)

This work is in many ways the culmination of a lifetime's body **work**.

What does this work say?

If you read these words, then the first is quite obvious.

But there is a deeper meaning to this work.

This work is the catalyst.

What does this work take away?

That we are all beautiful as we come together.

What is a reminder of this beauty?

All we need do is look at other parts of this city

(Machine-written)

Cathy Wilkes is an artist who finds deep, spiritual connection in the power of motherhood,

(Notes from British Council Fellowship program)

Body and monumentality, reduction to make room for ideas,

(Notes from Cathy Wilkes guided tour around the pavilion on 6 May 2019)

A doll isn't a representation of a literal living, breathing, flesh-and-blood child and any relation to something, physical or non-physical, is connected to our experience of infancy,

(Wilkes and Whitley, 2019)

and shares these kinds of tender moments through her art. She writes art that brings pain into what we sometimes thought was peace. In her personal experiences, she shares the critical pain of motherhood, and as an artist she gives life to the capacity for pain that is the gift of **motherhood**.

(Machine-written)

and madness (adoration of those whom bourgeois society has reduced to material existence), ignorance, despair, indifference, mere musicality, parade, scepticism, and the rest, are often the general reaction against a vital condition of one's own nature (life) to which one has become intimate, dependent, a victim and a slave. But that which is divine, this which is the object and realization of the Highest One (the **God**), can make one's destiny into a life's adventure, and will thus bring about such spiritualism.

(Machine-written)

This is quite self-evident: the expressions and memories of **children** are real. All of us think and have dreams about our babies; our 'babies' are metaphors for a particular moment in time. Having had my daughter, we can say with confidence that: It took no longer than a couple of seconds to 'know' her: I gave birth, she was born. She was my very first experience of childbearing. This, of course, is utter nonsense. We know 'when' we are pregnant because of the 'changes' in the chemistry.

(Machine-written)

The results of these systems are appealing, but make me think of the possibilities of AI to conduct convincing fake news and the potential hazards that this evokes. However, I wouldn't just copy sentences written by these machines for my artwork, as some times it makes no sense and it doesn't have a compelling narrative structure. My goal is to use these machines as a creative prosthesis in my work and process the outputs in order to synthesise a mixed human - machine narration.

I plan to use this system and generate my narrations that will be a cognitive enhancement of my performance for the fellows' exhibition in London, on March 2020.

NEXT STEPS

NEURAL STORYTELLER

Neural Storyteller is an algorithm that "see" an image, and try to narrate a story for it (Samim, 2015). Storytelling is at the heart of human nature. Natural Language Processing (NLP) is very important for the development of human and computer interaction. The generated narration is based on different genres as the Recurrent Neural Network (RNN) model is trained on more than 2,000 romantic novels.

There is developed an AI, called Pix2Story made by Microsoft (2019) that can be tested here: <https://pix2story.azurewebsites.net/W>

My objective is to create a dialogue between Cathy's exhibition, people's reflections and machines' interpretations. Specifically, I plan to construct an installation with two robots that discuss about the art exhibition, like art critics. At the same time a painter, with whom I will collaborate, will capture the machines generations into drawings. It will look like the Chinese telephone game, in which the message is getting garbled along the way. Starting from Cathy's exhibition, the idea is interpreted through a machine and then this interpretation is represented by the performer. The audience will compare the original idea with the final version and will create a debate about the notion of open interpretation in art but also the unreliability of the computational systems.

DISCUSSION

Computation is changing aesthetics and there is great debate regarding the role of the artists and appreciators of the arts in this trend (Finn, 2017). Nevertheless, it is important to acknowledge that all these sophisticated machines, are biased and result of human programming. But we can discuss further and design connections and interactions with these convincingly creative robots. Instead of looking at them as tools, we can try to face them as equal collaborators and explore what new creative ideas we can develop with them.

BIBLIOGRAPHY

Finn, E. (2017). Art by algorithm. <https://aeon.co/essays/how-algorithms-are-transforming-artistic-creativity> (accessed 5 January 2020).

Johnson, J, Karpathy, A. and Fei-Fei, L. (2015). DenseCap: Fully Convolutional Localization Networks for Dense Captioning [ebook] Stanford University. Available at: <https://cs.stanford.edu/people/karpathy/densecap.pdf> [Accessed 5 Jan. 2020].

Koskinen, I., Zimmerman, J, Binder, T, Resdtrom, I and Wensveen, S. (2012). Design research through practice. Waltham, MA: Morgan Kaufmann/Elsevier.

Microsoft (2019). Pix2Story: Neural storyteller which creates machine-generated story in several literature genre [online] Azure.microsoft.com. Available at: <https://azure.microsoft.com/en-us/blog/pix2story-neural-storyteller-which-creates-machine-generated-story-in-several-literature-genre/> [Accessed 5 Jan. 2020].

OpenAI. (2019). Better Language Models and Their Implications [online] Available at: <https://openai.com/blog/better-language-models/> [Accessed 5 Jan. 2020].

Ordonez, V, Kulkarni, G. and Berg, T. (2011). Im2Text: Describing Images Using 1 Million Captioned Photographs [ebook] NY: Stony Brook University. Available at: http://www.tamaraberg.com/papers/generation_nips2011.pdf [Accessed 5 Jan. 2020].

Rugoff, R. (2019). Biennale Arte 2019 | Introduction by Ralph Rugoff. [online] La Biennale di Venezia. Available at: <https://www.labiennale.org/en/art/2019/introduction-ralph-rugoff> [Accessed 5 Jan. 2020].

Runwayml.com. (2019). [online] Available at: <https://runwayml.com/> [Accessed 5 Jan. 2020].

Samim. (2015). Generating Stories about Images. [online] Available at: <https://medium.com/@samim/generating-stories-about-images-d163ba41e4ed> [Accessed 5 Jan. 2020].

Souqwen, C. (2018). Omnia per Omnia. [online] Souqwen.com. Available at: <http://souqwen.com/project/omniaperomnia> [Accessed 10 Jul. 2018].

Storr, A. (2015). Inner worlds and outer realities Cathy Wilkes. [ebook] Liverpool: Tate Available at: <https://www.themoderninstitute.com/files/565310f799c67-cwtateetc.spring2015.pdf> [Accessed 5 Jan. 2020].

Talktotransformer.com. (2019). Talk to Transformer. [online] Available at: <https://talktotransformer.com/> [Accessed 5 Jan. 2020].

Tyka, M. (2015). The art of neural networks. TEDx Talks. <https://www.youtube.com/watch?v=0qVOUD76l0g> (accessed 5 January 2020).

Wilkes, C. and Whitley, Z. (2019). Cathy Wilkes - Exhibition Catalogue. HENI Publishing.

Wilkes, C. and Whitley, Z. (2019). Cathy Wilkes - Exhibition Pamphlet. HENI Publishing.

Xu, T., Zhang, P., Zhang, H., Gan, Z., Huang, X. and He, X. (2018). AttnGAN: Fine-Grained Text to Image Generation with Attentional Generative Adversarial Networks. [ebook] Available at: http://openaccess.thecvf.com/content_cvpr_2018/papers/Xu_AttnGAN_Fine-Grained_Text_CVPR_2018_paper.pdf [Accessed 5