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Navigating Faith through Artificial Intelligence

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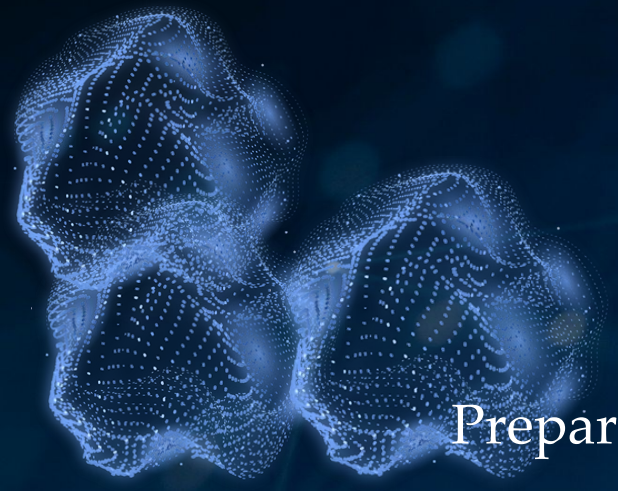


Prepared by: **AIIT** and **SimpliSolve Inc.**

وَسَخَّرَ لَكُم مَّا فِي السَّمَاوَاتِ وَمَا فِي الْأَرْضِ جَمِيعًا مِّنْهُ ۚ إِنَّ فِي ذَٰلِكَ لَآيَاتٍ لِّقَوْمٍ يَتَفَكَّرُونَ

[الجاثية- 13]

“And He has subjected to you whatever is in the heavens and whatever is on the earth – all from Him. Indeed in that are signs for a people who give thought.” (Al-Jathiyah 45:13)

AGENDA

- What is AI and how it all started?
- Generative AI
- Ethical use of AI in everyday life
- Appreciating AI as a divine favor
- Leverage AI to promote truth and refute falsehood

Voice Synthesis

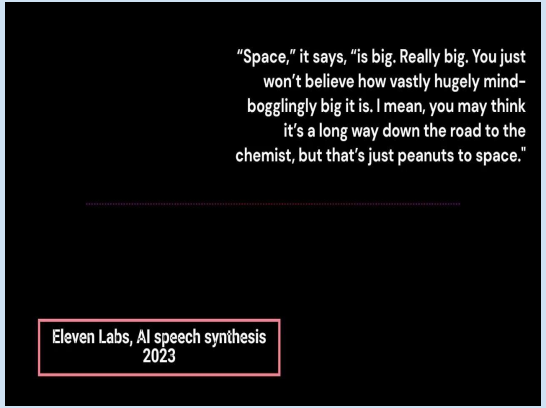
1939

First electrical speech synthesizer, **VODER** (Voice Operation DEmonstratoR) was developed by Homer Dudley at **Bell Labs** and demonstrated at both the 1939 New York World's Fair and the 1939 Golden Gate International Exposition.

1985

AmigaOS, introduced in 1985. The voice synthesis was licensed by Commodore International from **SoftVoice, Inc.**, who also developed the original MacinTalk text-to-speech system.

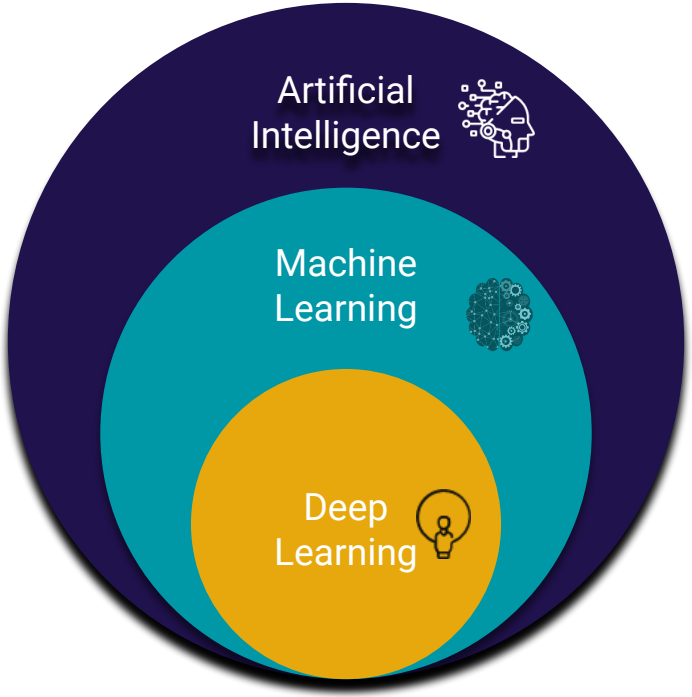
2023



A Voice Synthesis platform called **ElevenLabs** just released a new service for generating insanely impressive voice files from just text.

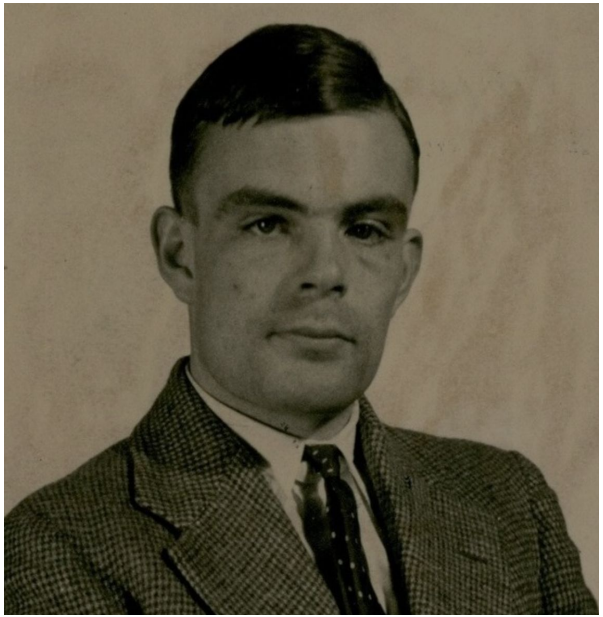
01. What is AI and how it all begin?

AI in a nutshell



Artificial Intelligence vs Machine Learning vs Deep Learning

Genesis Moment - October 1950



Alan Turing
(1912-1954)

Thinking is -

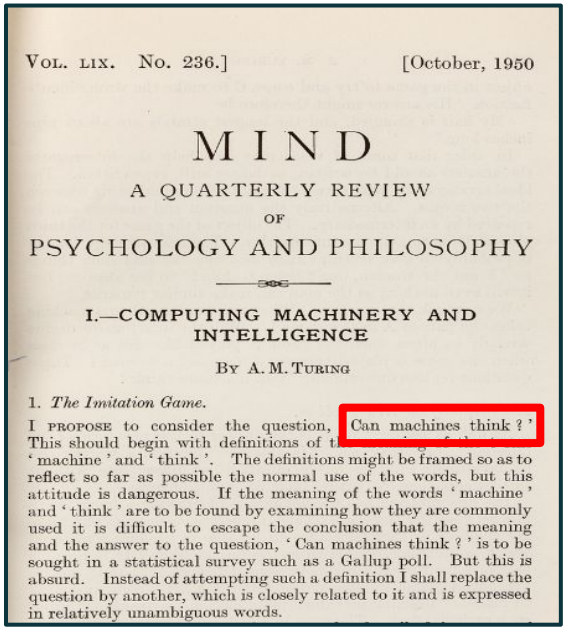
- Learning and
- Creative Imagination

Can AI do these two?

Answer: Yes

How this was achieved?

Answer: Decades of scientific innovation



VOL. LIX. No. 236.] [October, 1950

MIND

A QUARTERLY REVIEW
OF
PSYCHOLOGY AND PHILOSOPHY

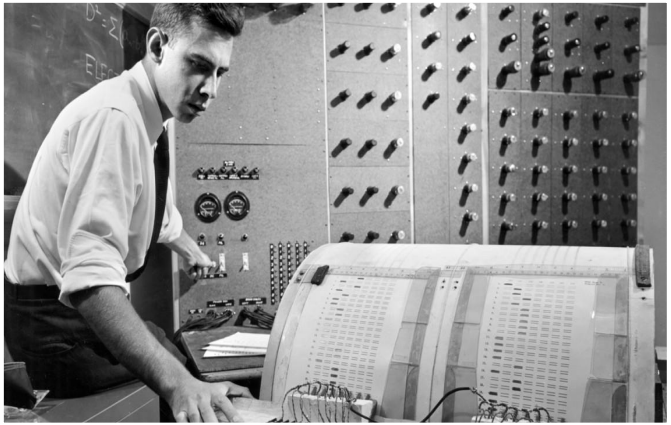
I.—COMPUTING MACHINERY AND INTELLIGENCE

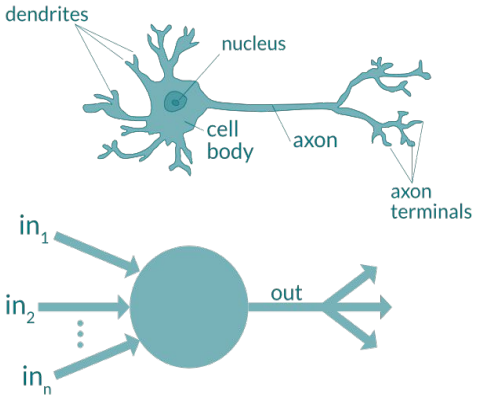
BY A. M. TURING

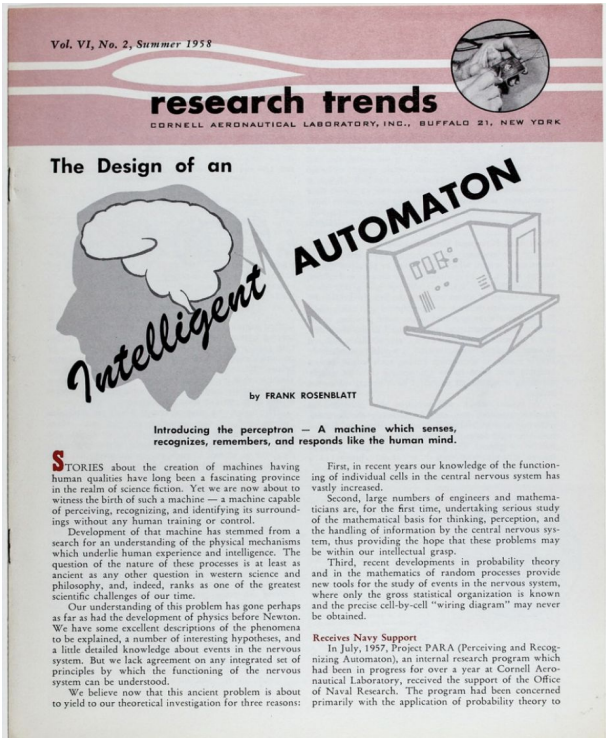
1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of th... 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

Perceptron Model - 1958







Vol. VI, No. 2, Summer 1958

research trends

CORNELL AERONAUTICAL LABORATORY, INC., BUFFALO 21, NEW YORK

The Design of an

Intelligent AUTOMATON

by FRANK ROSENBLATT

Introducing the perceptron — A machine which senses, recognizes, remembers, and responds like the human mind.

STORIES about the creation of machines having human qualities have long been a fascinating province in the realm of science fiction. Yet we are now about to witness the birth of such a machine — a machine capable of perceiving, recognizing, and identifying its surroundings without any human training or control.

Development of that machine has stemmed from a search for an understanding of the physical mechanisms which underlie human experience and intelligence. The question of the nature of these processes is at least as ancient as any other question in western science and philosophy, and, indeed, ranks as one of the greatest scientific challenges of our time.

Our understanding of this problem has gone perhaps as far as had the development of physics before Newton. We have some excellent descriptions of the phenomena to be explained, a number of interesting hypotheses, and a little detailed knowledge about events in the nervous system. But we lack agreement on any integrated set of principles by which the functioning of the nervous system can be understood.

We believe now that this ancient problem is about to yield to our theoretical investigation for three reasons:

First, in recent years our knowledge of the functioning of individual cells in the central nervous system has vastly increased.

Second, large numbers of engineers and mathematicians are, for the first time, undertaking serious study of the mathematical basis for thinking, perception, and the handling of information by the central nervous system, thus providing the hope that these problems may be within our intellectual grasp.

Third, recent developments in probability theory and in the mathematics of random processes provide new tools for the study of events in the nervous system, where only the gross statistical organization is known and the precise cell-by-cell "wiring diagram" may never be obtained.

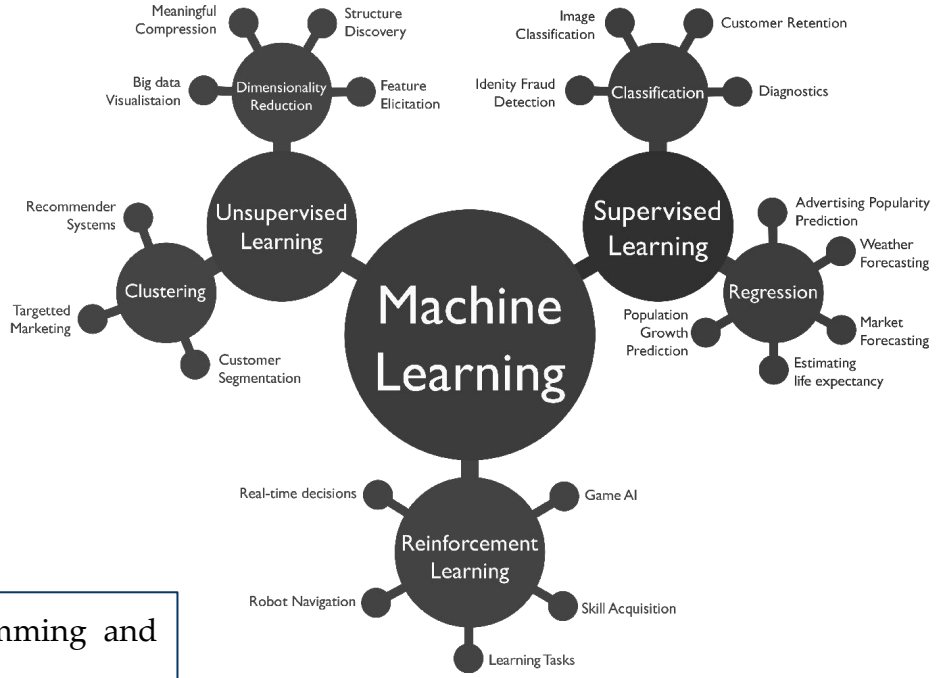
Receives Navy Support

In July, 1957, Project PARA (Perceiving and Recognizing Automaton), an internal research program which had been in progress for over a year at Cornell Aeronautical Laboratory, received the support of the Office of Naval Research. The program had been concerned primarily with the application of probability theory to

"The foundations for all of this artificial intelligence were laid at Cornell."

- Thorsten Joachims, Professor of CS Cornell University

Insights of Machine Learning (1959)



During 1959 Arthur Samuel pioneer of computer programming and Artificial Intelligence coined the term **Machine Learning**.

Machine Learning is such a computer programming which optimize performance criterion on the basis of training data or past experience.

Backpropagation - decades of innovation

Backpropagation: learning by continuously correcting errors

Algorithm:

1. Predict the output
2. See if your prediction is very close to the truth
3. If your prediction is far away from truth
   - take a small step towards the truth and go to step 1
4. If your prediction is very close to the truth,
   - you are done and the model is cooked.

1970

The modern form was derived first by **Linnainmaa** in his 1970 masters thesis that included FORTRAN code for backpropagation but did not mention its application to neural networks.

1985

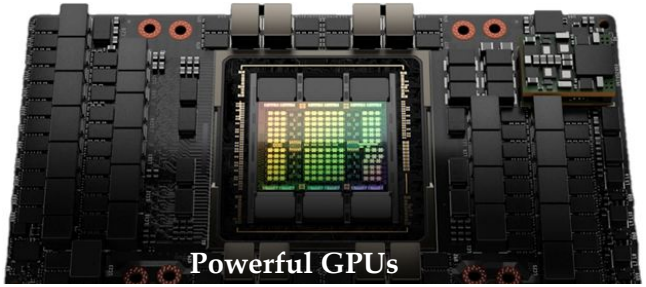
Rumelhart, Hinton,and Williams showed that, backpropagation in neural networks could yield interesting distributed representations.

1989

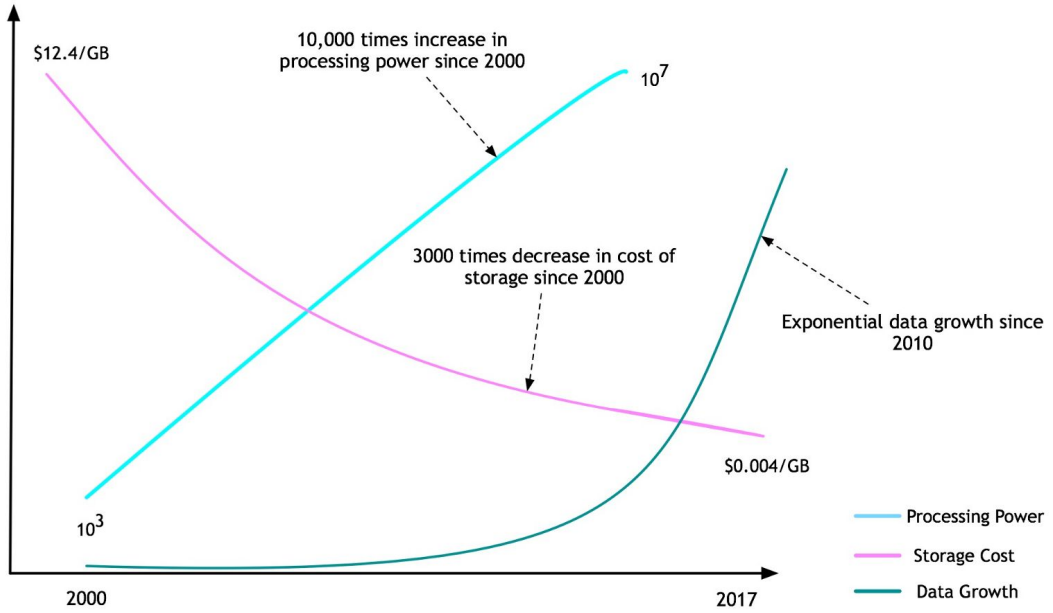
The first true, practical application of backpropagation came about through the work of **LeCun** at **Bell Labs.**

Drawback: Data Hungry | Computationally Expensive

Cost effectiveness of building AI models



Compute as a service.
No need to Buy. Rent as needed.



Cost effectiveness of building AI models

Empowering everyone for AI journey

Ensuring massive growth potential

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02. Generative AI

How AI Achieved Creativity - Generative AI (10 Jun 2014)

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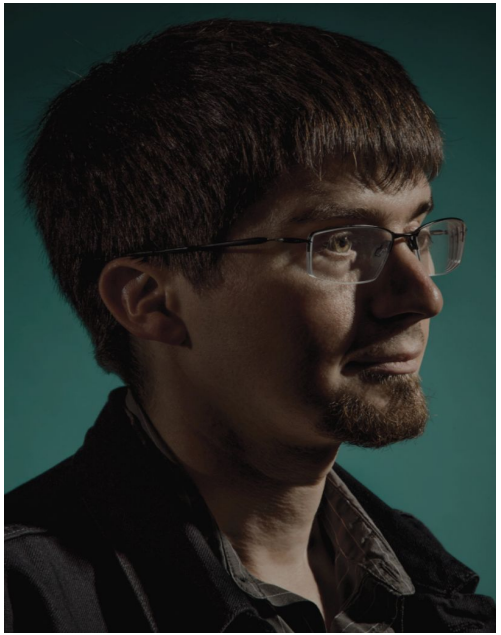
Generative Adversarial Nets

Ian J. Goodfellow, Jean Pouget-Abadie,* Mehdi Mirza, Bing Xu, David Warde-Farley, Sherjil Ozair,† Aaron Courville, Yoshua Bengio‡
Département d'informatique et de recherche opérationnelle
Université de Montréal
Montréal, QC H3C 3J7

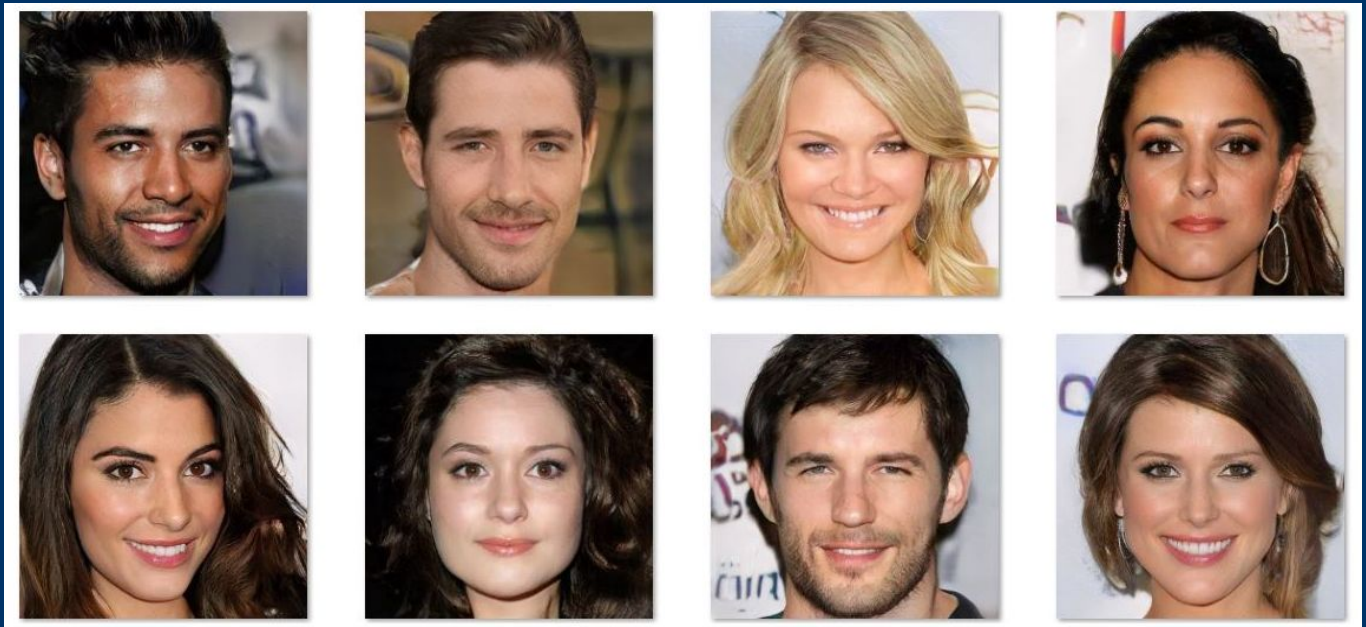
Abstract

We propose a new framework for estimating generative models via an adversarial process, in which we simultaneously train two models: a generative model G that captures the data distribution, and a discriminative model D that estimates the probability that a sample came from the training data rather than G. The training procedure for G is to maximize the probability of D making a mistake. This framework corresponds to a minimax two-player game. In the space of arbitrary functions G and D, a unique solution exists, with G recovering the training data distribution and D equal to $\frac{1}{2}$ everywhere. In the case where G and D are defined by multilayer perceptrons, the entire system can be trained with backpropagation. There is no need for any Markov chains or unrolled approximate inference networks during either training or generation of samples. Experiments demonstrate the potential of the framework through qualitative and quantitative evaluation of the generated samples.



Ian J. Goodfellow
(1987-Not a dead guy)
In fact only 37 years old

How GAN works - DeepFake

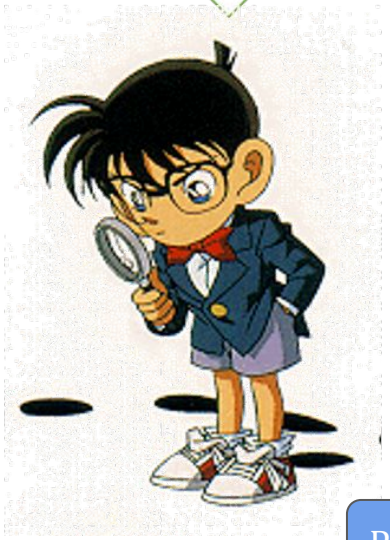


These celebrities DO NOT EXIST and NEVER EXISTED

How GAN works

Generator wants to generate fake money

Discriminator wants to distinguish between fake and real money



How GAN works

Fake

Real

How GAN works

Fake

Real

How GAN works

Real

Real

Primitive Generative AI - 1960

```
  Welcome to
                 EEEEEE  LL      IIII   ZZZZZZ   AAAAA
                 EE      LL       II       ZZ   AA   AA
                 EEEEE   LL       II     ZZZ    AAAAAAA
                 EE      LL       II    ZZ      AA   AA
                 EEEEEE  LLLLLL  IIII ZZZZZZ    AA   AA

  Eliza is a mock Rogerian psychotherapist.
  The original program was described by Joseph Weizenbaum in 1966.
  This implementation by Norbert Landsteiner 2005.


ELIZA: Is something troubling you ?
YOU:   Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU:   They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU:   Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU:   He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU:   It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:
```

ELIZA was a **Rogerian psychotherapist chatbot**.
It worked by **recognizing keywords** or phrases in user inputs and responding with **pre-programmed templates**.

DeepFake - Voice Cloning - Only 3s Sample Voice

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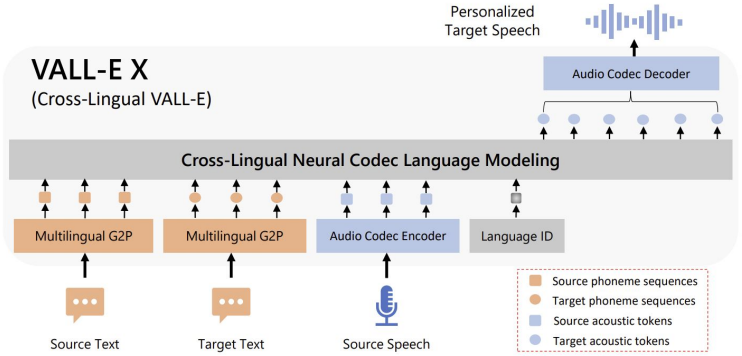
Type	Original	Cloned
General Cloning		
Multilingual Cloning		
Multilingual Emotion		

Creates opportunities as well as security concerns

7 March 2023

Speak Foreign Languages with Your Own Voice: Cross-Lingual Neural Codec Language Modeling

Ziqiang Zhang* Long Zhou* Chengyi Wang Sanyuan Chen Yu Wu Shujie Liu
Zhuo Chen Yanqing Liu Huaming Wang Jinyu Li Lei He Sheng Zhao Furu Wei
Microsoft
https://github.com/microsoft/unilm



DeepFake - Text to video

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Complete movie can be made by providing the storyline and plot by 2028.

SORA - 2024

Prompt

A stylish woman walks down a Tokyo street filled with warm glowing neon and animated city signage. She wears a black leather jacket, a long red dress, and black boots, and carries a black purse. She wears sunglasses and red lipstick. She walks confidently and casually. The street is damp and reflective, creating a mirror effect of the colorful lights. Many pedestrians walk about.

03. Ethical use of AI in everyday life

Classical AI: Definition and Approach

- **Supervised Learning:** Learns from labeled data. Examples include regression and classification tasks using decision trees.

- **Unsupervised Learning:** Uses unlabeled data to find hidden patterns or intrinsic structures in input data. Examples include clustering and dimensionality reduction.

Classical AI: Applications

- **Predictive Analytics:** Forecasting future trends based on historical data.
- **Image Recognition:** Identifying objects within images.
- **Spam Detection:** Filtering out unwanted emails.
- **Recommendation Systems:** Suggesting products or content based on user behavior.

Classical AI vs Generative AI

- **Generative Models:** Focus on generating new data samples that are similar to a input dataset. They model the underlying distribution of data to produce new, synthetic instances.
- **Unsupervised and Self-Supervised Learning:** Often use large, unlabeled datasets and learn to generate data by understanding the structure and patterns within the data.

Classical AI vs Generative AI

- Drug discovery
- Image/video/text generation
- Data augmentation

Drug Development Process

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Step 1 Discovery & Development	Step 2 Pre-clinical Development	Step 3 Clinical Development	Step 4 Regulatory Approval	Step 5 Marketing and Sales
- Identifying biological targets associated with disease - Screening compounds to find potential drugs	- Refinement of the compounds to enhance efficacy and reduce toxicity - Testing in animal models	- Investigational New drug (IND) application with regulatory bodies (FDA, EMA) - Phase I, II, III clinical trials	- Submission of new drug application (NDA) - Regulatory review - Approval	- Market launch - Sales and distribution

From initiation to marketing: 10 years and $1.4 billion, on average. About 80 percent of those costs are associated with clinical development, according to researchers at the Tufts Center for the Study of Drug Development.

Major cases of AI in drug history

Molecule generation

Digital twins clinical trials

What are digital twins

Functionality

- Evolve and adapt in real-time based on incoming data

- making a dynamic representations of actual patients.

Concept

- Digital twins are virtual models that replicate real-world entities, in this case, patients.
- Built using comprehensive datasets that include health records, genetic information, lifestyle data, and treatment histories.

Possibilities and challenges

Possibilities

- Simulation of clinical scenarios
- Synthetic control arms
- Historical data integration and simulating control group outcome prediction

Challenges

- Regulatory bodies are increasingly supportive
- Data privacy and ethical considerations
- Model validations and implementation

04. Appreciating AI as a divine favor

Thank You

Get In Touch

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