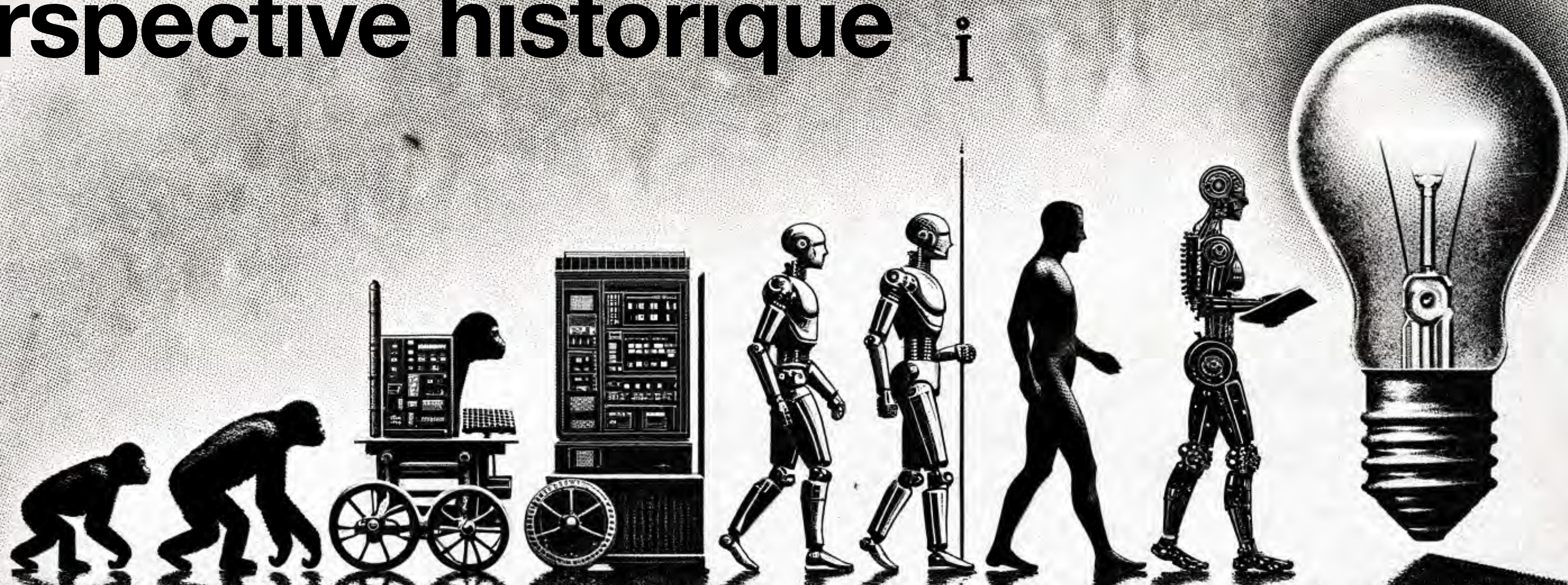


Intelligence artificielle et musique

- **Perspectives historiques et état des lieux**
- **Créer et composer avec l'IA**
 - Explorer les principes de l'intelligence artificielle générative et ses implications dans le domaine musical.
 - Les outils d'IA générative dédiés à la création musicale, avantages, opportunités, limites, notamment d'un point de vue éducatif.
- **Enseigner la musique avec l'IA**
 - Découvrir et analyser des outils d'IA générative appliqués à l'enseignement et à l'apprentissage de la musique, en évaluant leurs intérêts, leurs potentialités et leurs limites.
 - Examiner les effets de l'IA générative sur les pratiques pédagogiques en musique.
 - Les outils d'IA générative dédiés à la création musicale : point de vue éducatif.
- **IA générative et évolution des métiers liés à la musique**



IA Perspective historique



De la création de l'univers à l'IA

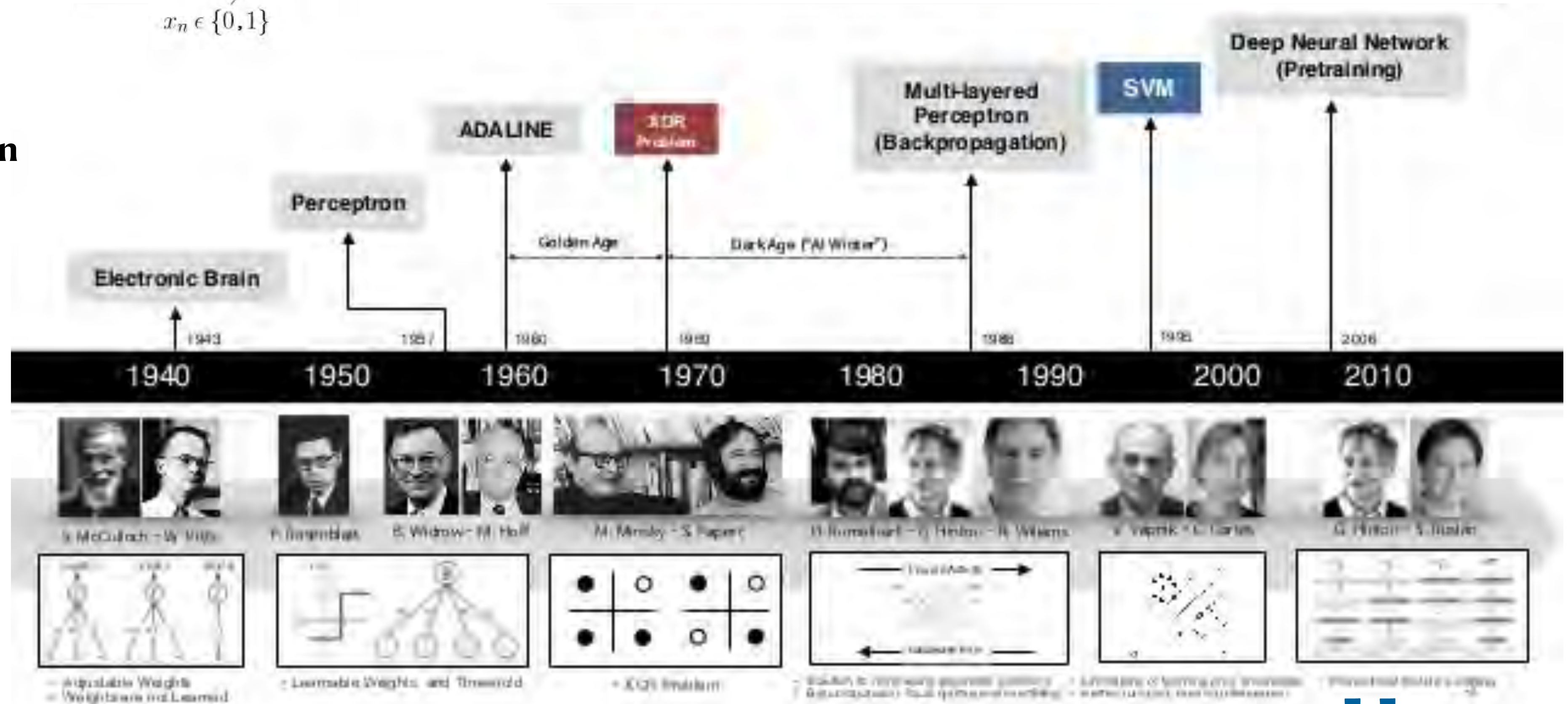
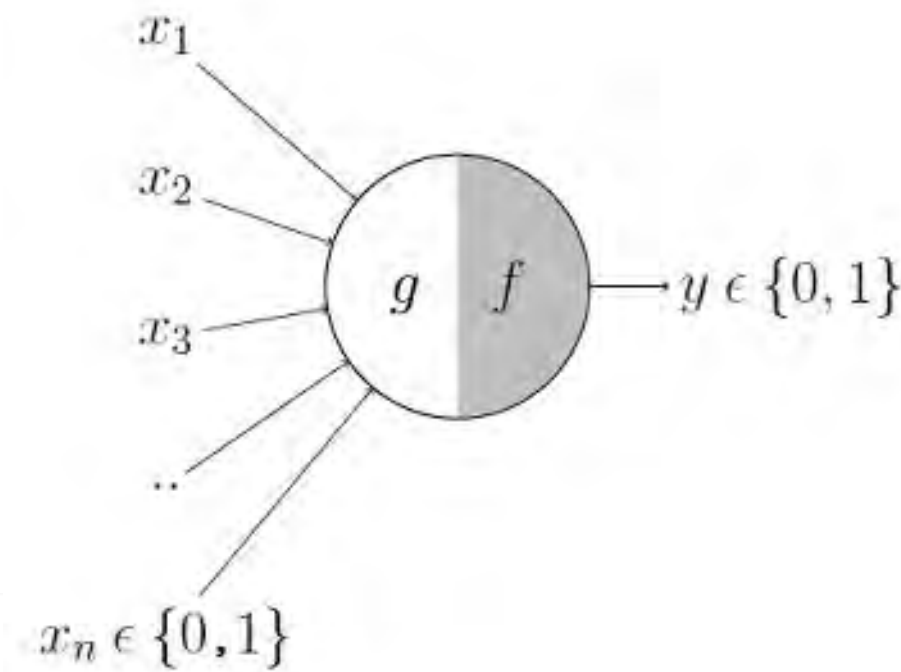
ANACHOUSTIC AI

- **Création de l'univers, il y a 13.8 milliards d'années**
- **Création de la terre, il y a 4.56 milliards d'années**
- **Apparition du genre humain, il y a 2,5 millions d'années**
- **Homme moderne (Homo Sapiens), il y a 300 000 ans**
- **Civilisation, il y a 12000 ans**
- **Écriture, il y a 5000 ans**



L'IA : de 1940 à nos jours

- 1940 - Electronic Brain
- 1950 - Perceptron
- 1960 - ADALINE (Adaptive Linear Neuron)
- 1970 - XOR Problem
- 1980 - Multi-Layered Perceptron (algorithme de “Back Propagation”)
- 1990 - SVM (algorithm de Machine Learning avec supervision)
- 2000 - Deep Neural Network (modèles d’IA pré-entraînés ou “Pre-Trained”)



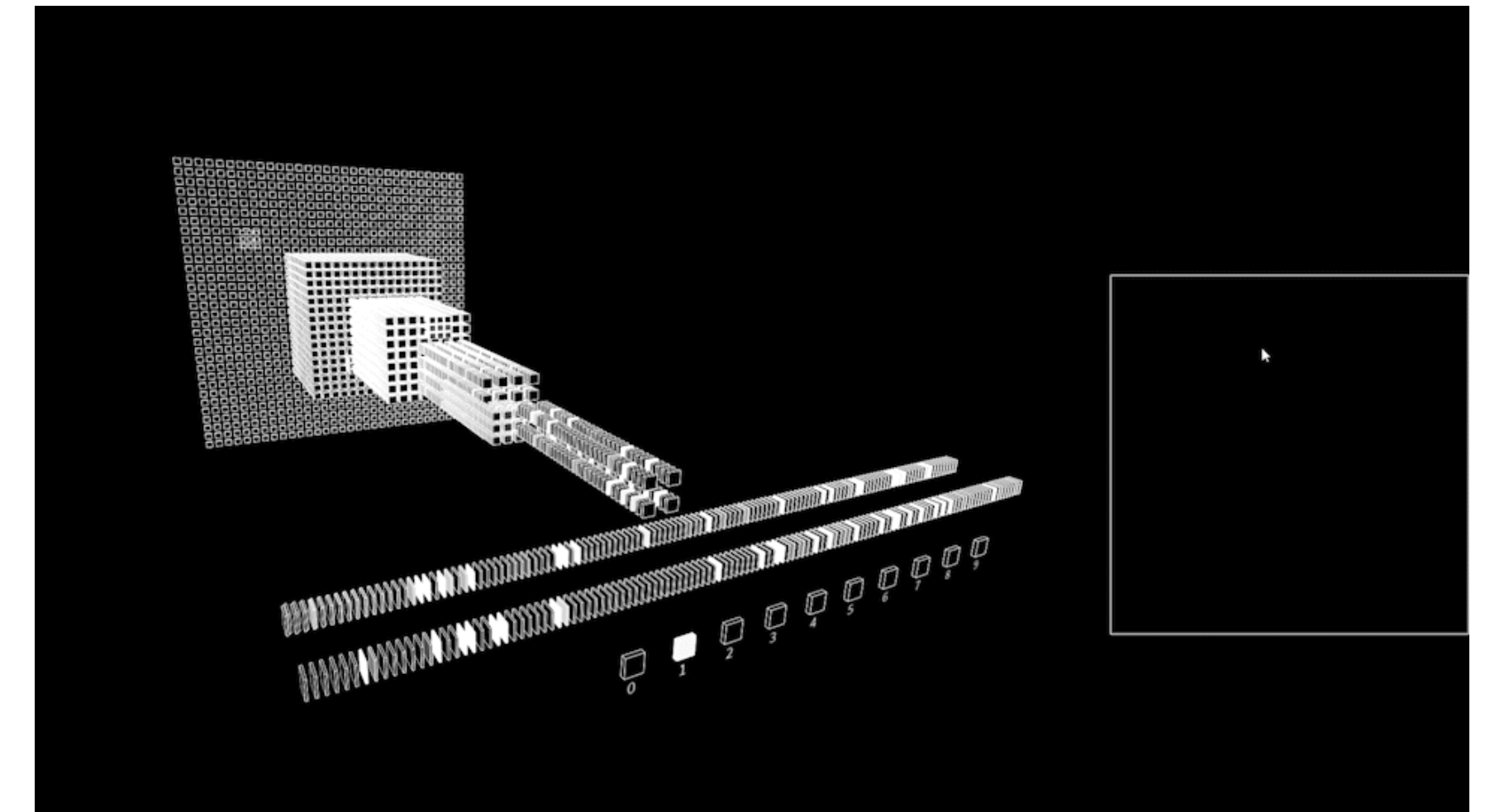


Fig. 1 — Organization of a biological brain. (Red areas indicate active cells, responding to the letter X.)

- Le **perceptron** (1957), modèle d'apprentissage automatique. Cet algorithme est le précurseur des réseaux neuronaux modernes, mis au point par **Frank Rosenblatt** (1928-1971) dans les années 1950.

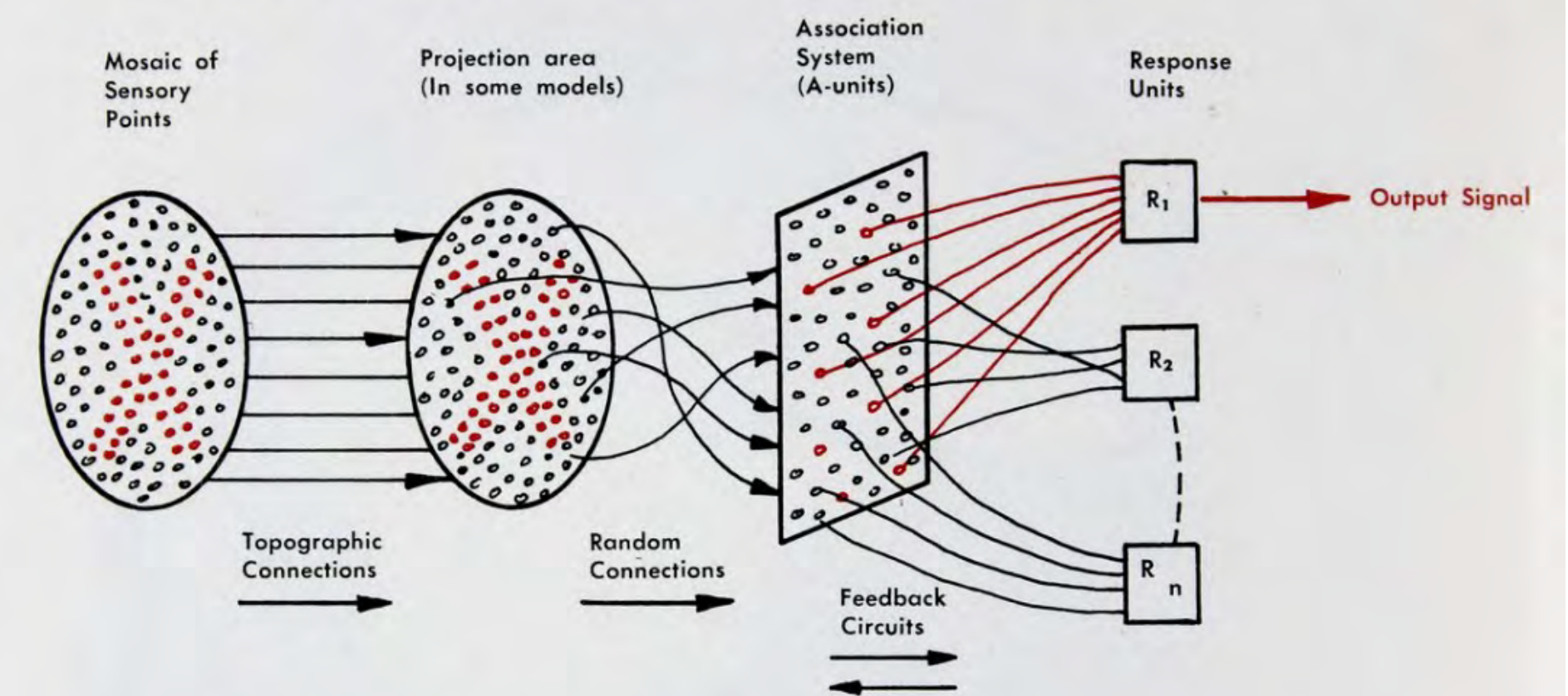


FIG. 2 — Organization of a perceptron.

IA et musique



IA et musique état des lieux

Un sondage parmi les artistes et musiciens réalisé par la société musicale Ditto

Ditto Music surveyed 1,299 independent artists actively releasing music in 2023

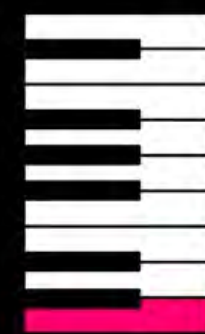
DITTO

Is AI the future of music? We asked the artists...



59.5%

of artists already use AI within their music projects



11%

of artists have used AI for their songwriting



20.3%

of artists have used AI for music production



30.6%

of artists have used AI for mastering music



38%

of artists have used AI for music artwork

Would you consider using AI in future music projects?



47.1%

of artists would use AI for their songwriting



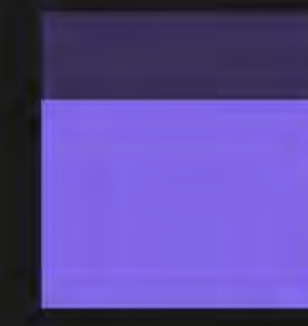
61.5%

of artists would use AI for music production



66%

of artists would use AI for mastering music



76.5%

of artists would use AI for music artwork

28.5%

of artists say they would never use AI



What has put artists off using AI?



IA et Musique

La voix d'Edith Piaf

Orchestration
Nathan Stornetta



Time travel . . . avec les Beatles



Time travel . . . avec les Beatles

NOW AND THEN

THE LAST BEATLES SONG

Création musicale et IA



Typologie des outils d'IA pour la création musicale

• Composition et Génération de Musique

- aide à l'orchestration : Orchidea
- Arrangement Intelligents : RipX , lalal.ai
- Outils de composition assistée par IA : Los Angeles Composers
- Plugins VST basés sur l'IA
- IA générative pour la musique et les processus créatif : Bandlab, Udio, Suno, AIVA etc.

• Production musicale, Mastering

- Traitement du son : utilisation de l'IA pour la suppression de bruit, la restauration d'enregistrements, améliorations du signal pour le mixage et le mastering
- Création et Synthèse : RipX, Synthplant, Fluid Corpus Manipulation



RipX

Lalal.ai

Handwritten musical score for Viola and Piano. The score consists of several systems of staves. The top system includes a treble clef staff with notes and rests, and a bass clef staff with notes and rests. The middle system shows a treble clef staff with notes and rests, and a bass clef staff with notes and rests. The bottom system shows a treble clef staff with notes and rests, and a bass clef staff with notes and rests. The handwriting is in brown ink on aged paper.

*Beethoven
Violoncello
Quintett
in B*

BEETHOVEN
by Arrangement
Volume One
Works for Viola and Piano

Viola Sonata in A; fragment
Horn Sonata, Op. 17
arr. Paul Silverthorne
Notturmo, Op. 42
arr. Karl Xaver Kleinheinz
Grand Duo in E flat (Septet), Op. 20
arr. Friedrich Hermann

Includes first recordings

Aut dem Hingean Leipzig.

Beethoven Sonate pour Alto

Sonate für Clarin und Viola.

D'après un fragment retrouvé par Karl Holz,
Secrétaire de Beethoven et second violon du quatuor Schuppanzigh Quartet

(Archive Beethovenhaus Bonn)

Allegro

Clarin

The image shows a handwritten musical score for Clarinet and Viola. The tempo is marked 'Allegro'. The score consists of two staves. The top staff is for the Clarinet and the bottom staff is for the Viola. The music begins with a treble clef and a key signature of one sharp (F#). The first measure shows a series of notes in the Clarinet part, followed by rests in the Viola part. The second measure continues the Clarinet line with more notes and rests. The third measure shows a similar pattern. The fourth measure has a note in the Clarinet part and a rest in the Viola part. The fifth measure has a note in the Clarinet part and a rest in the Viola part. The sixth measure has a note in the Clarinet part and a rest in the Viola part. The seventh measure has a note in the Clarinet part and a rest in the Viola part. The eighth measure has a note in the Clarinet part and a rest in the Viola part. The ninth measure has a note in the Clarinet part and a rest in the Viola part. The tenth measure has a note in the Clarinet part and a rest in the Viola part. The eleventh measure has a note in the Clarinet part and a rest in the Viola part. The twelfth measure has a note in the Clarinet part and a rest in the Viola part. The thirteenth measure has a note in the Clarinet part and a rest in the Viola part. The fourteenth measure has a note in the Clarinet part and a rest in the Viola part. The fifteenth measure has a note in the Clarinet part and a rest in the Viola part. The sixteenth measure has a note in the Clarinet part and a rest in the Viola part. The seventeenth measure has a note in the Clarinet part and a rest in the Viola part. The eighteenth measure has a note in the Clarinet part and a rest in the Viola part. The nineteenth measure has a note in the Clarinet part and a rest in the Viola part. The twentieth measure has a note in the Clarinet part and a rest in the Viola part. The twenty-first measure has a note in the Clarinet part and a rest in the Viola part. The twenty-second measure has a note in the Clarinet part and a rest in the Viola part. The twenty-third measure has a note in the Clarinet part and a rest in the Viola part. The twenty-fourth measure has a note in the Clarinet part and a rest in the Viola part. The twenty-fifth measure has a note in the Clarinet part and a rest in the Viola part. The twenty-sixth measure has a note in the Clarinet part and a rest in the Viola part. The twenty-seventh measure has a note in the Clarinet part and a rest in the Viola part. The twenty-eighth measure has a note in the Clarinet part and a rest in the Viola part. The twenty-ninth measure has a note in the Clarinet part and a rest in the Viola part. The thirtieth measure has a note in the Clarinet part and a rest in the Viola part. The thirty-first measure has a note in the Clarinet part and a rest in the Viola part. The thirty-second measure has a note in the Clarinet part and a rest in the Viola part. The thirty-third measure has a note in the Clarinet part and a rest in the Viola part. The thirty-fourth measure has a note in the Clarinet part and a rest in the Viola part. The thirty-fifth measure has a note in the Clarinet part and a rest in the Viola part. The thirty-sixth measure has a note in the Clarinet part and a rest in the Viola part. The thirty-seventh measure has a note in the Clarinet part and a rest in the Viola part. The thirty-eighth measure has a note in the Clarinet part and a rest in the Viola part. The thirty-ninth measure has a note in the Clarinet part and a rest in the Viola part. The fortieth measure has a note in the Clarinet part and a rest in the Viola part. The forty-first measure has a note in the Clarinet part and a rest in the Viola part. The forty-second measure has a note in the Clarinet part and a rest in the Viola part. The forty-third measure has a note in the Clarinet part and a rest in the Viola part. The forty-fourth measure has a note in the Clarinet part and a rest in the Viola part. The forty-fifth measure has a note in the Clarinet part and a rest in the Viola part. The forty-sixth measure has a note in the Clarinet part and a rest in the Viola part. The forty-seventh measure has a note in the Clarinet part and a rest in the Viola part. The forty-eighth measure has a note in the Clarinet part and a rest in the Viola part. The forty-ninth measure has a note in the Clarinet part and a rest in the Viola part. The fiftieth measure has a note in the Clarinet part and a rest in the Viola part.

Musique Générative

Los Angeles Music Composer

Los Angeles Music Composer Edition (ver. 4.0)

Powered by tegriddy-tools: <https://github.com/asigalov61/tegridy-tools>

WARNING: This complete implementation is a functioning model of the Artificial Intelligence. Please exercise great humility, care <https://www.nscail.gov/>

Project Los Angeles
Tegriddy Code 2023

⌵ (GPU CHECK)

> NVIDIA GPU check

▶ Show code

⌵ (SETUP ENVIRONMENT)

> Install dependencies

▶ Show code

> Import modules

▶ Show code

⌵ (LOAD MODEL)

How to Use

Los Angeles Music Composer

*In memory of
MuseNet*

A tutorial by Timzart7
on the Python/Jupyter AI program
running in Colab notebook
on GitHub, Composer Version

This tutorial posted on July 9, 2023

Program written by
Aleksandr Sigalov

Musique Générative

ChatGPT + Claude.ai + Gemini

**Movement 1:
Prelude - “Tears of Dawn”
(Adagio Molto)**

IA générative

Les générateurs de musique par IA sont particulièrement aptes à créer des pistes dans des genres tels que l'électronique, la pop, le hip-hop etc.

Suno

Udio

Runway



Fluid Corpus Manipulation

FluCoMa est un ensemble d'outils de ML et d'IA pour la synthèse et la création sonore

SP-Tools
(alpha teaser video)



**Machine Learning Tools
for Drums and Percussion**

Synthplant

“Synplant donne une tournure génétique à la conception sonore en allant au-delà des traditionnelles manipulations de boutons et des réglages, en mettant l'accent sur l'exploration et la découverte. Ici, vos oreilles vous guident à travers une forêt de textures organiques et de timbres évolutifs.”



Enseigner avec l'IA

- **Défis et opportunités dans le domaine de la musique**
- **l'IA et :**
 - **Les processus d'apprentissage des élèves en musique**
 - **Le rôle et les méthodes de l'enseignant·e / musicien·ne ?**
 - **Les pratiques de création artistique**
 - **L'évolution des métiers liés à la musique**



Typologie des outils d'IA pour l'enseignement

- Outils d'analyse pour la composition, l'écriture, l'écoute
- Pratique instrumentale et formation musicale
- Suivi des étudiants



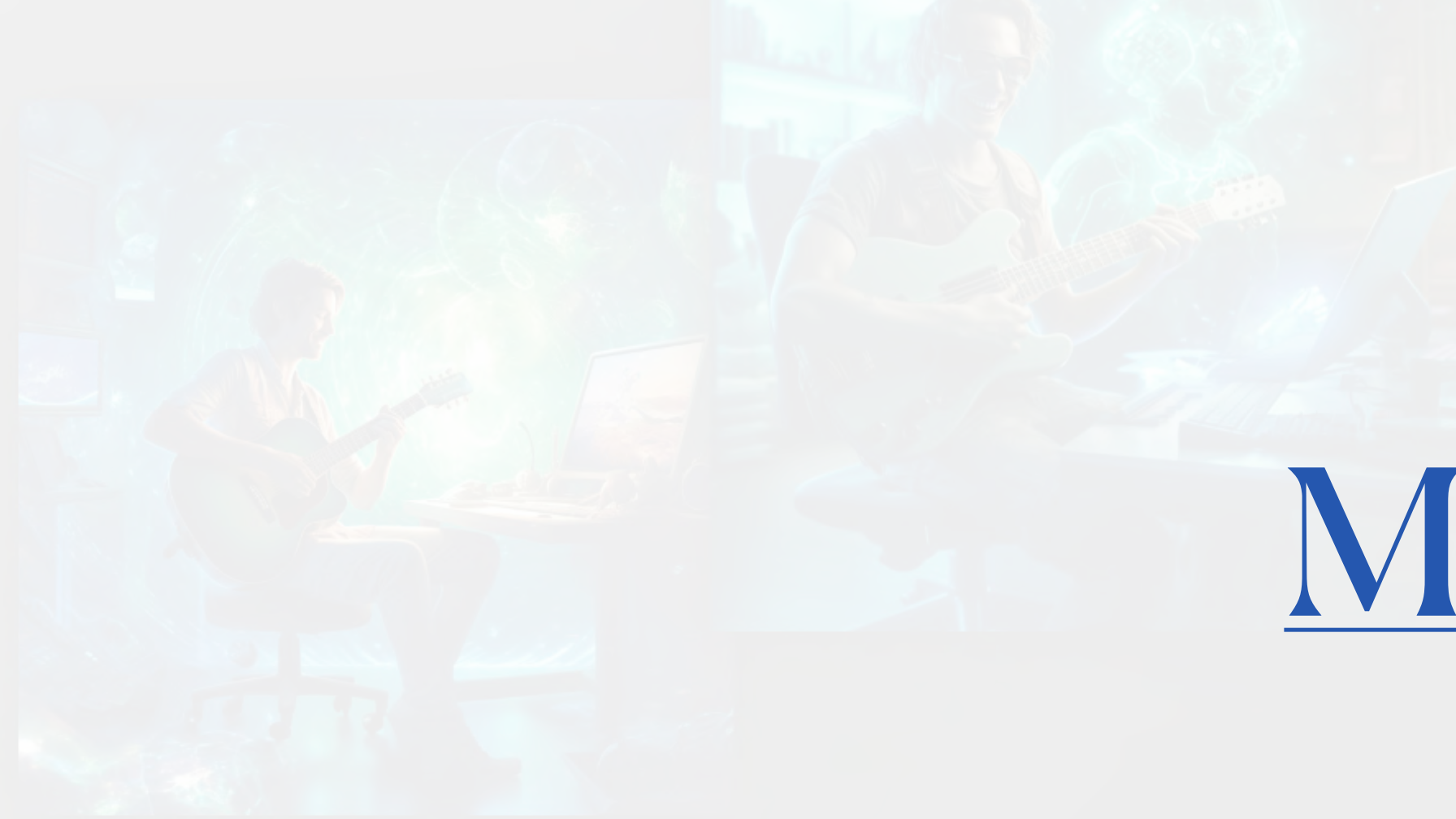
Enseigner et apprendre la musique avec l'IA ?

- **Pratique instrumentale et feedback instantané** ([Metronaut](#))
- **Outils de Pratique Augmentée: transformer l'apprentissage théorique de la musique et la formation de l'oreille en jeux interactifs.** ([Chrome MusicLab](#) , [Duolingo](#))
- **Mentors virtuels de musique : l'IA pour les suivis, l'évaluation et les cours personnalisés** ([musicmentor.ai](#))
- **Outils d'aide à l'analyse** ([RipX](#), [Moises](#) , [Fadr](#))
- **Outils permettant de générer des propositions sur lesquelles on construit un retour analytique** ([Orchidea](#))

Metronaut / Antescofo (IA)

Une application pour jouer avec un accompagnement





Traditional music education (which is still taught today) was invented centuries ago, before computers existed. It involves complicated notation, and can take years or decades to become proficient (if ever)!

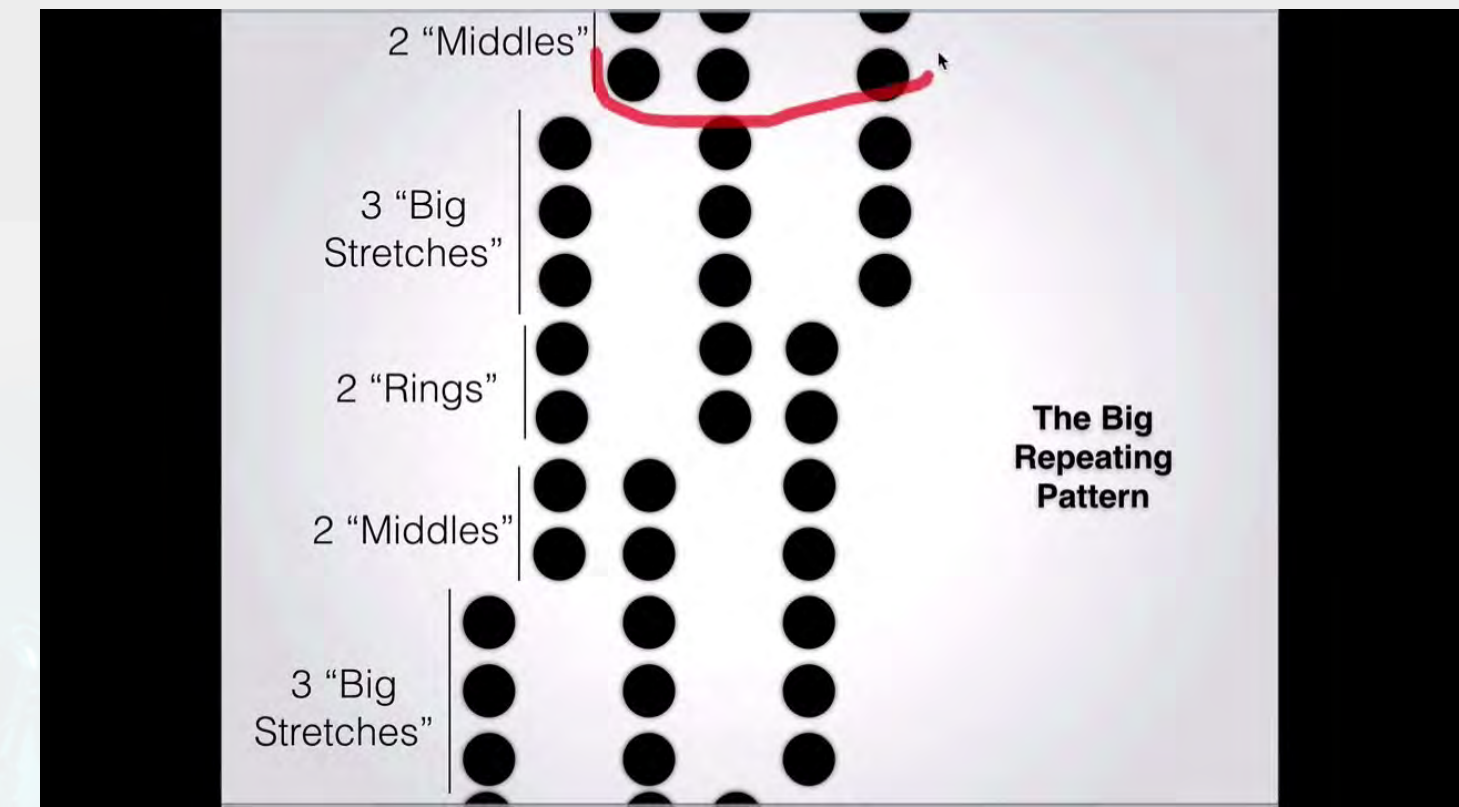
IA

Music Mentor

But now, with the help of our Music Mentor, you can easily learn music in your natural learning style, with customized steps that quickly transform you into the musician you always wanted to be.

THE PERFECT PRACTICE PARTNER

- Pratique musicale personnalisée
- Théorie companion who's always available, and always knows what to do next.
- Roadmap / Plan de travail provides the perfect steps at the perfect time
- Historique et analyse des progrès track your musical goals faster than you ever imagined
- Organisation des videos & leçons



IA

Analyse, mixage & démixage

RipX

- Analyse de timbre
- Travail de l'écoute
- Décomposition instrumentale
- Transcription
- Accompagnement réel


Moises


Bien plus


Ta bibliothèque


ation : un partenaire de musique.


Quel que soit ton appareil, n'importe quel appareil, stockée dans le cloud en toute sécurité.

 Séparation audio par l'IA

 Métronome Intelligent et
Modificateur de vitesse
audio

 Changement et détection
de tonalité par IA

 Détection d'accords

 Toutes les fonctionnalités



The screenshot displays the Moises app interface. At the top, it shows the project name "Fillmore - Kiss to kill" and a track list including "7 Tracks", "112", "A", and "12/34". Below this, there are several tracks: "Kick Drum", "Snare", "Hi-Hat", "Toms", and "Cymbals". A central section shows a chord progression: "Gadd9", "Cadd9", "G", "Am7(9)", and "Am7(9)". The bottom part of the screen shows a waveform and a "Move" button. The Moises logo is visible in the bottom right corner.

Orchidea

- Un outil d'orchestration et d'analyse de l'orchestration
- Pouvoir faire des propositions et les discuter

The screenshot displays the Orchidea software interface. The window title is "preferido nov 23 B.orchidea". The interface is divided into several sections:

- TARGET AUDIO SOURCE:** Includes a play button and a "Solve From Script" button.
- PROPERTIES:** Contains "Use" (Target Sample), "Solve From Script" (Open/Close), and "Target" (Open/Close).
- OPTIMIZATION:** Includes "Quality" (High), "Initialization" (Random), "Normalization" (Max Abs), "Diversity" (0.01), and "Sparsity" (0.000).
- ANALYSIS:** Includes "Partial Filtering" (Enable) and "Threshold (dB)" (4.00).
- SEGMENTATION:** Includes "Damp Cutoff (Hz)" (5000), "Damp Exponent" (2.0), "Threshold" (0.58), and "Timegate" (100).
- EFFECTS:** A section for applying effects.
- FILTERS:** A section for applying filters.
- ORCHESTRA:** A section for managing the orchestration.

The right side of the interface shows a musical score with multiple staves for different instruments: Fl (Flute), Ob (Oboe), CIBb (Clarinet in Bb), Bn (Bassoon), and a double bassoon (Bn). The score includes various musical notations such as dynamics (ppf, mf, f), articulation (sfz), and performance instructions (ord, fing, reed). A vertical yellow bar highlights a specific time range in the score.

Orchidea

- une application d'aide à l'orchestration
- Paramètres de contrôle
- Segmentation
- Orchestration statique et dynamique

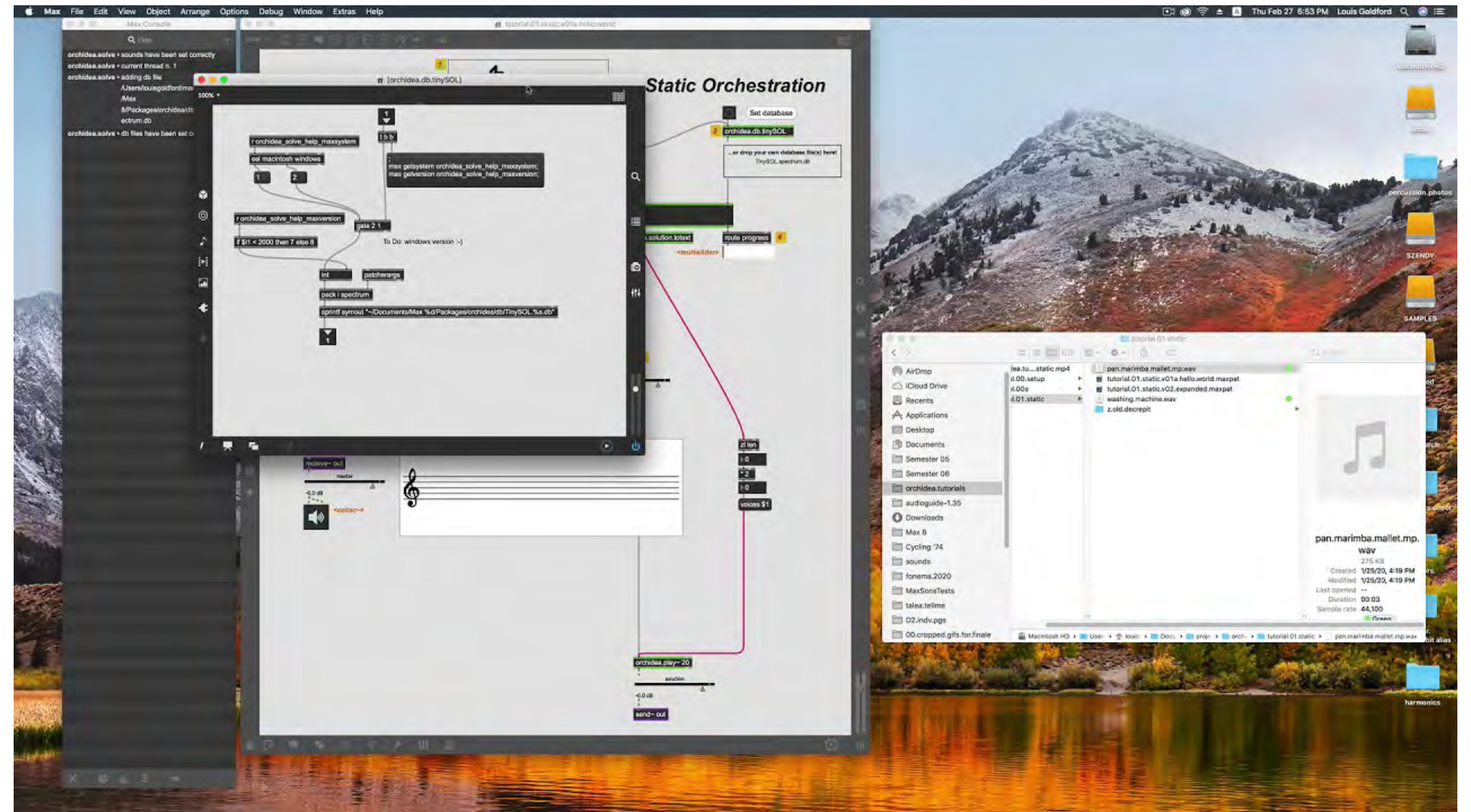
The screenshot displays the Orchidea software interface. On the left, a sidebar contains various control panels: TARGET AUDIO SOURCE, PROPERTIES, OPTIMIZATION, ANALYSIS, SEGMENTATION, EFFECTS, FILTERS, and ORCHESTRA. The main area shows a musical score for 'preferido nov 23 B.orchidea' with a timeline from 0'10" to 0'30". The score includes staves for Flute (Fl), Oboe (Ob), Clarinet in B-flat (ClBb), and Bassoon (Bn). The score is annotated with dynamic markings such as *ppf*, *mf*, *f*, and *ppp*, and includes performance instructions like 'ord', 'fl', 'fing', 'sfz', and 'blow_no_reed'. A vertical yellow bar highlights a specific section of the score.



Orch-idea

Orchestration générative (Recherche /
Création / Pédagogie)

- Dans l'environnement interactif
Max8



Arrangement - Analyse - Ecriture



Human Input

Human Input



Google Magenta Music Vae



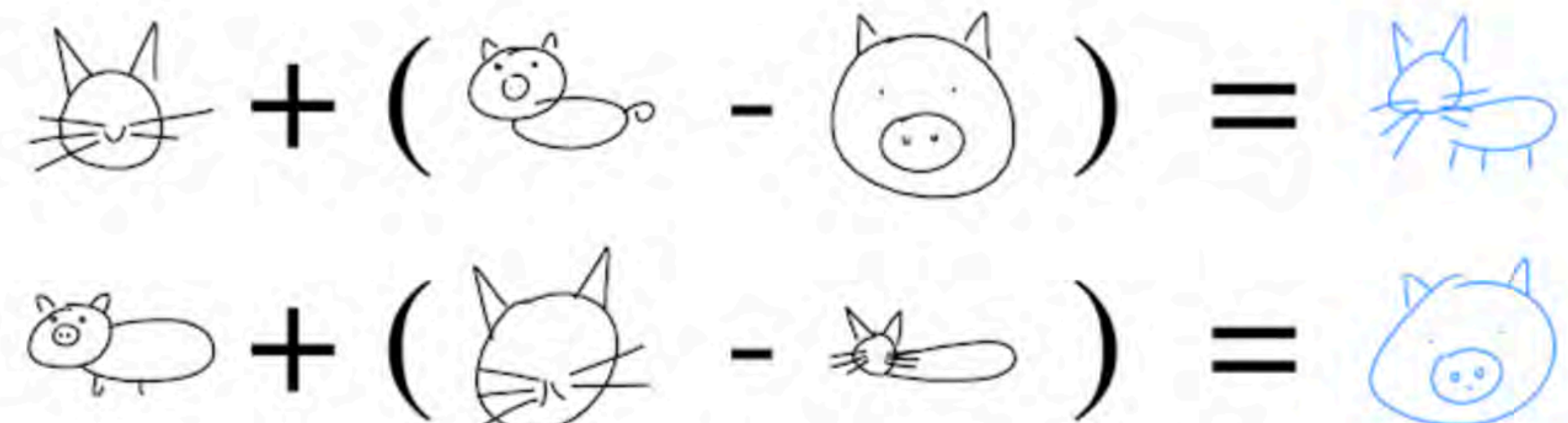
IA générative et éducation



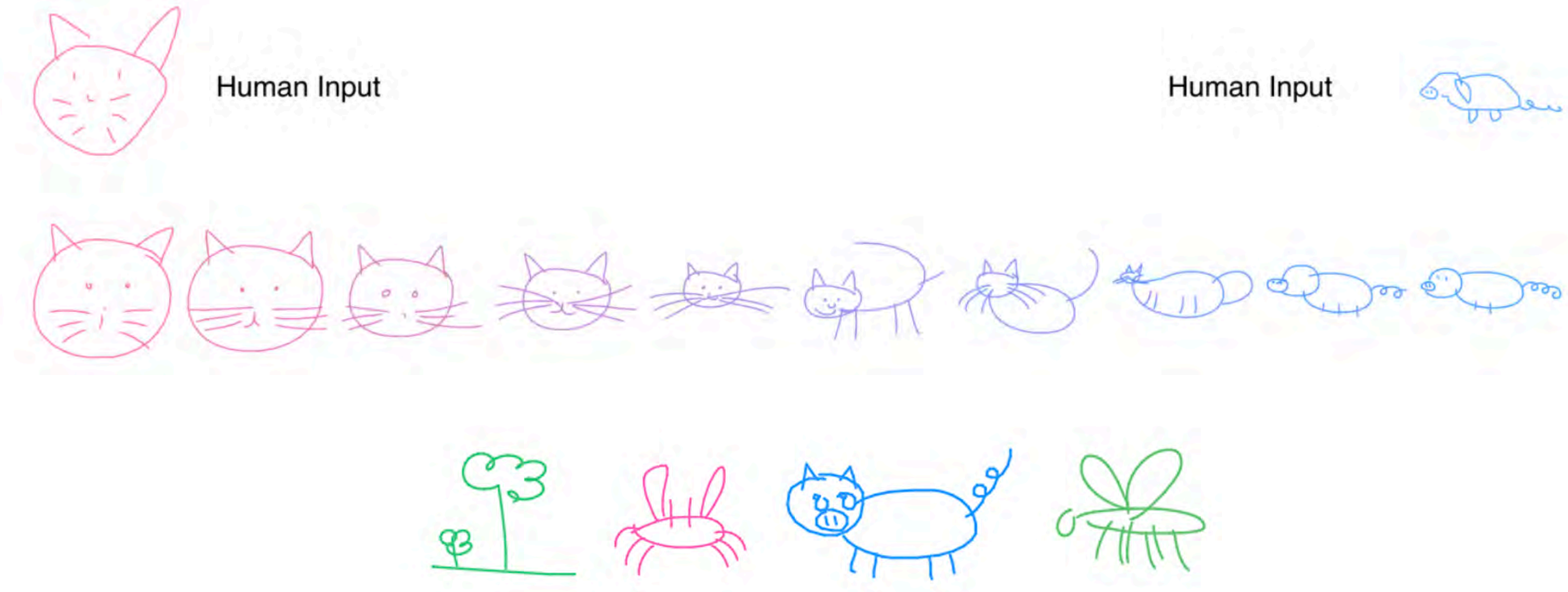
- Transformer l'éducation avec l'IA générative en offrant des outils d'assistance aux enseignants, tels que la création de plans de cours, de quiz et d'exercices personnalisés



- Différenciation pédagogique : l'IA générative peut aider à personnaliser l'apprentissage en s'adaptant aux besoins et aux rythmes de chaque élève



IA générative et éducation .



- o **Formation : importance de la mise en place des formations pour les enseignants afin de comprendre et d'intégrer les potentialités et limites de l'IA générative, ainsi que les bonnes pratiques pour une utilisation en classe**

$$\begin{aligned} & \text{Cat face} + (\text{Pig face} - \text{Cat face}) = \text{Pig-cat hybrid} \\ & \text{Pig face} + (\text{Cat face} - \text{Pig face}) = \text{Cat-pig hybrid} \end{aligned}$$