

Sztuczna Inteligencja

Uczenie maszynowe II

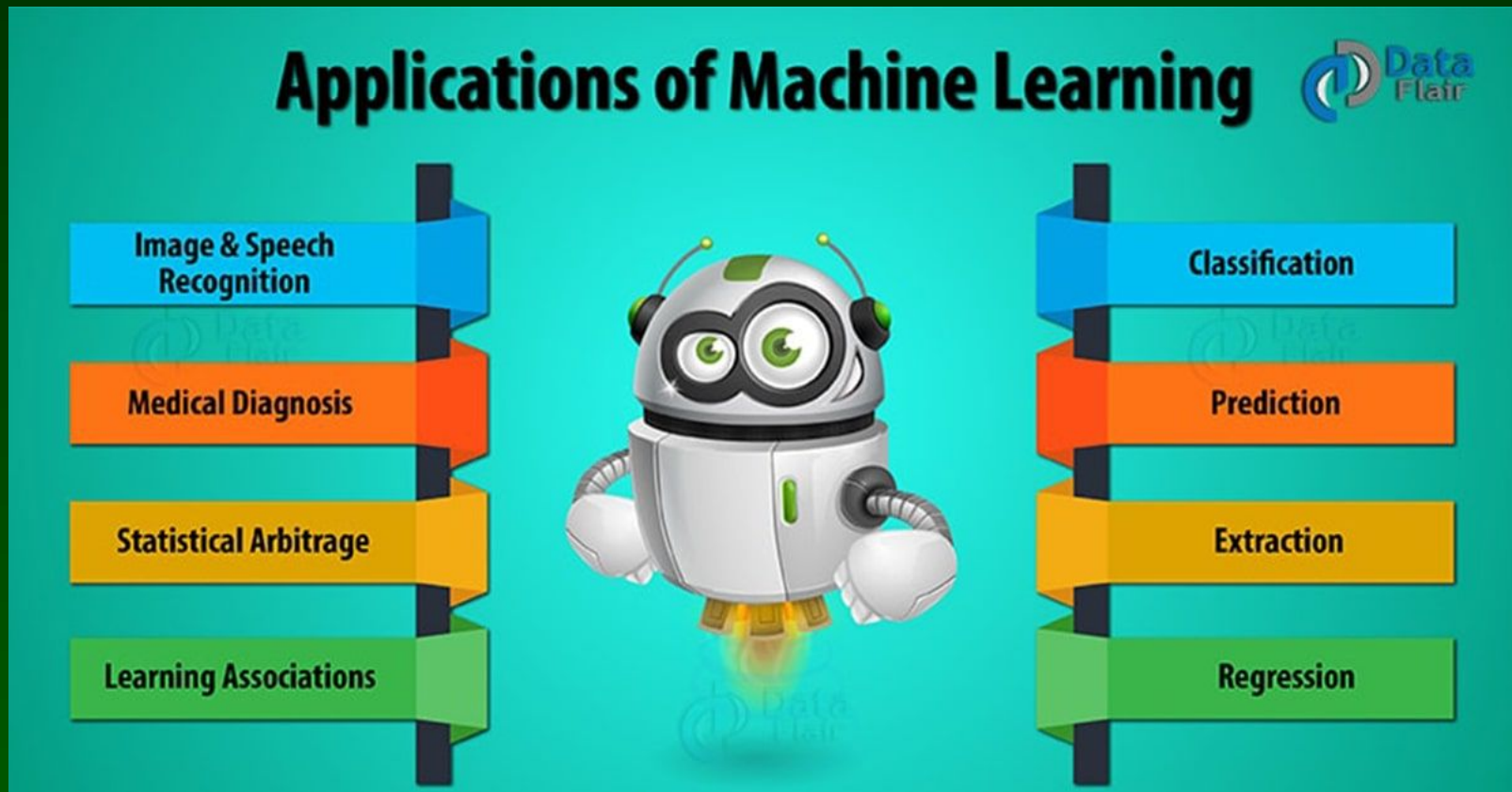


Włodzisław Duch

Katedra Informatyki Stosowanej UMK

Google: Włodzisław Duch

Zastosowania ML



Obecnie ML do wszystkiego ...

- ✓ Zintegrowane pakiety programów z elementami ML do data mining.
- ✓ Analiza obrazów i sygnałów.
- ✓ Sterowanie: automatyczny kierowca/pilot/czołg ...
- ✓ Analiza tekstów.

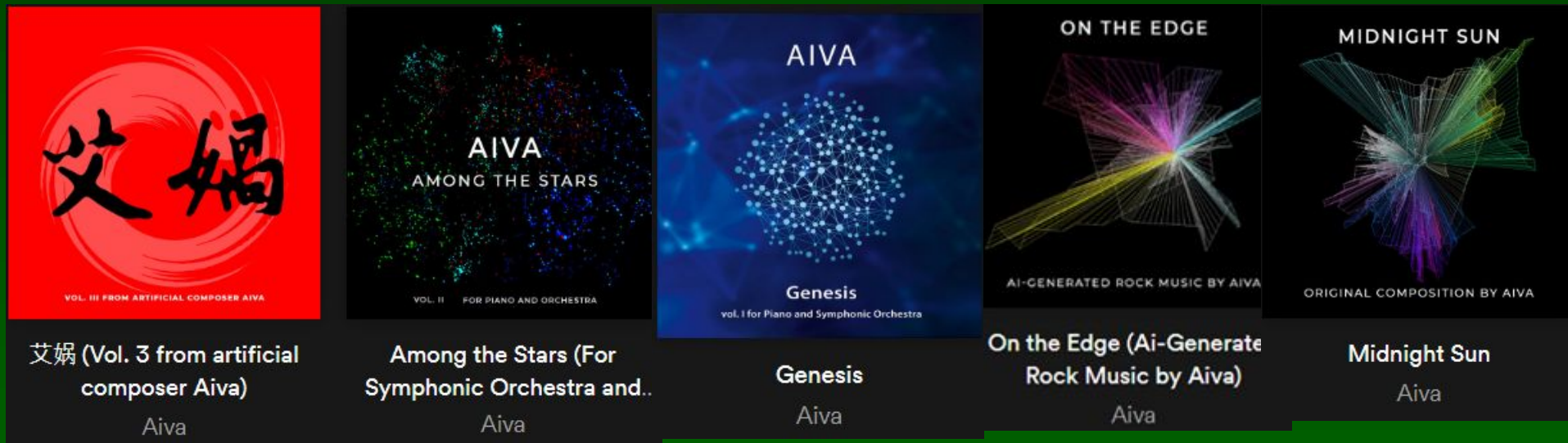
AI Virtual Artist

[AIVA](#) – AI Virtual Artist, member of author's rights society ([SACEM](#)), 206 works.

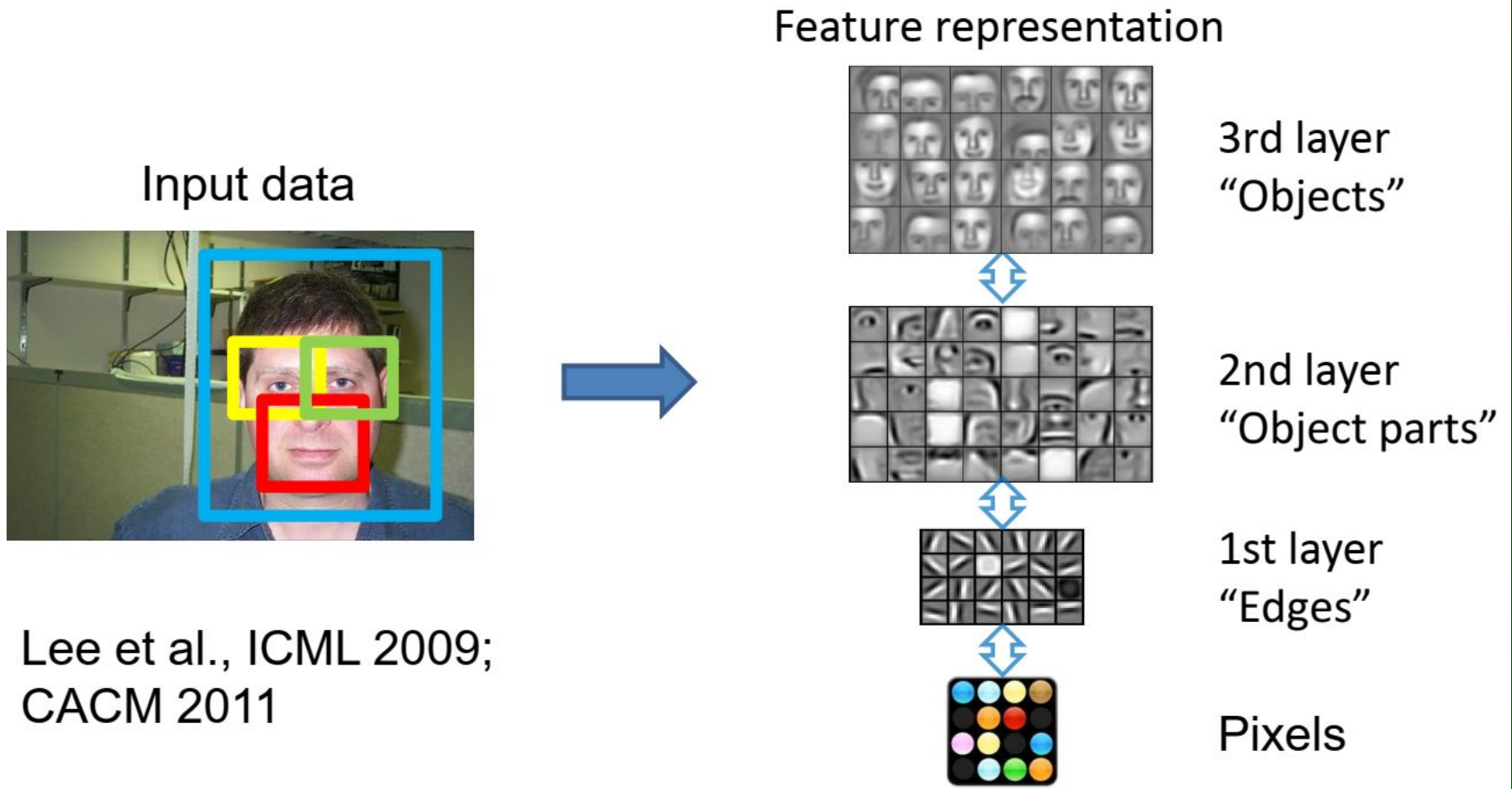
[AIVA YouTube](#) channel, Youtube „[Letz make it happen](#)“, Op. 23

[SoundCloud](#) channel

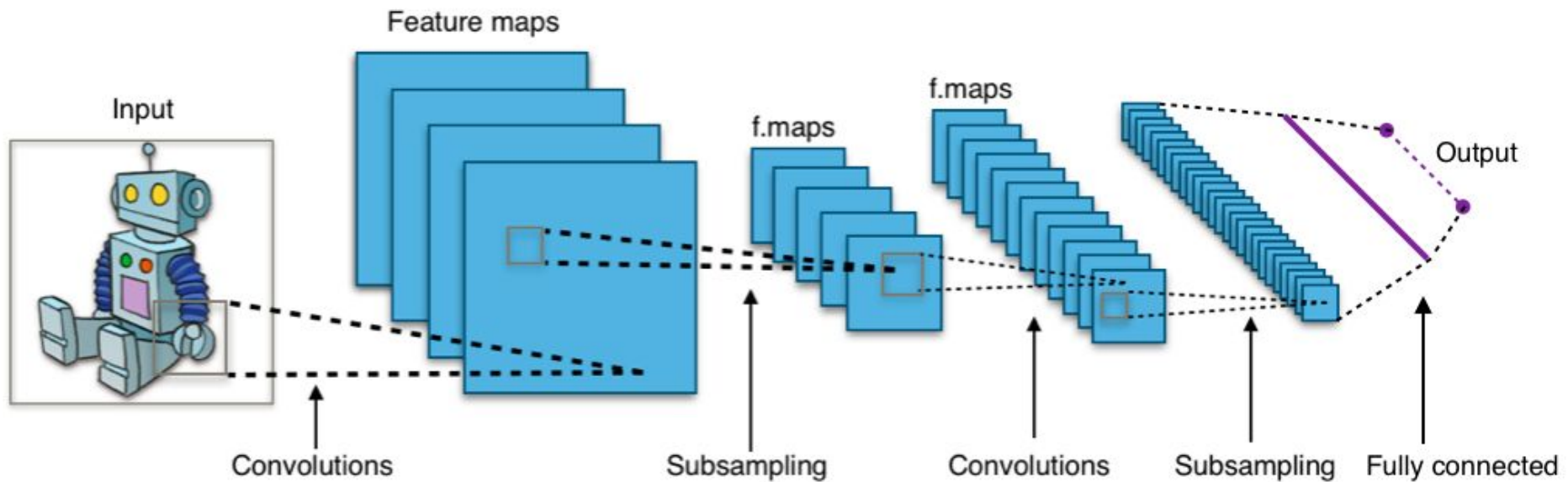
[Spotify](#) and [Apple](#) channel



Methods: NN for images



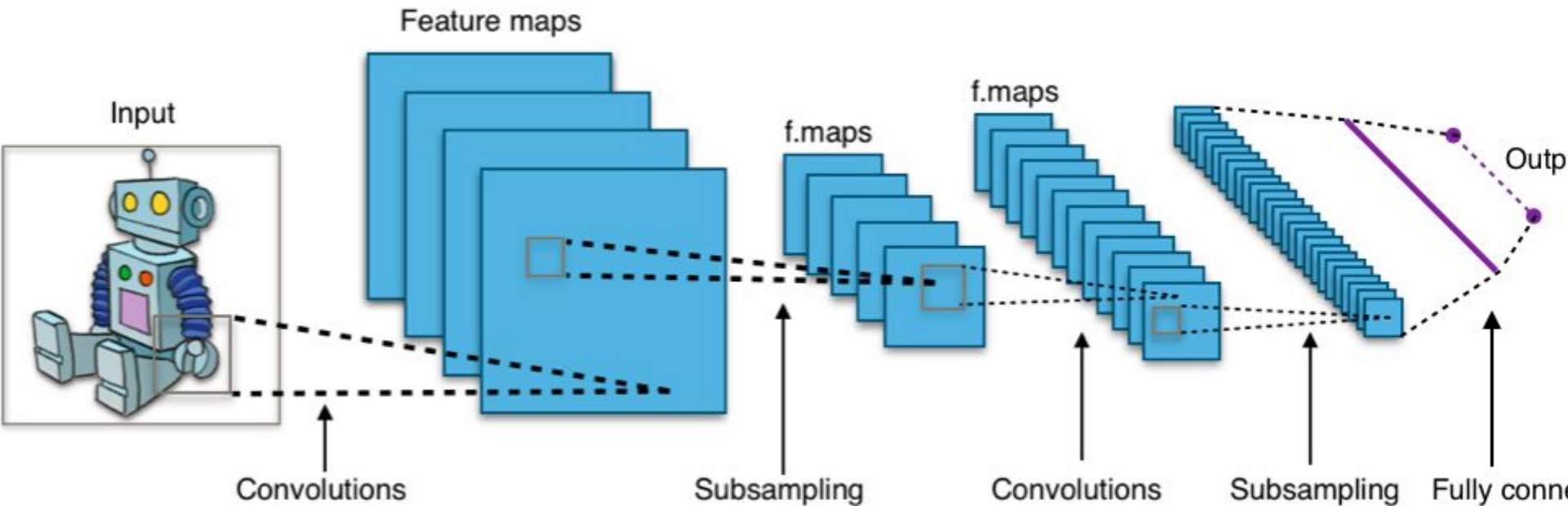
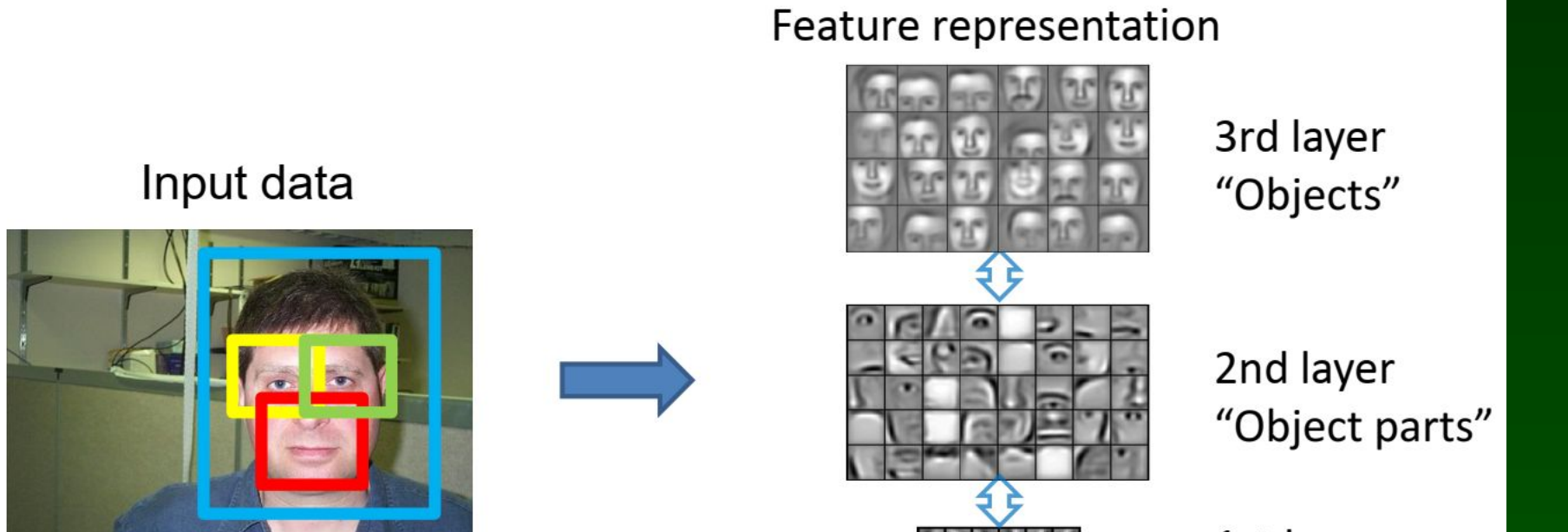
Methods: Deep NN for images



Small patches of image (ex. 5x5 pixels) are filtered through receptive fields in convolution operation, creating elementary features, combined together using sampling, and again filtered to generate more complex features.

Finally generated features are analyzed to determine image category.

Methods: NN for images



Superresolution



Deep NN for protein folding



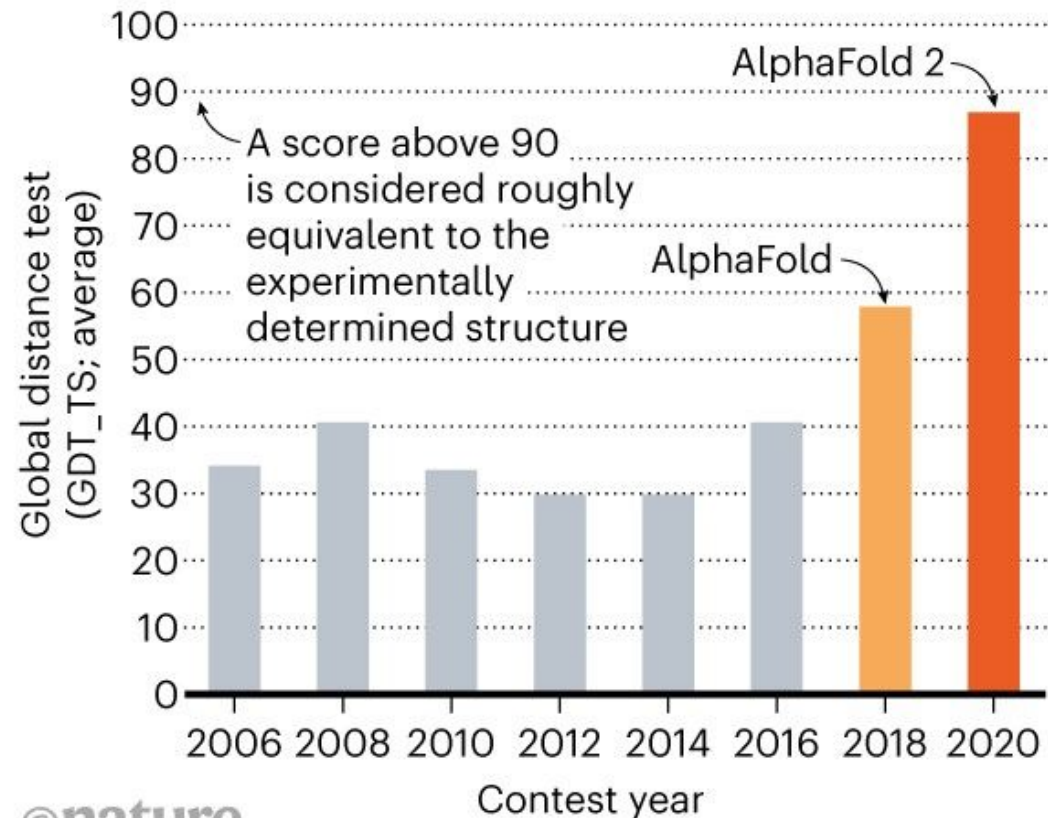
The ability to accurately predict protein structures from their amino-acid sequence will vastly accelerate efforts to understand the building blocks of cells, and enable quicker and more advanced drug discovery.

AlphaFold using deep neural networks has made great improvement, 2/3 of predicted structures is equivalent to experimental!

[Nature, 30.11.2020](#)

STRUCTURE SOLVER

DeepMind's AlphaFold 2 algorithm significantly outperformed other teams at the CASP14 protein-folding contest — and its previous version's performance at the last CASP.

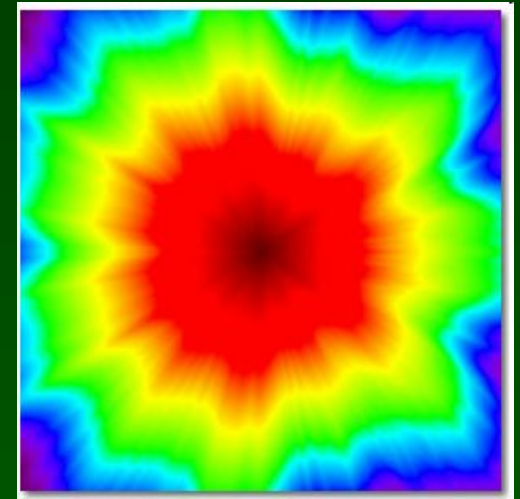
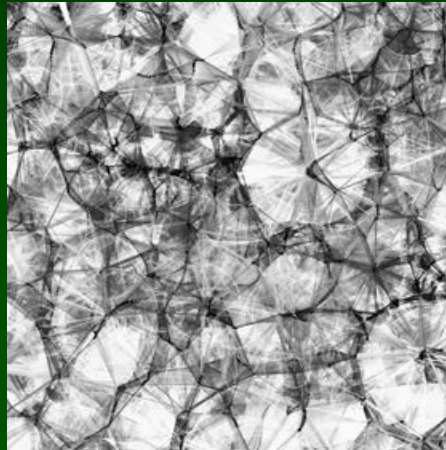


Generative art

„Generative art” in Wikipedia

http://en.wikipedia.org/wiki/Generative_art

<http://www.random-art.org>



<http://www.solaas.com.ar/dreamlines/p5/>

<http://www.jhlab.com/java/art.html>

Yuki singing animated avatar, first digital idol from Japan!



Aaron Painter

Harold Cohen has asked about minimal requirements that should be fulfilled to call something art painting, and created in 1973 [Aaron](#) robotic artist.



Aaron examples



Meeting On Gauguin's Beach,
Oil 1992



Aaron, with Decorative Panel, 1988

Basic principles of composition + randomization. [See more here.](#)

Aaron in museums



Liberty & Friends, 1985
Ink



Mural, Capitol
Children Museum 1980

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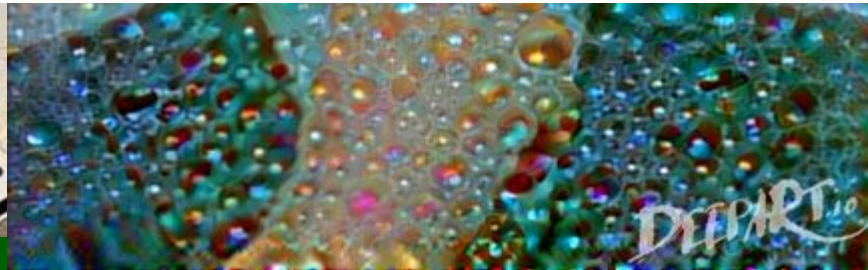
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Deep Art



<https://deepart.io/latest/> Deep Neural Networks, Deep Dream, LA Gatys, AS Ecker, M Bethge, A Neural Algorithm of Artistic Style (2015)

Examples of Deep Art



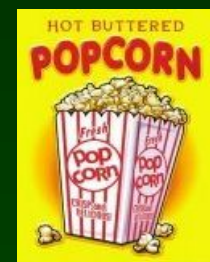
<https://deepart.io/latest/> Deep Art,
LA Gatys, AS Ecker, M Bethge, A Neural Algorithm of Artistic Style (2015)



[Google Deep Dream/Deep Style i Generator,](#)
LA Gatys, AS Ecker, M Bethge, A Neural Algorithm of Artistic Style (2015)

Generative music

„Popcorn”, Hot Butter hit from 1969,
Created through computer analysis of various melodies.
Computer helping human musicians.



Musicians learn by hearing and analyzing.

Why computers should not do the same? With access to all music in the world?

Algorithmic music: John Cage, Iannis Xenakis ...

http://en.wikipedia.org/wiki/Algorithmic_music

Lucasfilm Games' gra Ballblazer (1982) używała komputerowej improwizacji jazzowej, Xbox improwizuje na zadane tematy.

Generative music: Brian Eno started to experiment in 1975!

http://en.wikipedia.org/wiki/Generative_music

Examples of generative music:

<http://jmusic.ci.qut.edu.au/jmMusic.html>



From images to music

Can music be composed converting images?

Example: finish “metacomposer” Lauri Gröhn:

[Synesthesia Software Music](#)

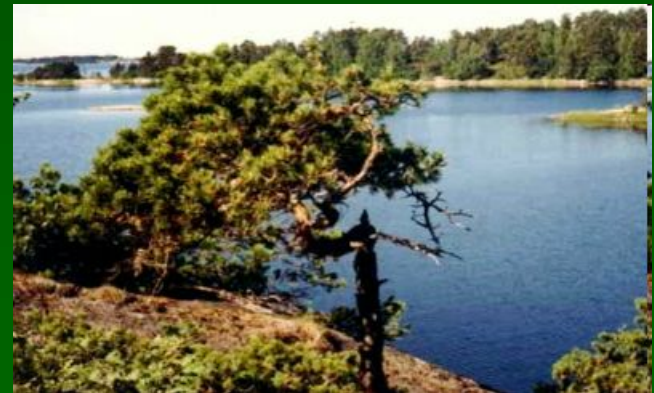
„I want to show that in future computers may compose as well as people”.



[Turku Archipelago](#), Fog, Sakura – interesting compositions!

Can computer really „feel” music?

[Greta ist trying...](#)



Flow Machines

by Sony CSL

<http://www.flow-machines.com>

Software that learns.
What is programmed
is only the motivation
to learn!

Learning to Create
(Lrn2Cre8) EU FP7
Project

Daddy's Car: a song composed by Artificial Intelligence - in the style of the Beatles

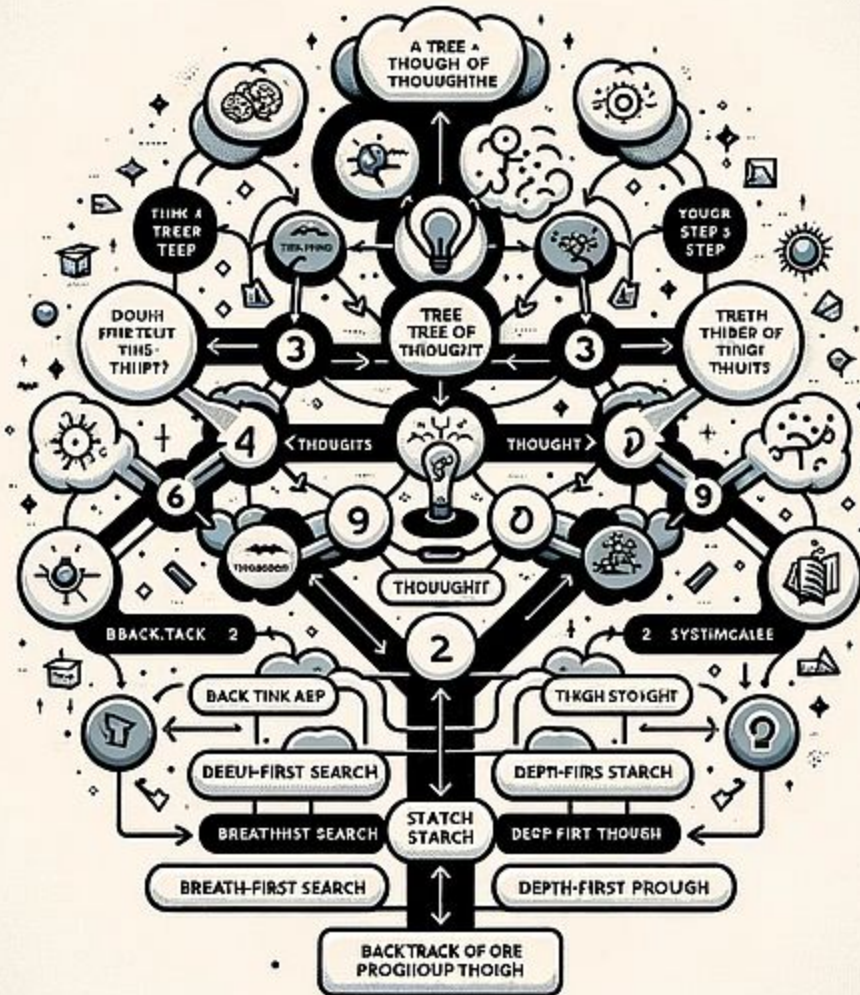


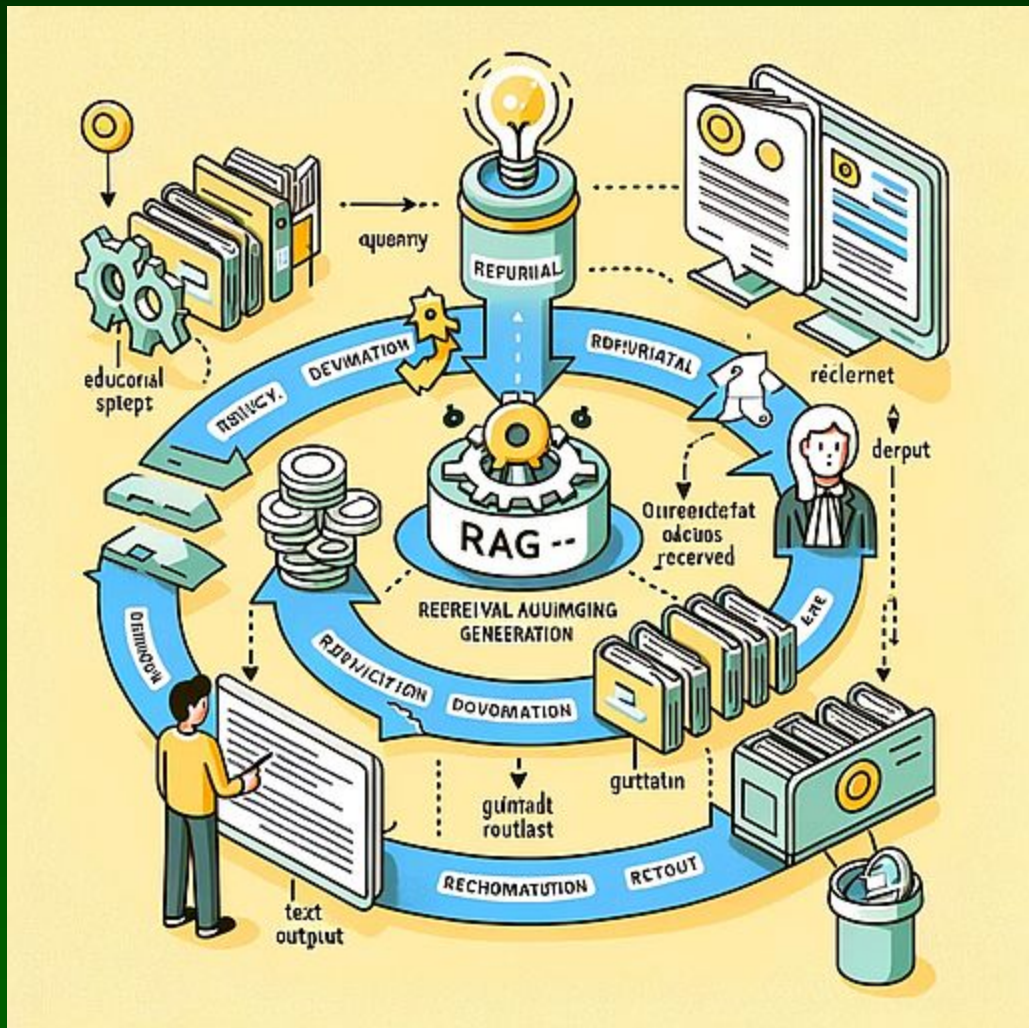
flowmachines
flowmachines

ML main repositories

- [OpenAI-cookbook](#)
- [Hugging Face](#)
- [Futurepedia](#)

- [Ozobot](#) that can teach lessons to individuals about coding.
- [Best Github projects](#) in data science and machine learning.
- [Human-machine collaboration](#) in scientific research.
- Prompt engineering examples:
<https://anakin.ai/blog/chatgpt-prompt-engineering/>
Book
- [Illustrated transformer](#)
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Examples of AI applications

- Forbes: [27 Incredible Examples of AI and Machine Learning in practice](#): [Hello Barbie](#), [Coca-Cola](#) bot, [Heineken](#) bot.
- [Botsify](#) - bot assistants, from FAQ bots to tutoring bots.
- [Mika](#) - AI math tutor for higher education.
- [Snatchbot](#) for teachers, for classroom.
- [Ozobot](#) that can teach lessons to individuals about coding.
- [Chef Watson](#) from IBM
- [Project Malmo](#), AI in virtual reality.
- Google [Semantris](#) (word association);
- [Talk to Books](#), [Cyborg Writer](#),
- [Best Github projects](#) in data science and machine learning.
- Image restoration. deblurring, sharpening: [Topaz Labs](#).
- Shared autonomy: [3rd wave AI](#) (industrial)
- [Human-machine collaboration](#) in scientific research.

AI in art

- [This Person Does Not Exist](#) artificial faces.
- Open AI [Dall-e2](#), od opisu do obrazu
- [Digital Humans](#).
- The [First Thinking Sculpture](#): Inspired by Gaudí, by Watson.
- [Autodraw](#), drawing from poor sketch.
- [AI artwork sells](#) for \$432,500 (12/2018); now selling NFT tokens
- [10 Amazing Examples Of How Deep Learning AI Is Used](#)
- [15 examples of AI in marketing](#).
- Reports on AI: The [European Artificial Intelligence landscape](#),
- [EU Digital Transformation 2021-27](#) plans
- [Communication: Artificial Intelligence for Europe](#)
- [Digital Poland: AI strategies \(in Polish\)](#)
- [My Flipboard Art & AI](#) and [Flipboard AI-CI-ML](#)

Computational Creativity

6 AI Tools for music generation

AIVA – AI Virtual Artist, registered in France with an author's rights society (SACEM), many compositions in different styles.

AIVA YouTube channel and SoundCloud channel.

Google Magenta for music, CNET news.

Deep Art: <https://deepart.io/>

27 Incredible Examples Of AI And Machine Learning In Practice

What's the purpose of humanity if machines can learn ingenuity? (extract from Marcus Du Sautoy's book, The Creativity Code).

Open AI Research and Google Deepmind