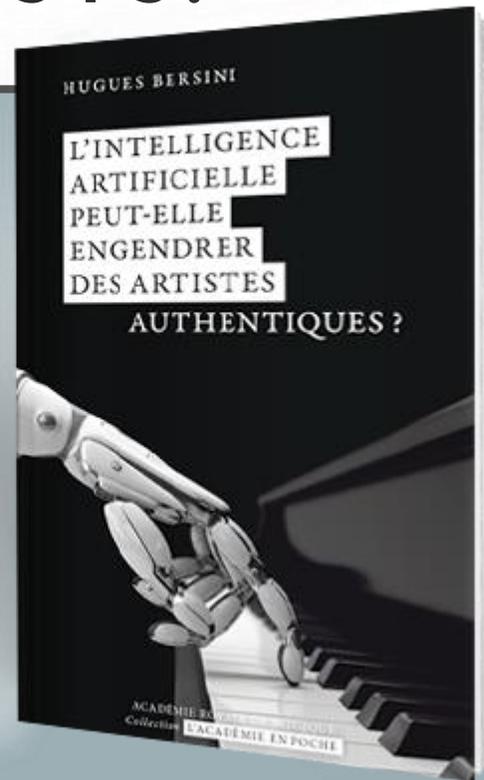


CAN AI GIVE RISE TO GENUINE ARTISTS?

Hugues Bersini
IRIDIA - ULB



PLAN

- Examples
- The techniques coming from two different AIs: **Conscious** and **Subconscious**
- But is that Art ?



I) EXAMPLES

Paris Match | Culture | Art

Un tableau créé par un algorithme vendu pour 432.500 dollars aux enchères



Paris Match | Publié le 25/10/2018 à 19h45

La Rédaction - AFP



Pierre Fautrel aux côtés de sa toile "Portrait d'Edmond de Belamy"

TIMOTHY A. CLARY / AFP



(1) Daddy's Car: a song comp... x +

youtube.com/watch?v=LSHZ_b05W7o

YouTube ^{BE} Daddy's car



...flawless his ee

0:12 / 3:00

Settings, Full Screen, and other video controls icons.

AI Artist ?

2019

AI/ML in the artistic domain

- *Morgan*, movie trailer generated by Watson (IBM)
- *Spotlight*, script generated by RNN (Goodwin)
- New *Rembrandt* generated by Microsoft AI
- DeepDream images and audio (Google)
- Style transfer for videos
- Automated Cooking (Chef Watson)





Artificial Intelligence is writing poetry, but is it any good?

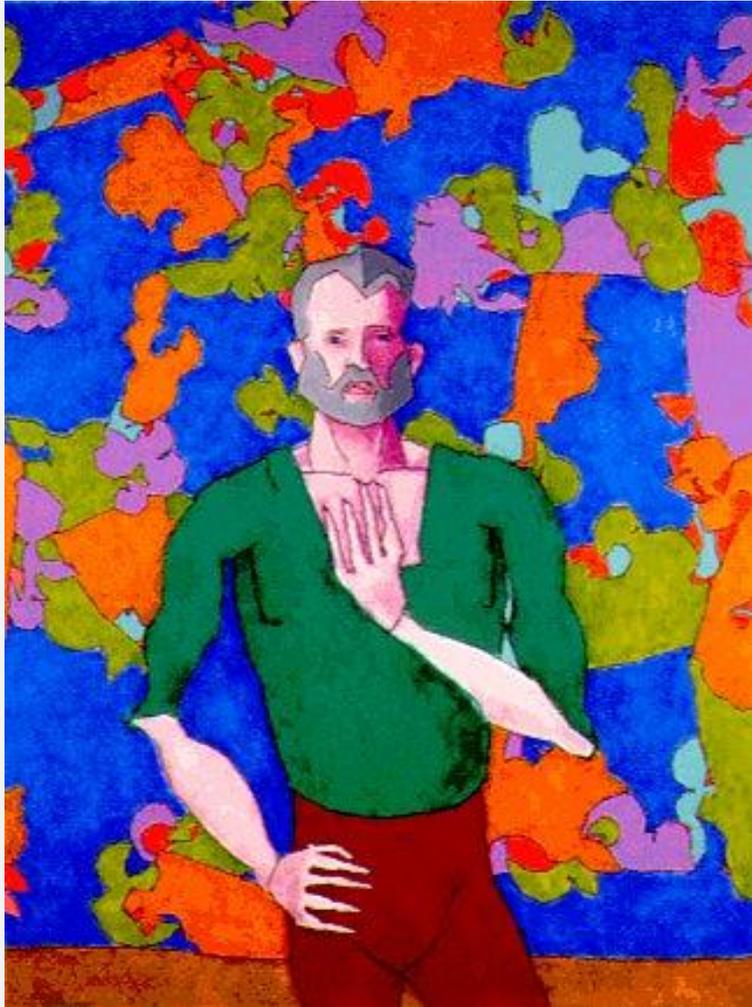
A newly developed neural network is facing off with Shakespeare

"How shall I compare thee to a classic Windows Bliss wallpaper?"

"Thou art less pixelated and of higher HTML colour"

While we may not be able to master the classic Shakespearean sonnet, scientists have been working on AI

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Harold Cohen's Aaron

AI Artist ?



Simon Colton's PaintingFool

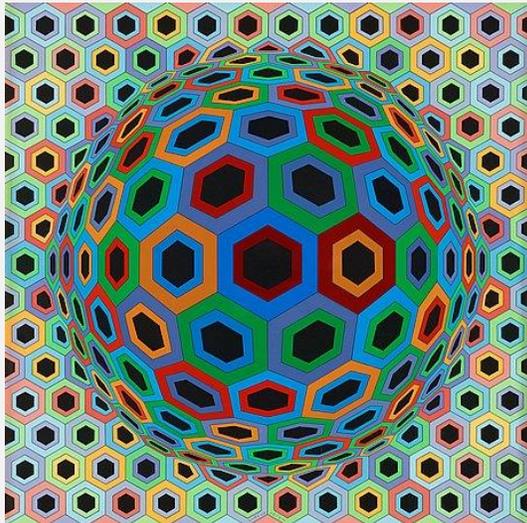
2019

II) THE TECHNICS COMING FROM THE TWO AI



MAGGIE BODEN: « *An artistic creation must be new, surprising and meaningful* »

A WORK OF ART IS A SINGULAR ARRANGEMENT OF SYMBOLS



AI Artist ?



 Charles BAUDELAIRE (1821-1867)

L'albatros

Souvent, pour s'amuser, les hommes d'équipage
Prennent des albatros, vastes oiseaux des mers,
Qui suivent, indolents compagnons de voyage,
Le navire glissant sur les gouffres amers.

A peine les ont-ils déposés sur les planches,
Que ces rois de l'azur, maladroits et honteux,
Laissent piteusement leurs grandes ailes blanches
Comme des avirons traîner à côté d'eux.

Ce voyageur ailé, comme il est gauche et veule !
Lui, naguère si beau, qu'il est comique et laid !
L'un agace son bec avec un brûle-gueule,
L'autre mime, en boitant, l'infirme qui volait !

Le Poète est semblable au prince des nuées
Qui hante la tempête et se rit de l'archer ;
Exilé sur le sol au milieu des huées,
Ses ailes de géant l'empêchent de marcher.

THE WINING AI COCKTAIL



RULES + EXPERIENCES/ENGAGEMENT + RANDOMNESS



The human contribution within those two AIs

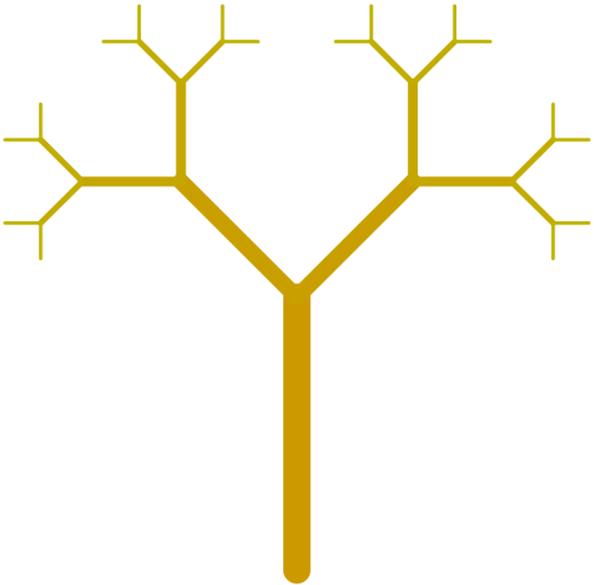


Explicit (conscious)

Implicit (subconscious)

I) DANS LES RÈGLES DE L'ART: THE RULE-BASED AI

Lindenmayer's vegetal organisms



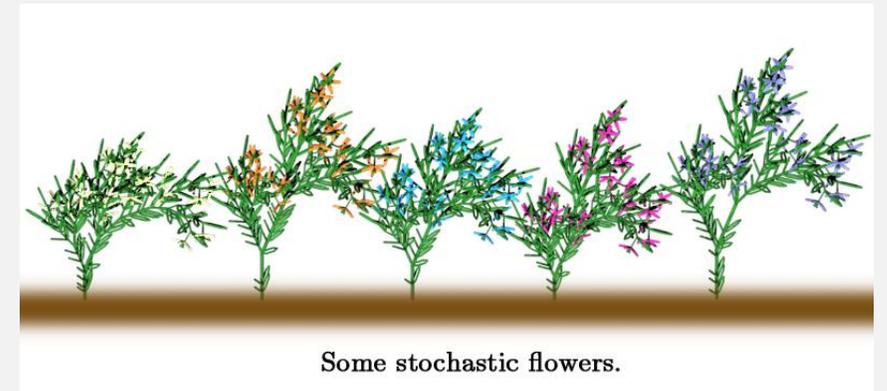
L-system

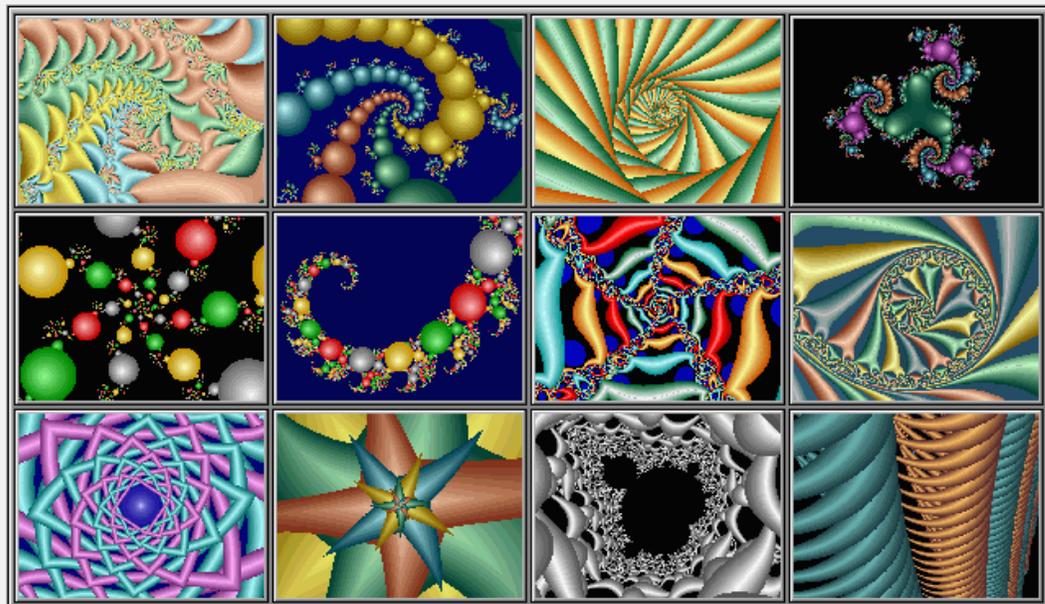
```
; Fractal - Simple Y-tree  
angle 8  
axiom ++FX  
X = >2@[-FX]+FX
```

Order 4 DRAW

Examples

- Fractal - Simple Y-tree
- Fractal - Sierpinski triangle
- Fractal - Sierpinski carpet
- Fractal - Koch curve
- Fractal - Koch snowflake
- Fractal - Dragon curve
- Fractal - Cesar's sweep
- Fractal - Moore fractal
- Fractal - Maze triangle
- Peano curve - Original





Il va même réfléchir à une façon d'utiliser l'intelligence artificielle pour créer à partir des éléments de son vocabulaire. Vasarely s'est intéressé très tôt à l'informatique et a travaillé avec IBM sur un projet de production de tableaux qui sera abandonné.





cours d'harmonie classique en ligne

pratique et interactif

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règles harmoniques 2

niveau 1

L'interdiction des quintes consécutives est la règle emblématique de l'harmonie tonale. Le "pourquoi ?" a souvent été développé pour qu'il soit nécessaire d'y revenir. Rappelons simplement que les quintes parallèles représentaient le souvenir d'un style médiéval révolu, que leur sonorité entraîne une lourdeur fruste et qu'elles nuisent à l'individualité des voix. Une autre règle, de même nature, est également importante :

Règle : Dans l'enchaînement de deux accords différents, on ne doit pas écrire deux octaves consécutives entre les mêmes voix. Ni un unisson suivi d'une octave et l'inverse.

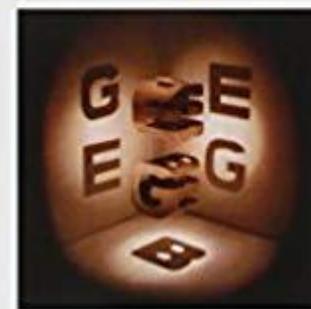
Cet exemple montre trois cas d'octaves consécutives prohibées :

Le premier cas (Do-Ré) entre le soprano et l'alto, le deuxième (Do-Fa) entre le ténor et la basse, et le troisième (Ré-Mi) entre alto et ténor.

The musical score illustrates three prohibited octave leaps between voices. The first example shows a soprano voice moving from C4 to D4 and an alto voice moving from C4 to D4, creating a parallel octave. The second example shows a tenor voice moving from C3 to F3 and a bass voice moving from C3 to F3, creating a parallel octave. The third example shows an alto voice moving from D4 to E4 and a tenor voice moving from D4 to E4, creating a parallel octave. Red dots highlight the notes involved in these leaps.

DOUGLAS
HOFSTADTER

GÖDEL ESCHER BACH



LES BRINS D'UNE GUIRLANDE ÉTERNELLE

DUNOD

POESIE : REGLES DE METRIQUE ET DE PROSODIE

I. L'ETUDE DES VERS ET DES STROPHES

1. La mesure des vers

Pour mesurer un vers, il faut compter les syllabes prononcées (ou mètre) :

Ex : « C'était l'heure tranquille où les lions vont boire. » (Victor Hugo)

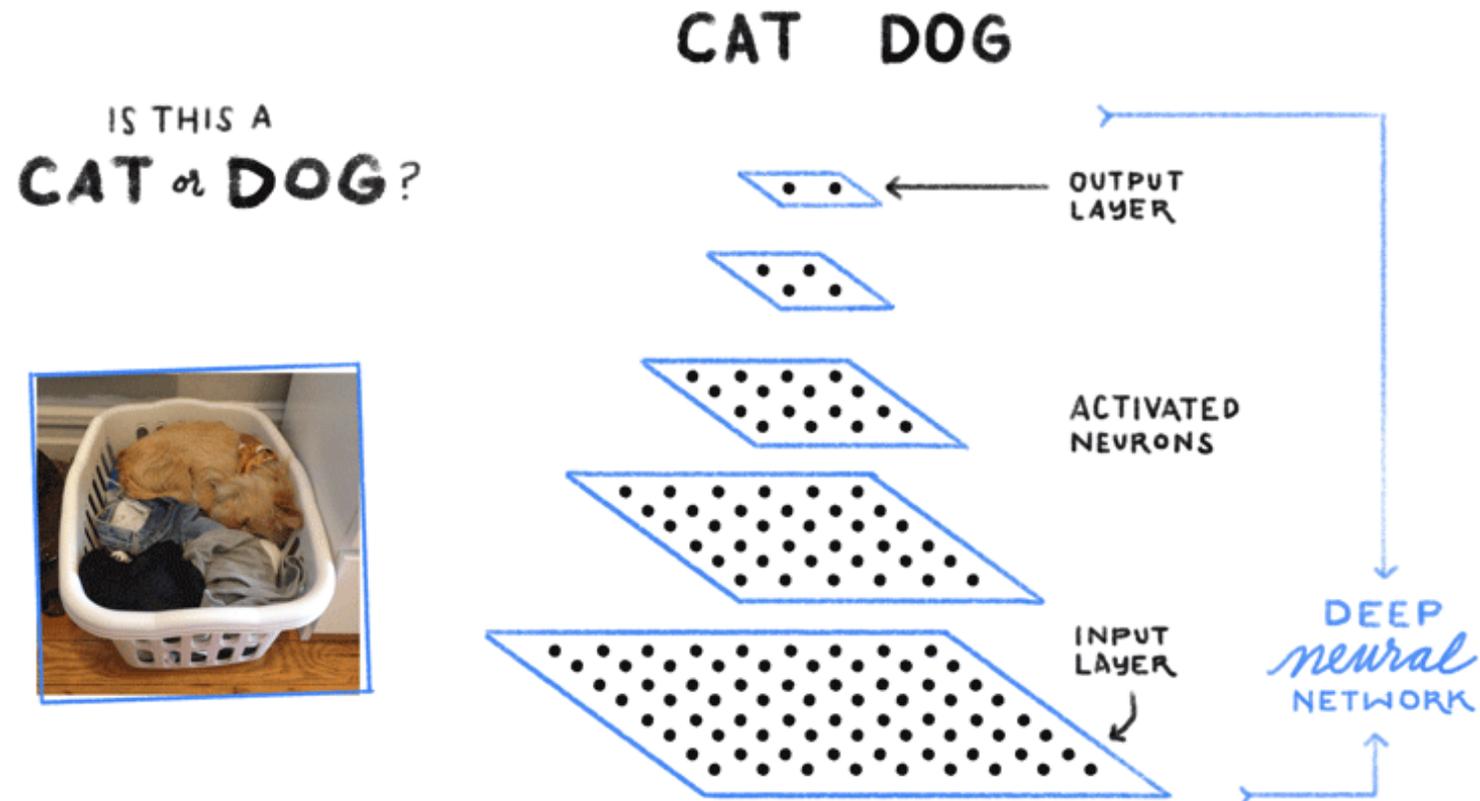
C'	tait	l'heu	re	tran	quil	l(e)	où	les	li	ons	vont	boire.
1	2	3	4	5	6	7	8	9	10	11	12	

Cependant, il faut tenir compte de trois particularités :

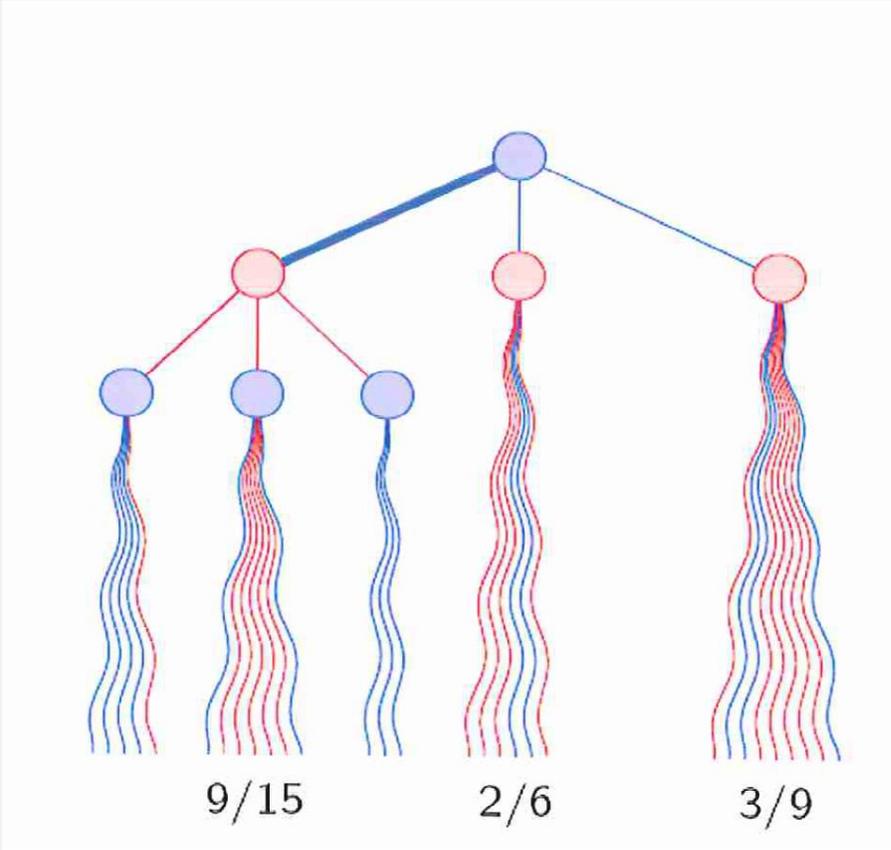
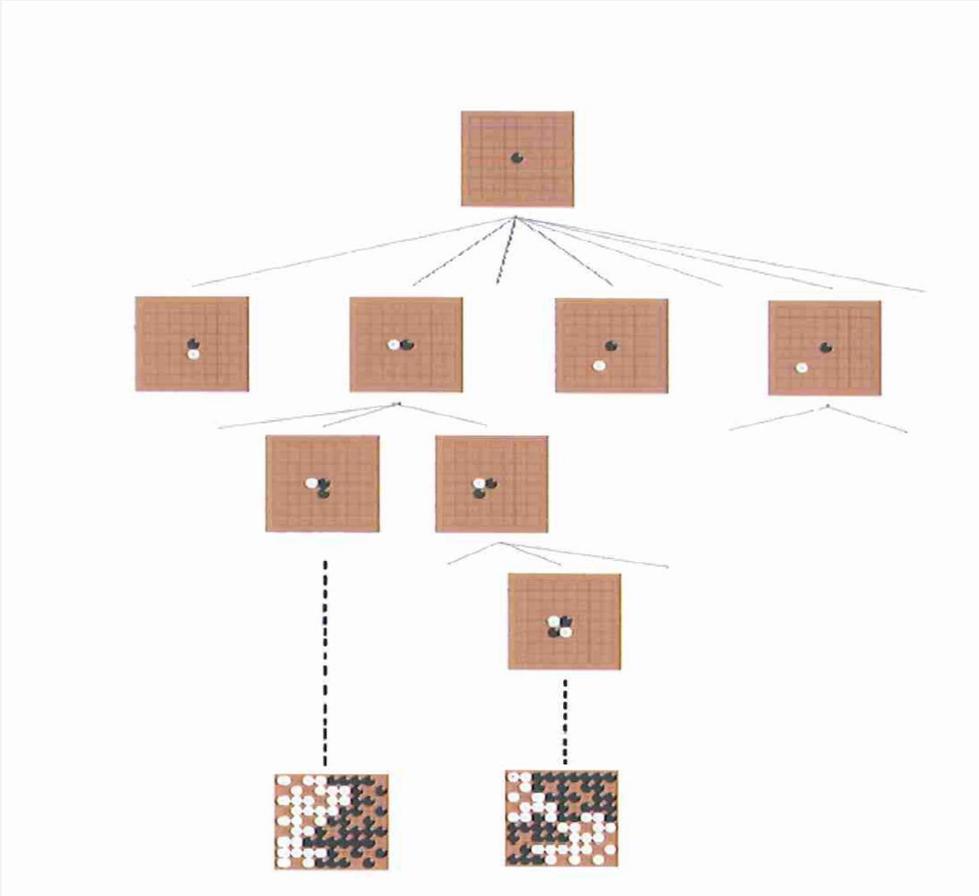
- la règle du «e» muet
- La synèrèse
- la diérèse

Le vers ci-dessus comporte 12 syllabes, c'est un alexandrin*, en raison de la diérèse* « lions » (li-
ons) sans quoi le vers aurait 11 syllabes, ce qui n'est pas conventionnel.

II) MACHINE LEARNING

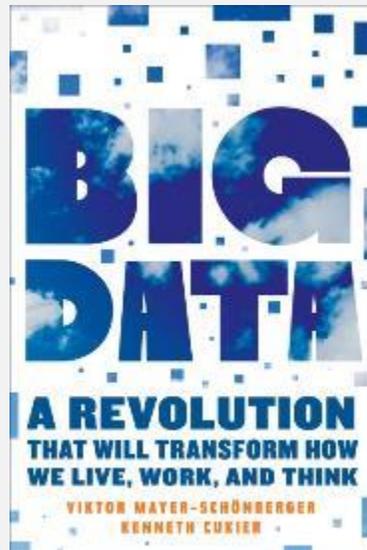
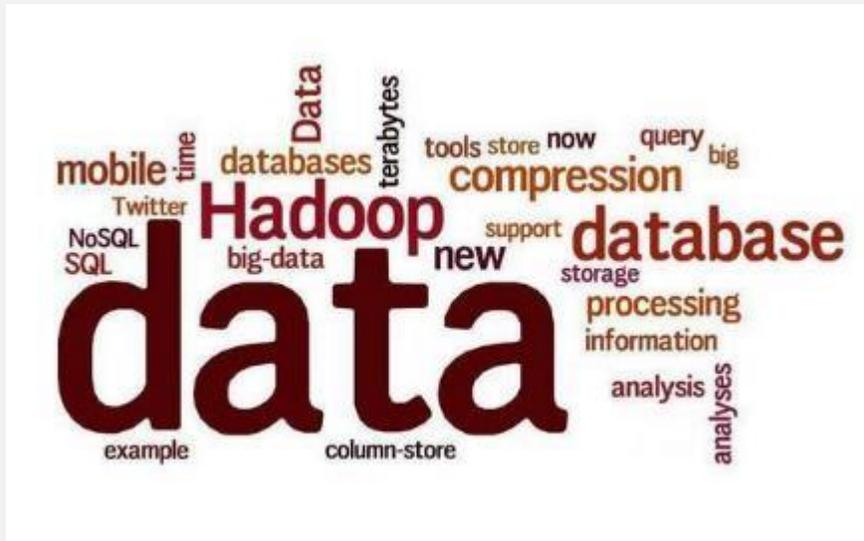


ALPHAGO



Example of a creative AI, new and surprising ?
But in a closed and well-defined world.





The « à la GOOGLE » AI

Detection of leakage

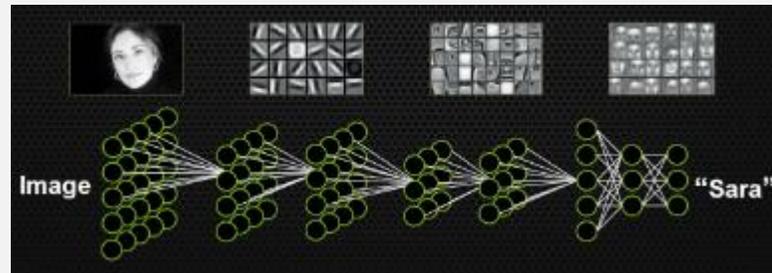


VS

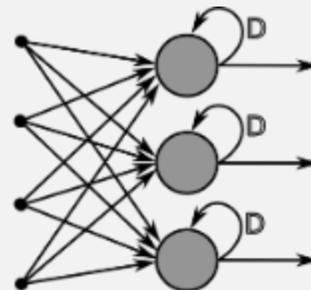


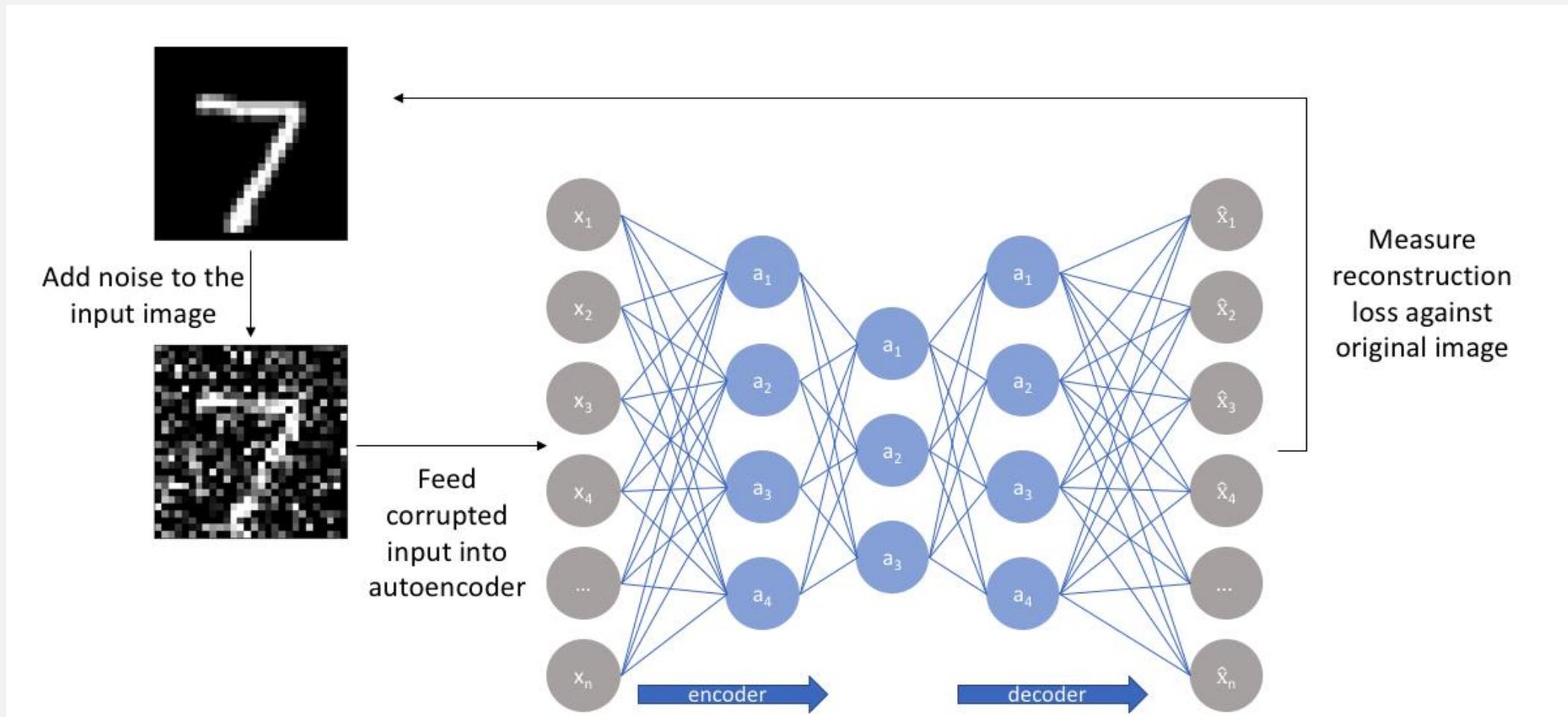
DEEP LEARNING

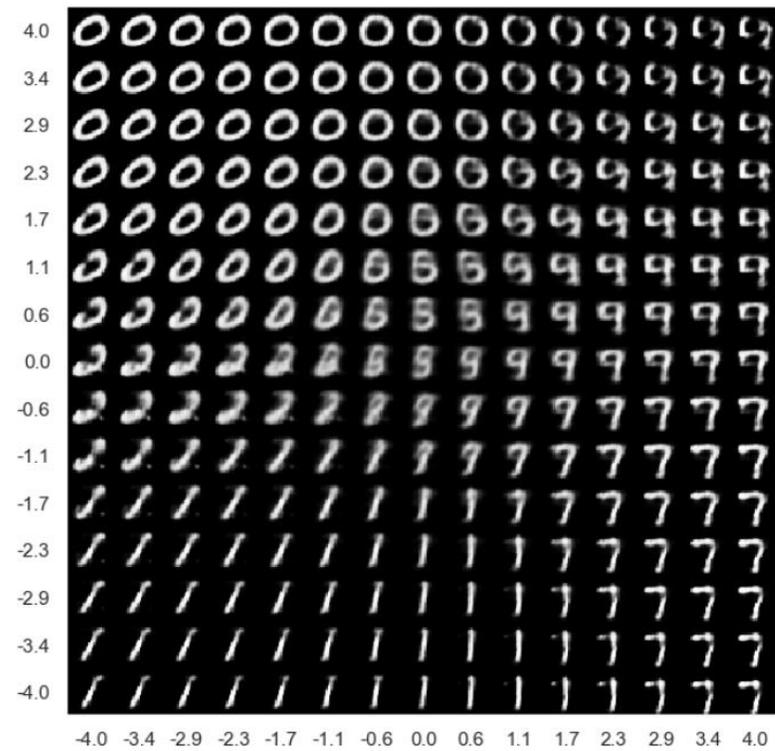
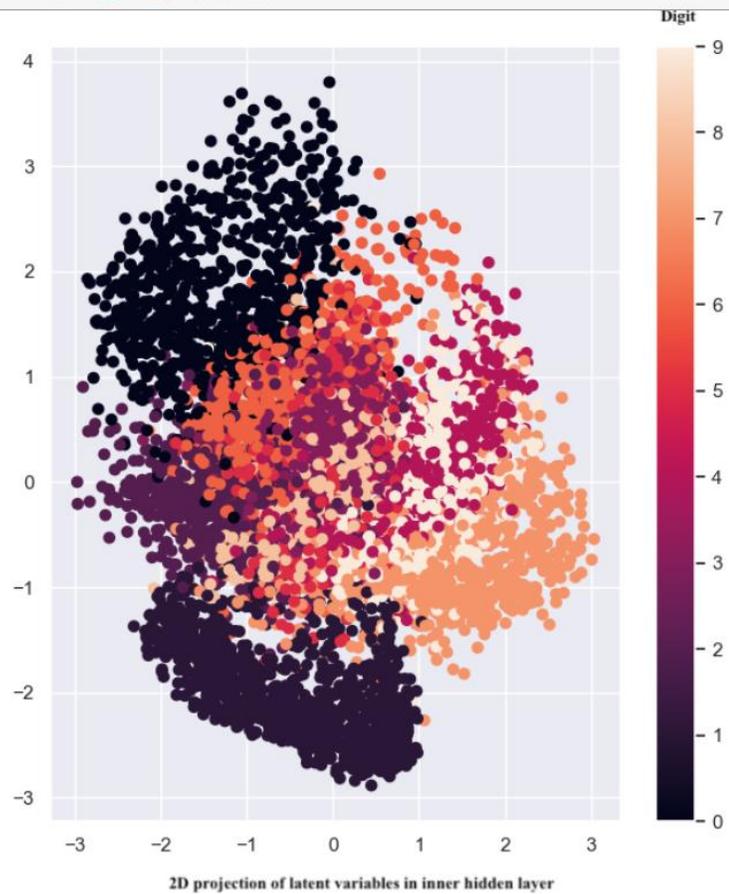
- Feedforward NN: deep in abstraction

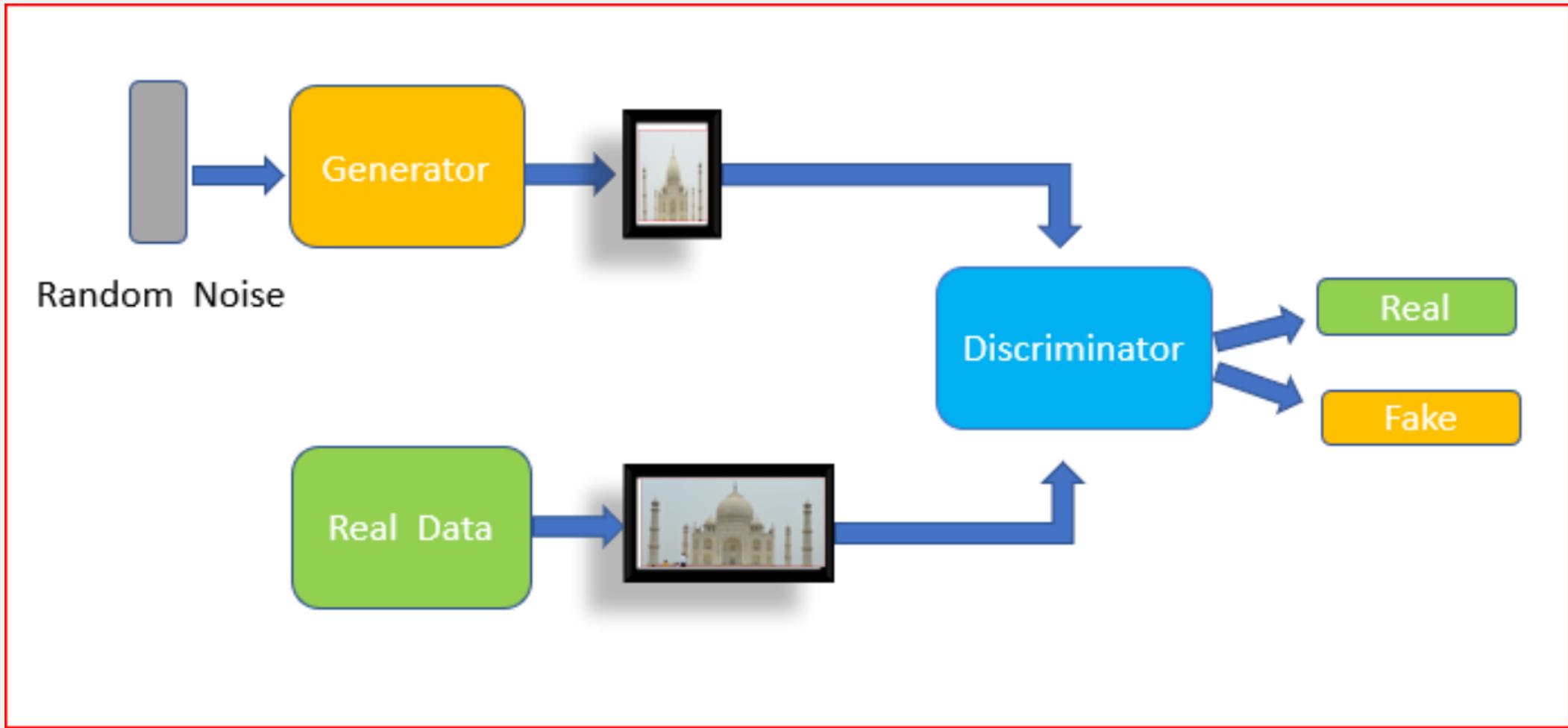


- Recurrent NN: deep in time

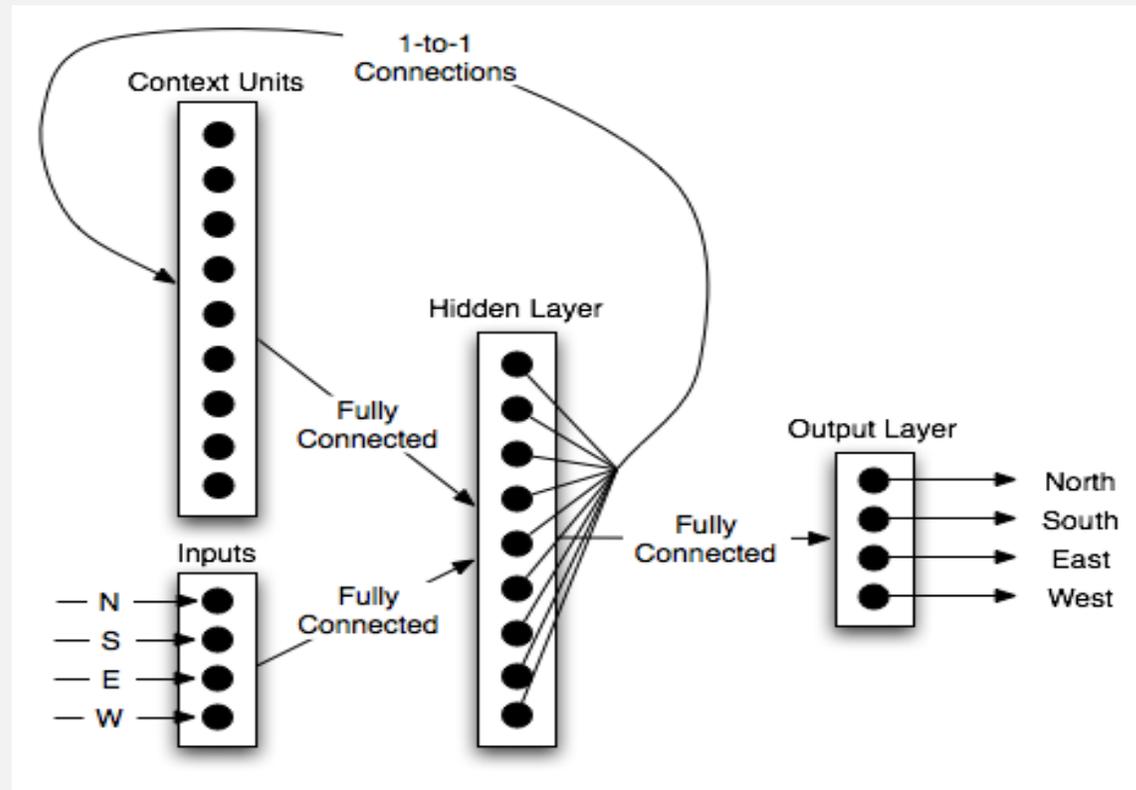




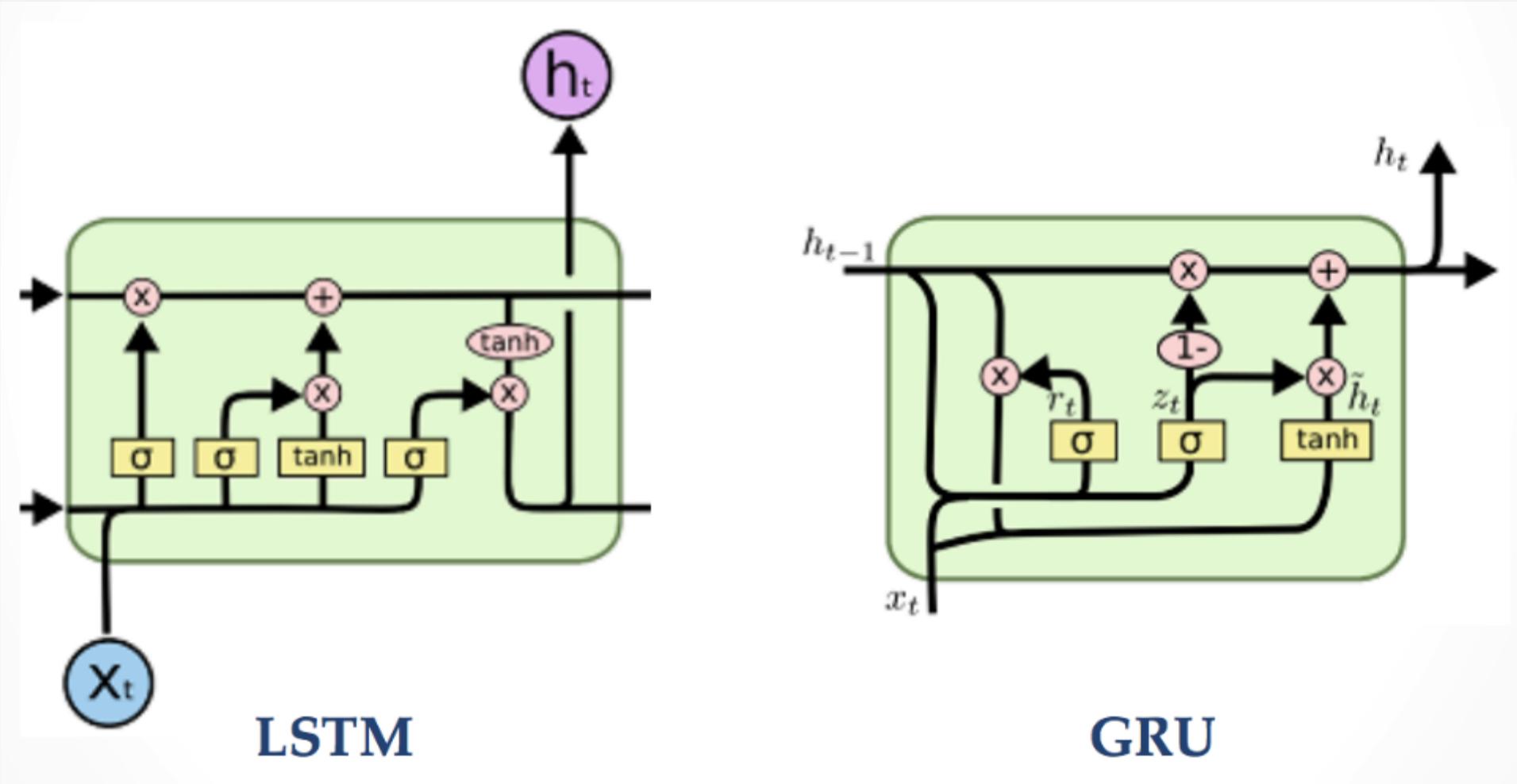




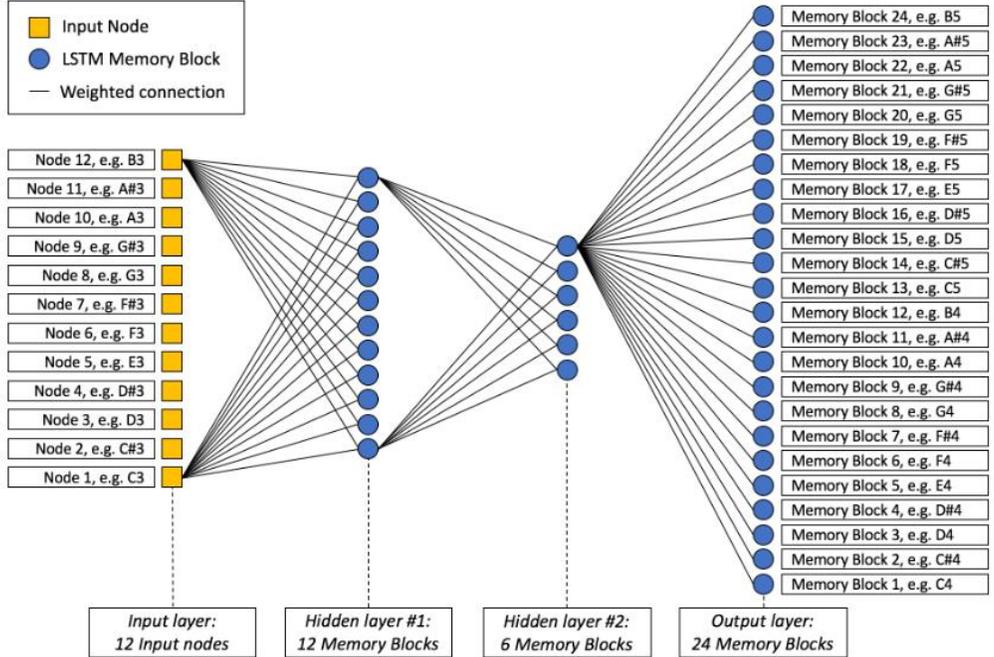
RECURRENT NEURAL NETWORKS



Elman NN = temporal processor : $Y(t)$ depends on the history of $x(t)$



In order to reduce the computational costs, the LSTM RNN's architecture has been restricted to twelve input nodes and 24 output nodes. Each node represents one pitch, meaning that chords that will feed-forward through the network need to be in the pitch range of an octave. The same goes for the melodies, which are available to the network at the output layer, thus need to be in the pitch range of two octaves. The number of hidden layers and nodes per hidden layer has been varied while conducting the experiments. For more detailed information, see the "Experiments" section of the thesis.

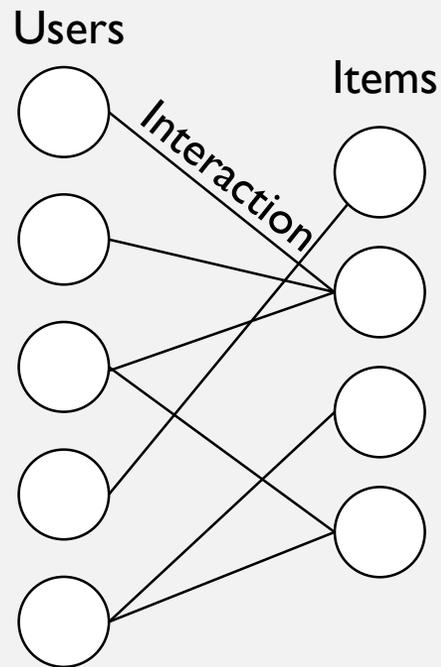


Listening Examples

After conducting the experiments with several different Network architectures, a network with two hidden layers (9 nodes in the first hidden layer, 18 nodes in the second one) has been chosen as the most promising architecture to fulfill the compositional aims from above.

Eight different chord sequences have been used to which the LSTM RNN composed the melodies. In addition,

OUR DEVELOPMENT: COLLABORATIVE FILTERING FROM LINK PREDICTION TO SEQUENCE PREDICTION



User 1:

User 2:	Item 03	Item 741	Item 56	?
User 3:	Item 95	Item 46	Item 08	?

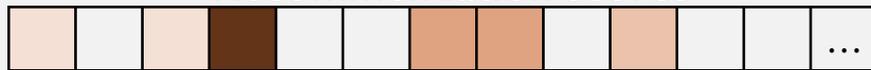
Goal: finding the missing links

Goal: predicting the next item in the sequence

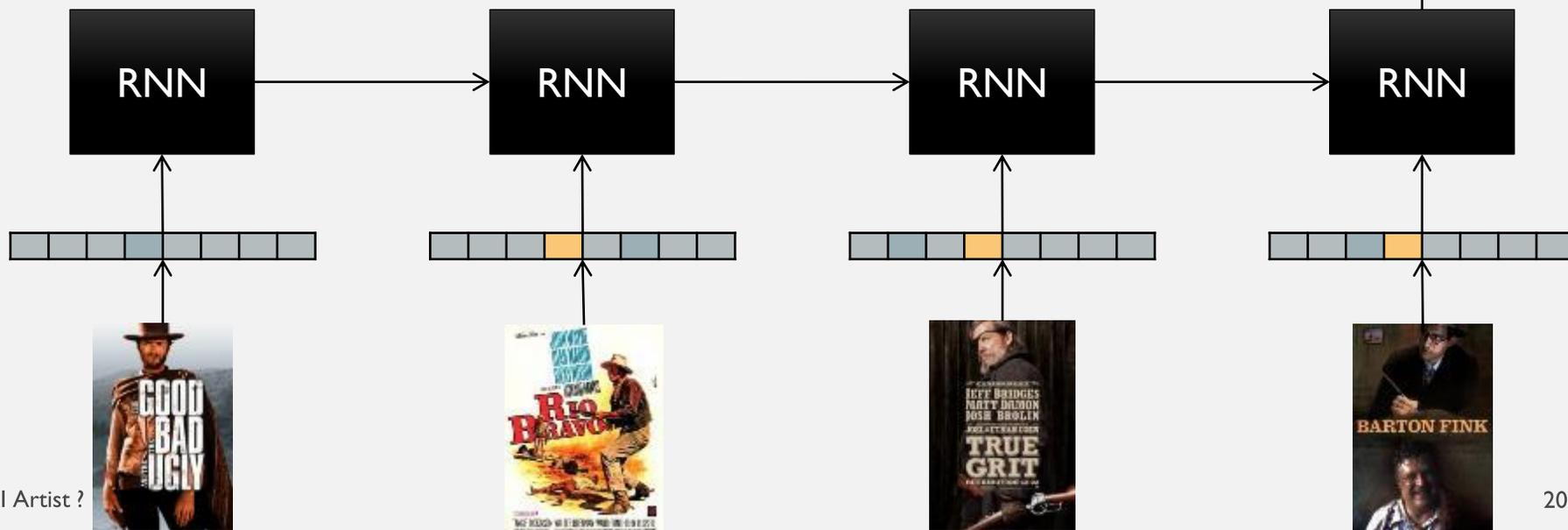
RNN: THE LARGE STRUCTURE

Items' representation

Recommendation scores

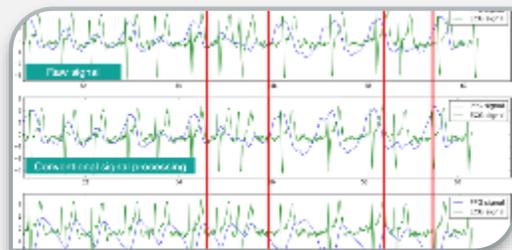
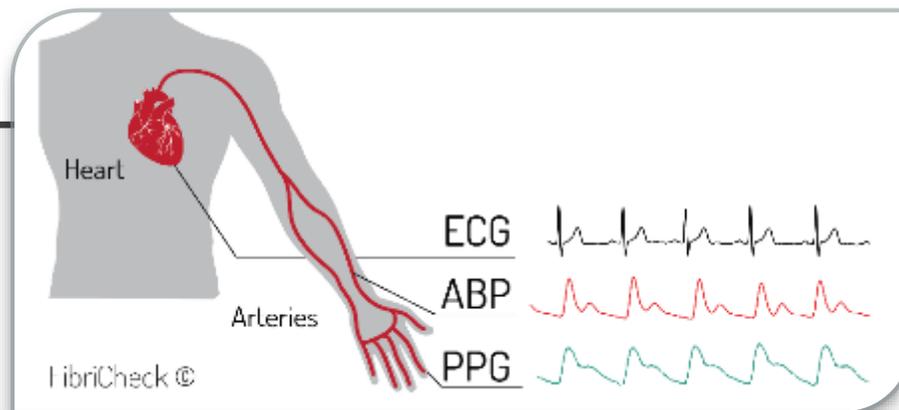


State of hidden neurons

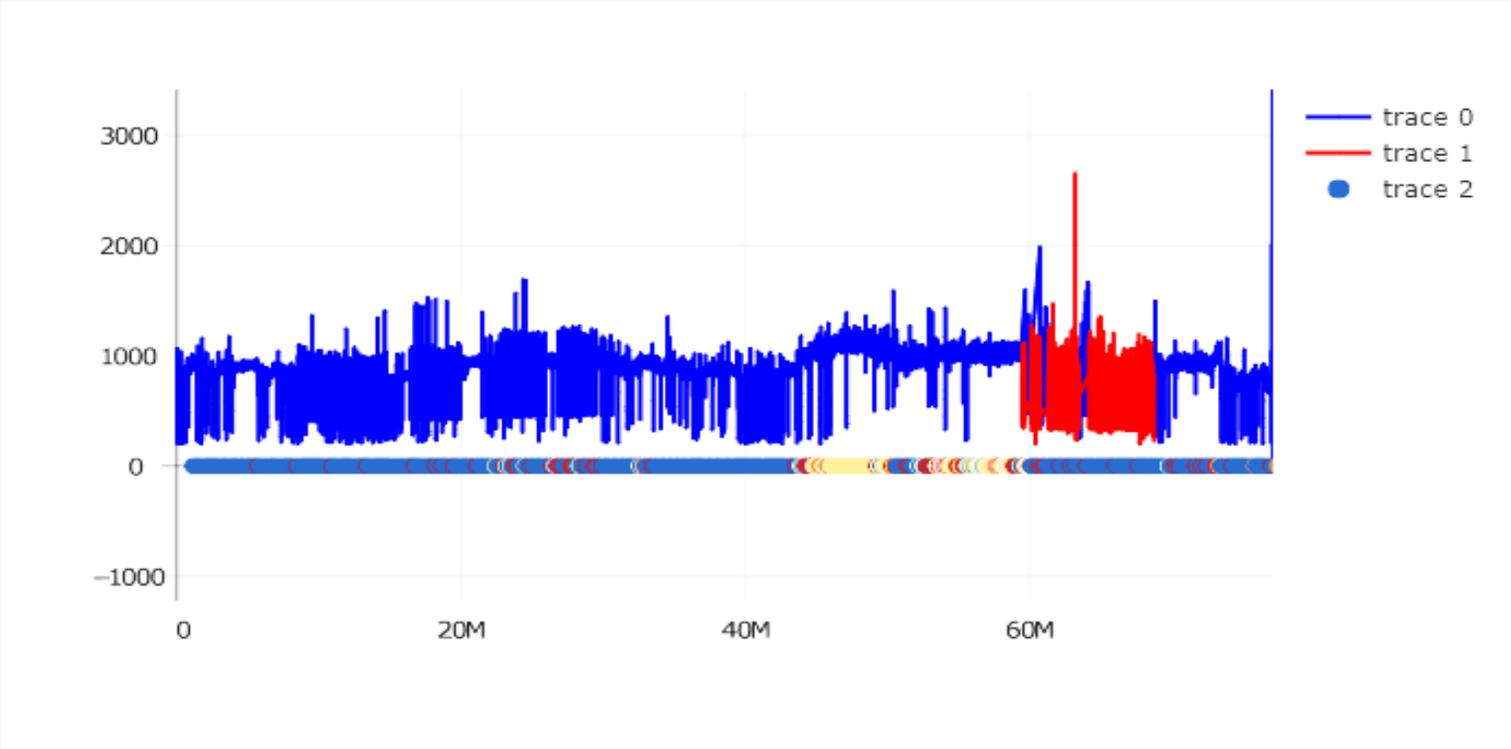


AI Artist ?

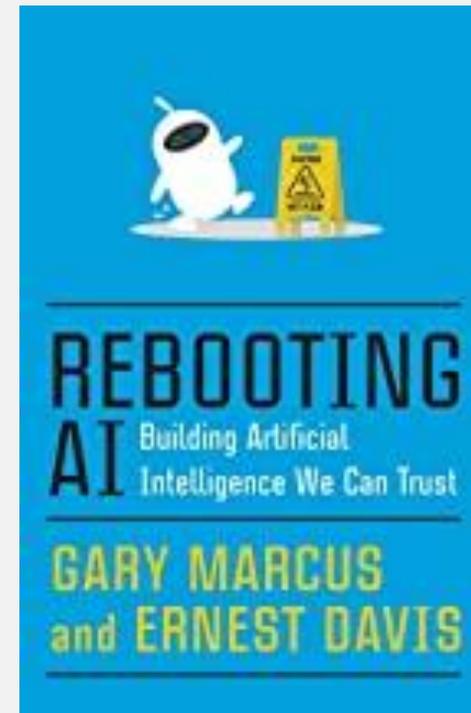
FIBRICHECK



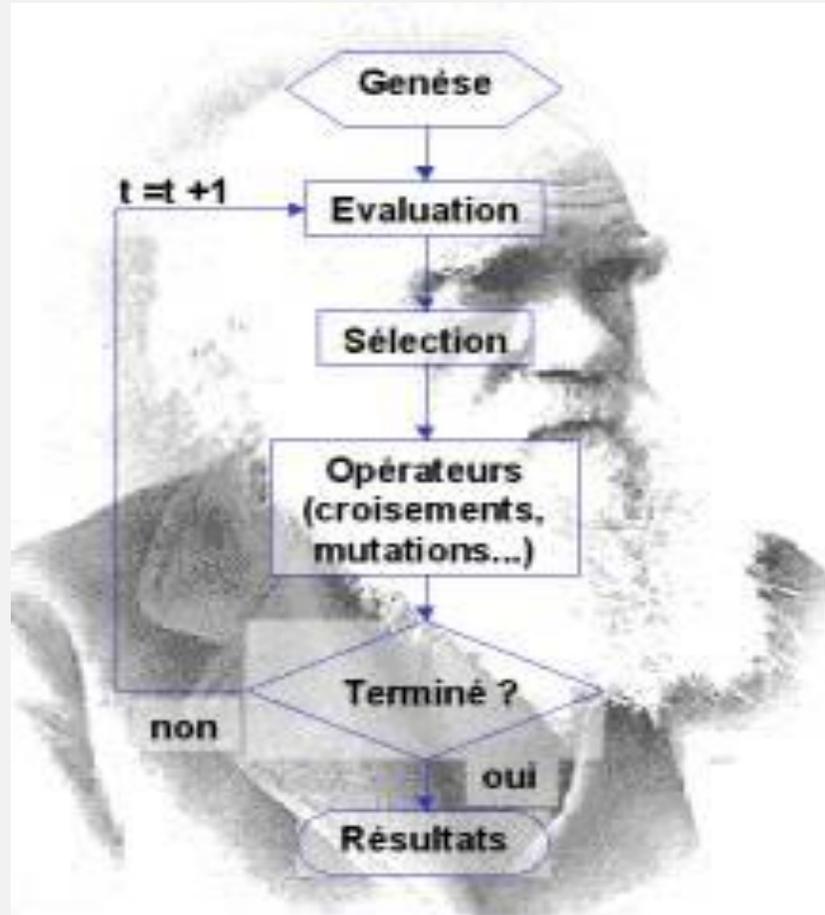
PRELIMINARY RESULTS



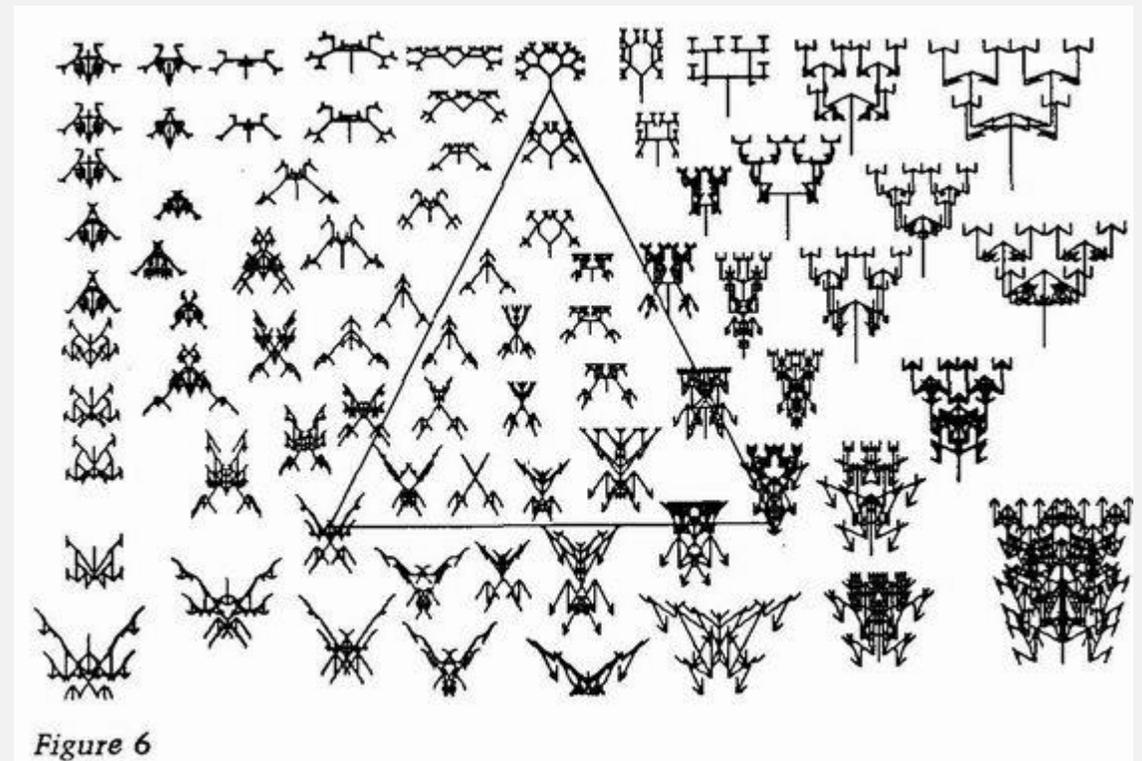
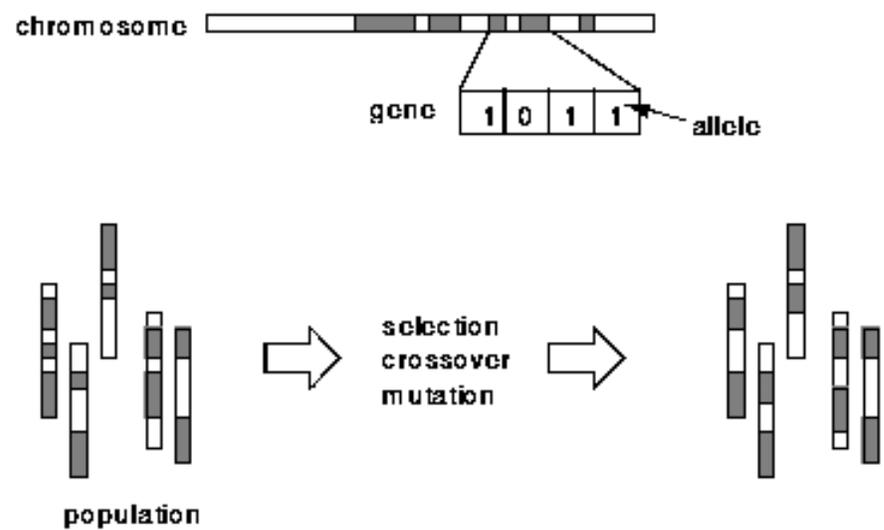
THE BLACK HOLE OF DEEP LEARNING



III) GENETIC ALGORITHMS AND EVOLUTIONARY ART



The GA lingo



Dawkins' Biomorphs

Art by Evolution on the Web
Pieter Cornelis Mondriaan

generate new paintings

scale 2 ▾ 9 paintings ▾

[\[start all over \]](#) [\[gene bank \]](#) [\[main page \]](#)

copyright © 1999-2001 by J.I. van Hemert

MAGGIE BODEN AGAIN

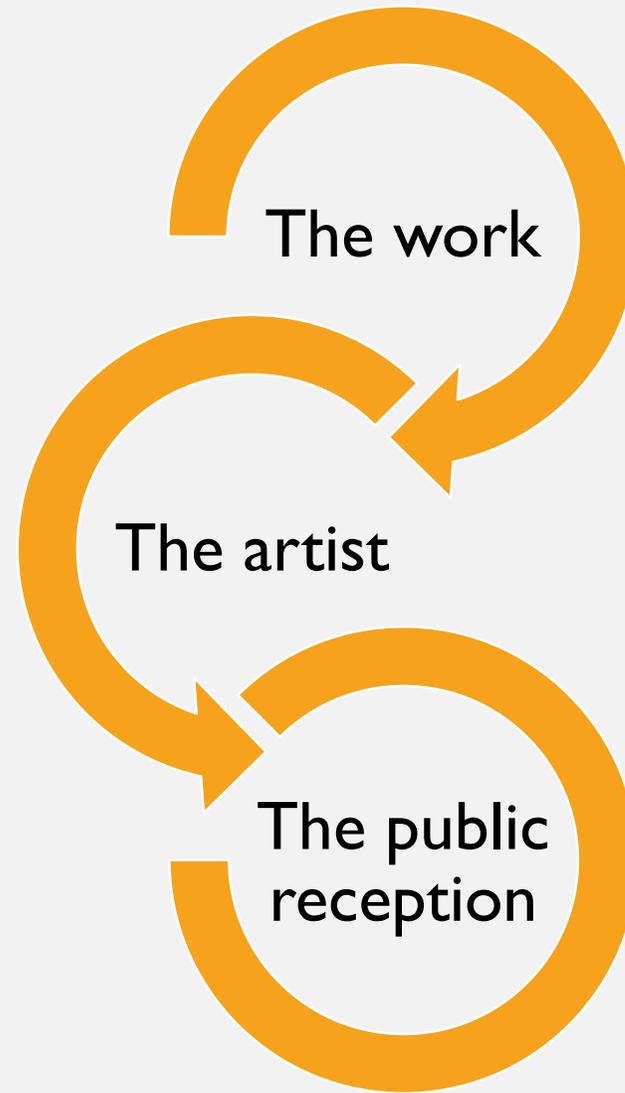
Exploratory Creativity
(exploration/exploitation of the past)

VS

Transformational Creativity
(Bifurcation from the past)

**III) BUT IS THAT ART?
IS THAT MEANINGFUL ?**

The conceptual triptych of art



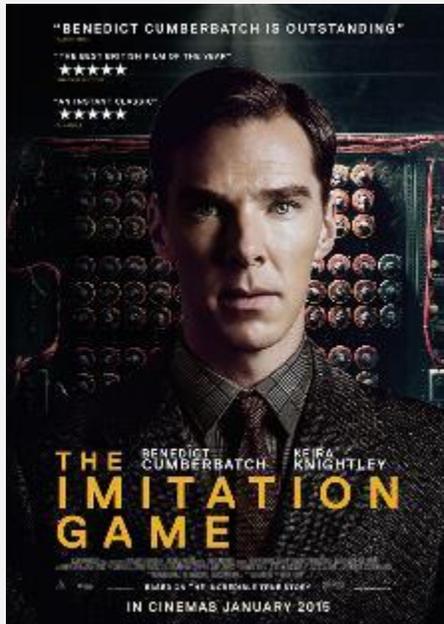
THE WORK

- At the origin of philosophical reflections (Kant), the beauty is entirely in the work
- The work speaks for itself
- That benefits the artistic autonomisation of AI (Simon Colton)
- But today: « What is art ? » → « When it is art ? »
- What would Kant have said in front of Duchamp's urinal ?
- Since the beginning of 20^{ème} century, Art less and less ignores the artist himself and the historical socio-cultural conditions of his creation
- Which can paradoxically favour or disfavour AI ??

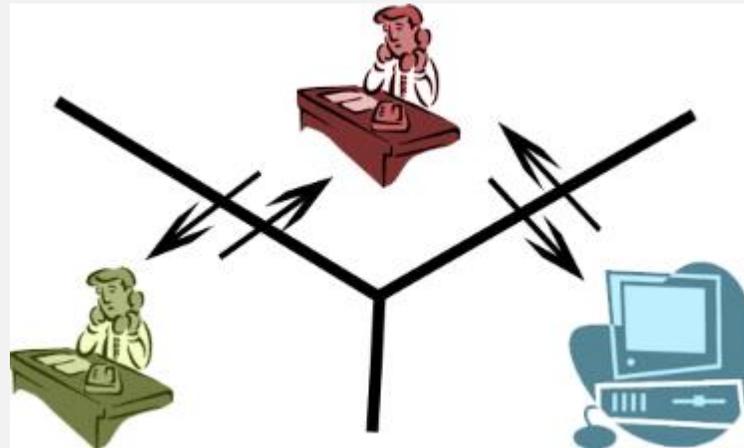
THE ARTIST AND THE TWO STEPS OF HIS CREATION: GENERATION AND EVALUATION

- The time being favours the fusion between the artist and his work
- The infinite possibility of artistic creation demands the selectivity of the artist
- Artist selectivity or public selectivity ?
- This calls for a strong emotional experience endowed with a strong subjectivity
- The personal emotion is a fantastic subjective filter, above all when it is question of transformational creativity
- We never imagine an artistic devoid of emotion, what remains characteristic of any machine these days.
- The artist explicit role makes the conscious AI much more valuable than the pastiches « à la Deep Learning » !

THE PUBLIC RECEPTION: THE FAMOUS TURING TEST



Whom am I speaking to?



1965: ELIZA -> LE SOFTWARE PSY



Joseph Weizenbaum

Le patient: "My boyfriend made me come here"

Le psy: Your boyfriend made you come here

Le patient: He says I'm depressed all the time

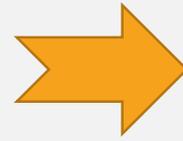
Le psy: I am sorry to hear you are depressed

THE SOCIO-CULTURAL CONDITIONS
OF THE PRODUCTION AT THE HEART
OF ART AND PUBLIC RECEPTION

EXAMPLES

- The Joconde owns its success not to its smile but to a theft in 1911 by a Louvres employee (Duncan Watts)
- Quatuor pour « la fin du temps » written by Messiaen in 1941 then prisoner in a concentration camp in Germany (Richard Powers)
- The ear of Van Gogh, the last piano note of Theleonus Monk,....
- The white square on white background of Malevitch: One year after the russian revolution of 1917 in reaction to « Constructivism » -> Transformational creativity
- We attend an unconscious dialog between the artist and the public, a shared socio-cultural background that totally escapes to the machine
- Art is part of social life while the machine is not living among us
- But could we invent a rich narratif for AI ?

BRANCUSI



CONCLUSIONS

AI WILL NEVER BE ARTIST

- Lack the emotional subjective filter indispensable for transformational creativity
- Today the figure of the artist is as important as his works
- The « pastiche » side disadvantages AI creativity exactly as copists or forgers.
- Nevertheless AI is valuable for its own and unique potential
- AI will remain as an exceptional tool, a brush, a feather or an instrument in the hands of the human artist.
- But it will never reach the complete autonomy to which it aspires
- The only hope is to quickly acquire a new interesting narrative, rich in new artistic experiences

