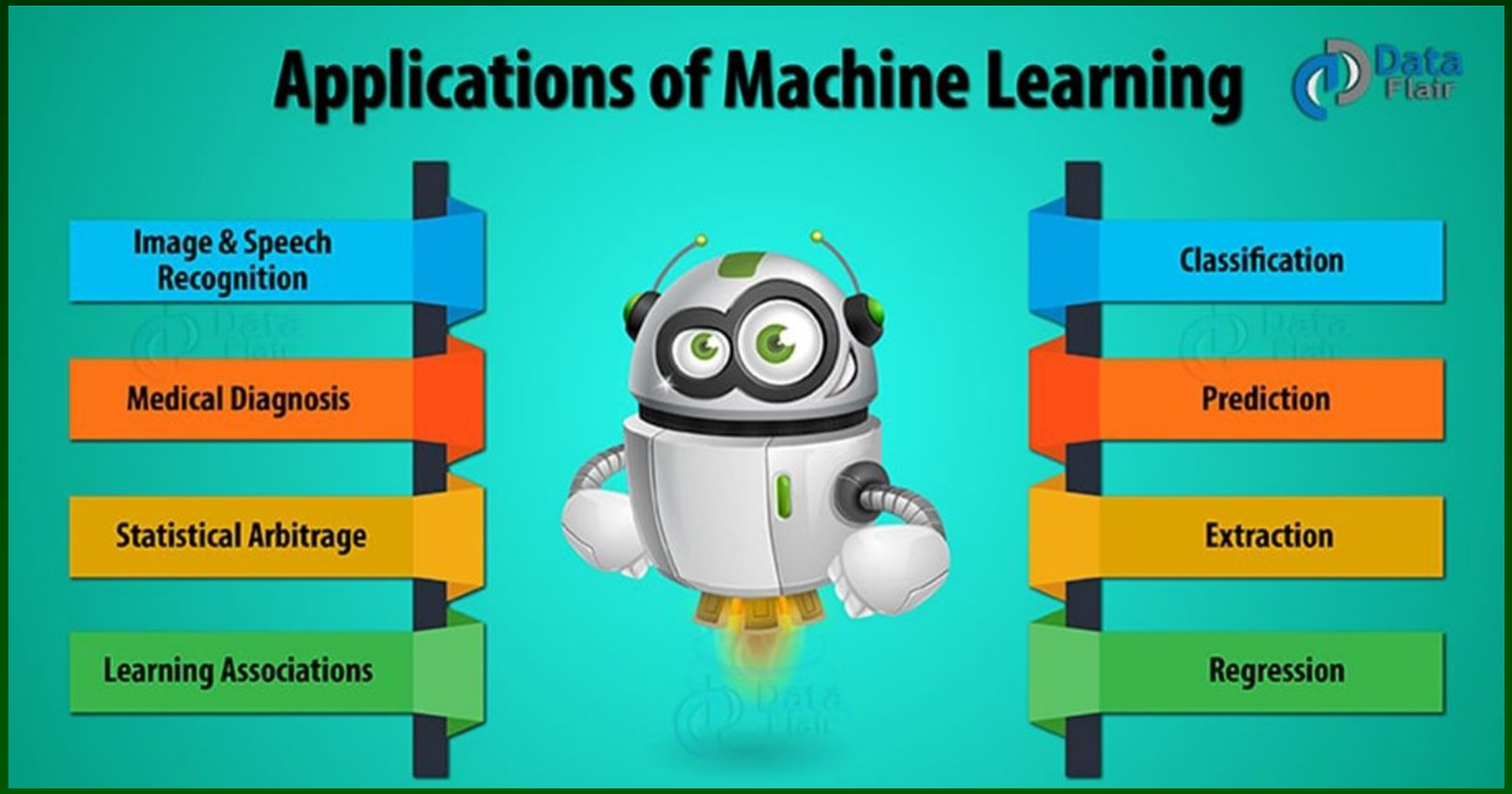
Sztuczna Inteligencja

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

艾娲 (Vol. 3 from artificial composer Aiva)

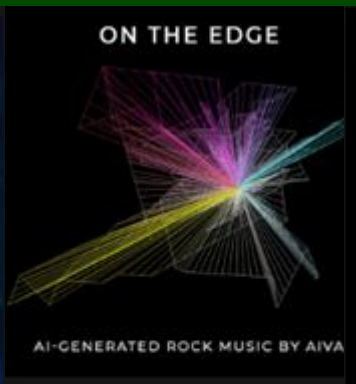
Aiva

Among the Stars (For Symphonic Orchestra and..

Aiva

Genesis

Aiva



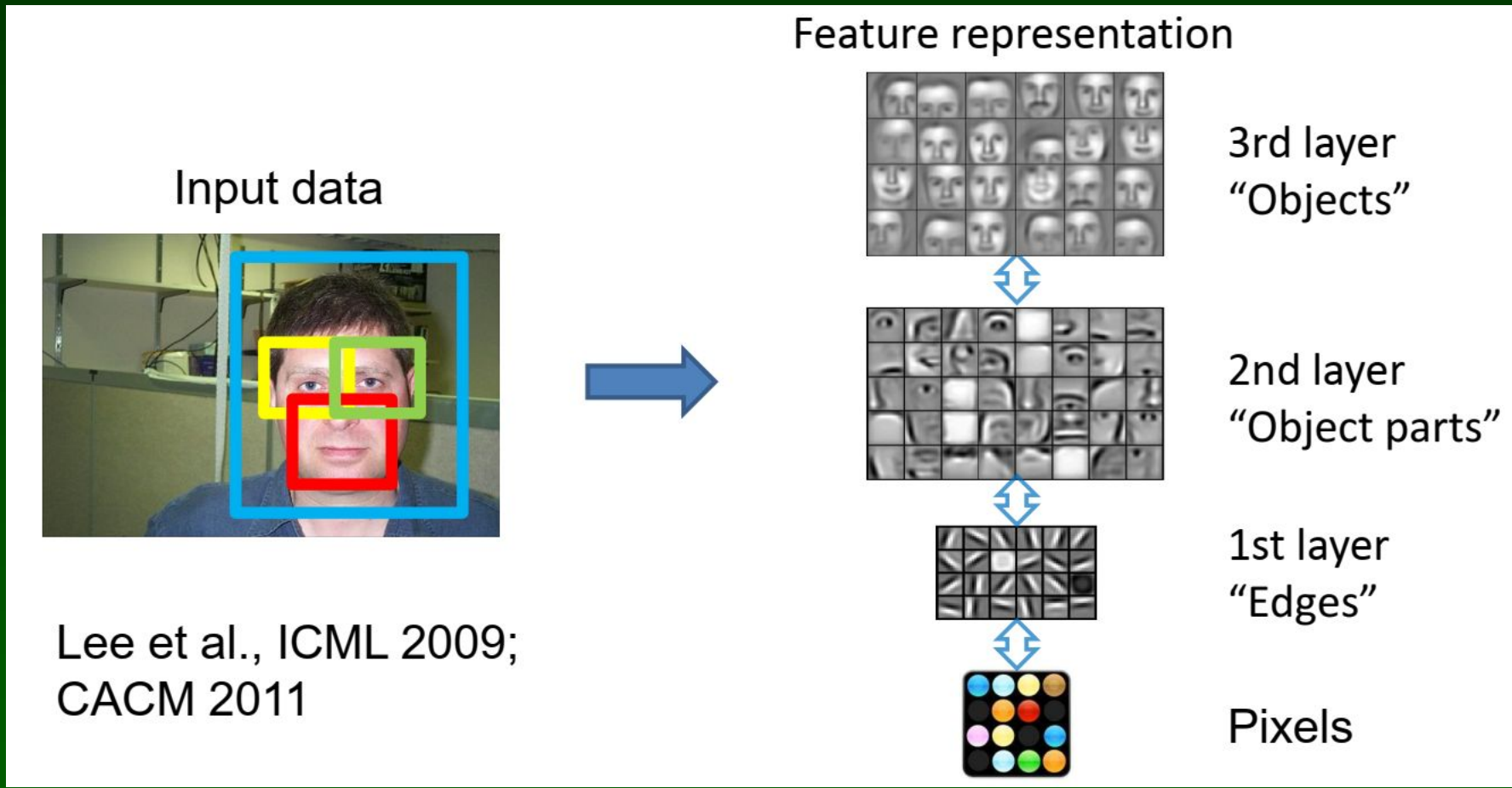
On the Edge (Ai-Generate Rock Music by Aiva)

Aiva

Midnight Sun

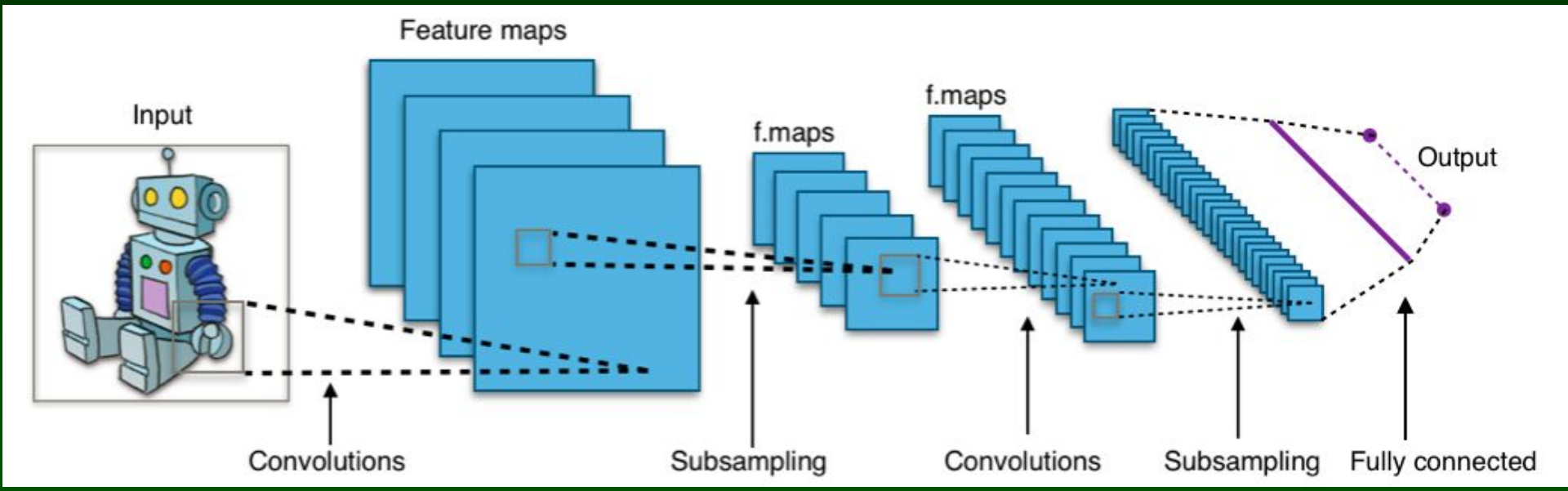
Aiva

Methods: NN for images



IBM an introduction to deep learning

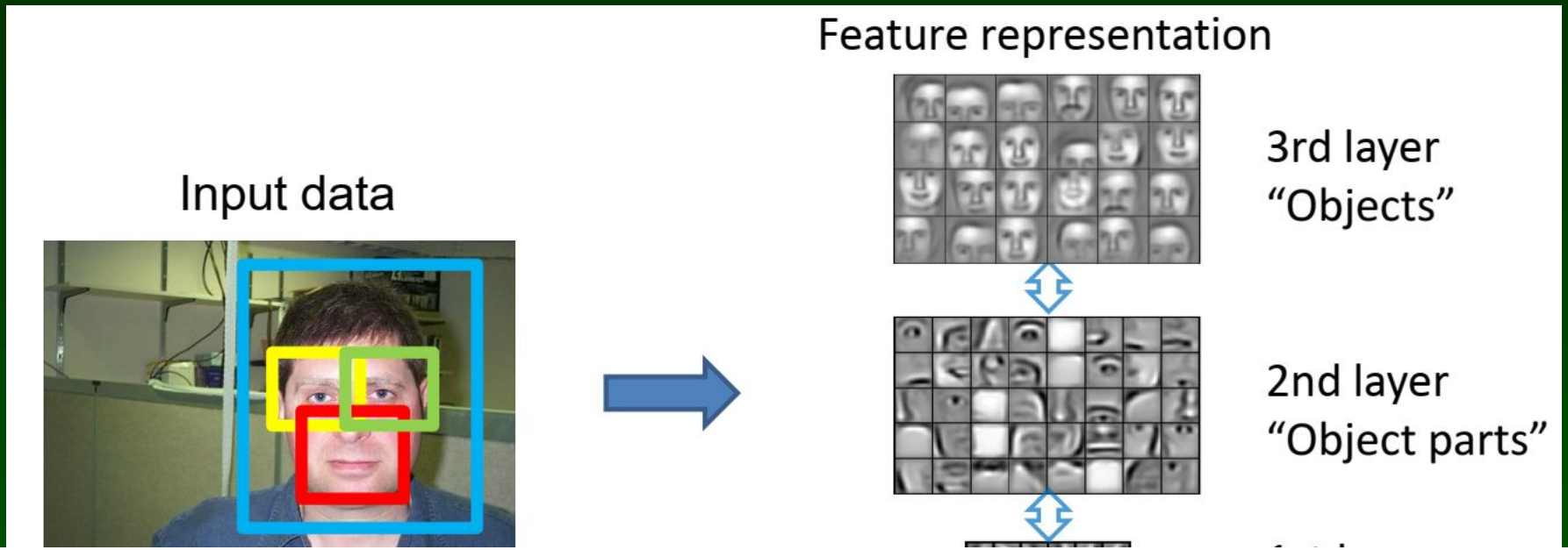
Methods: Deep NN for images

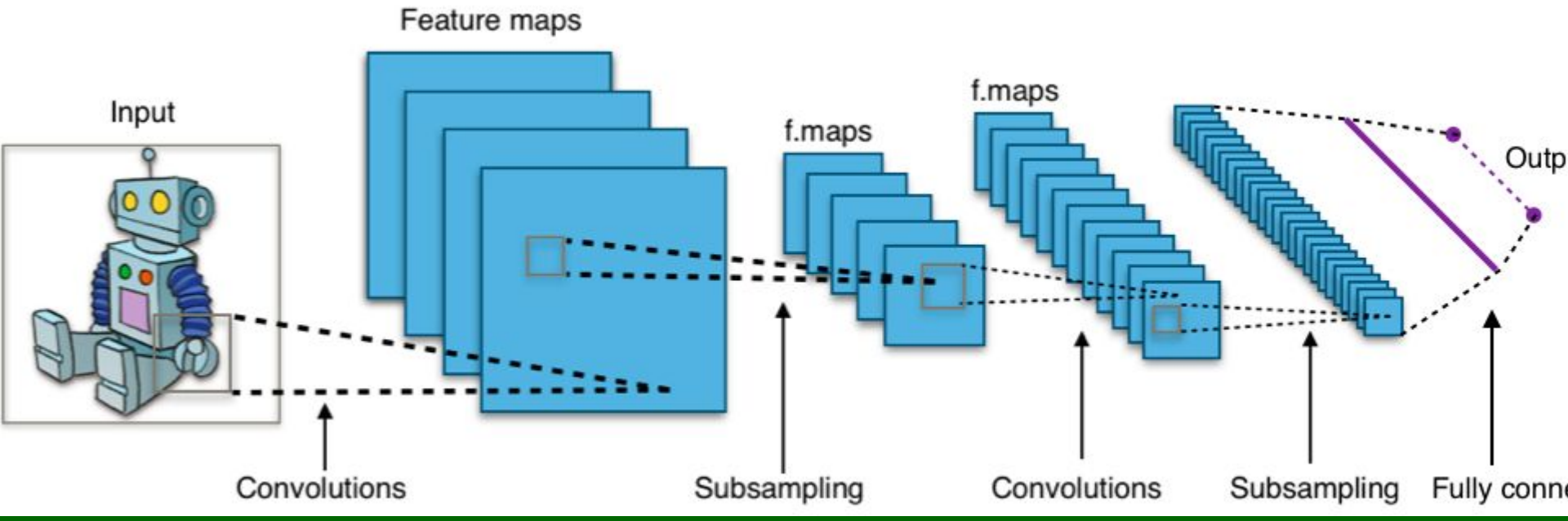


Small patches of image (ex. 5x5 pixels) are filtered through receptive fields in convolution operation, creating elementary features, combined together using sampling, and again filtered to generate more complex features.

Finally generated features are analyzed to determine image category.

Methods: NN for images



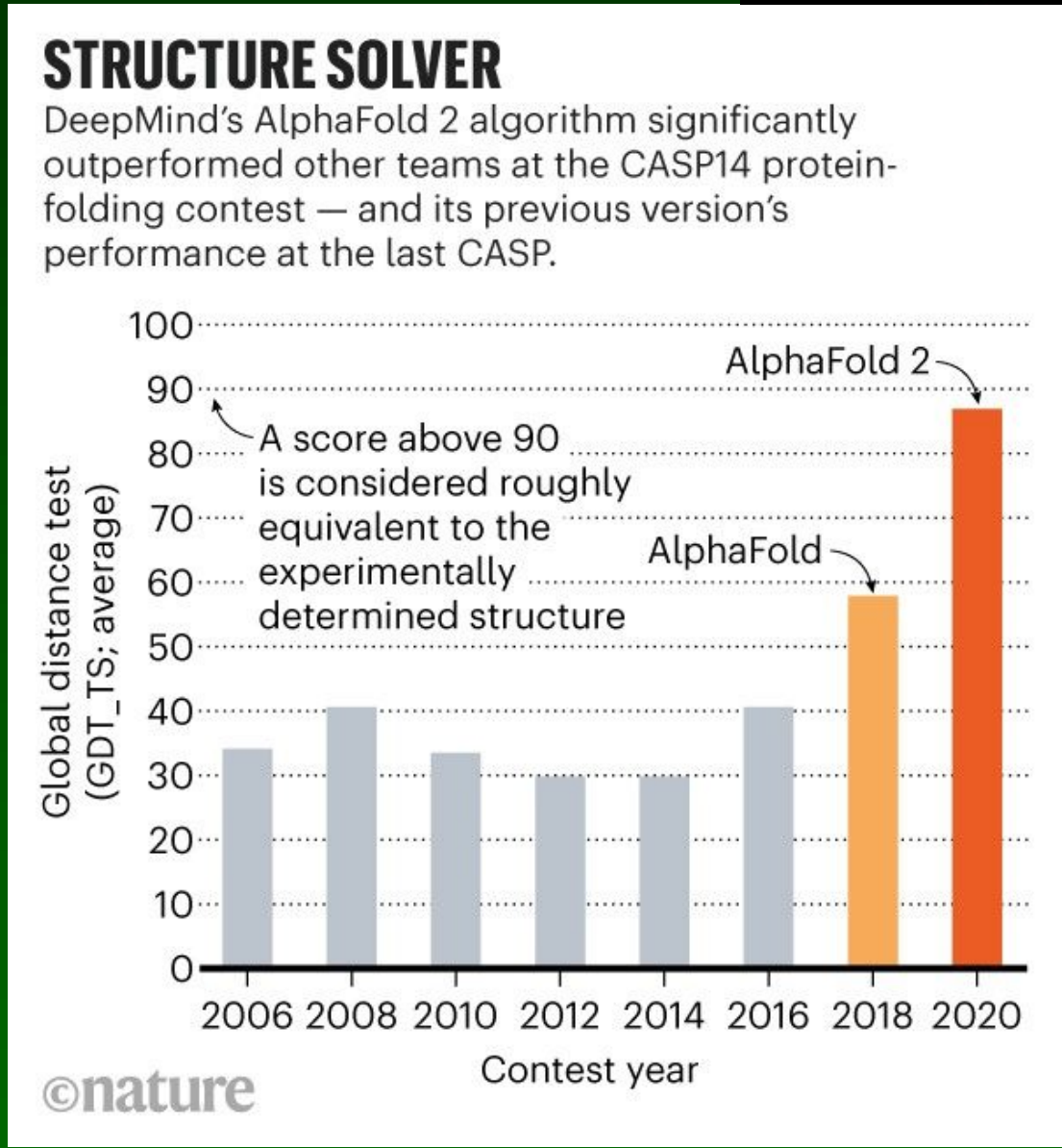


Superresolution

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

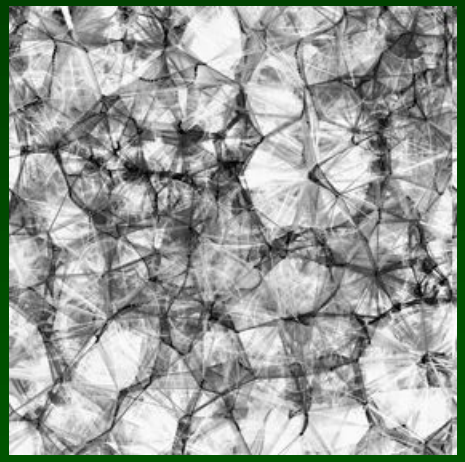


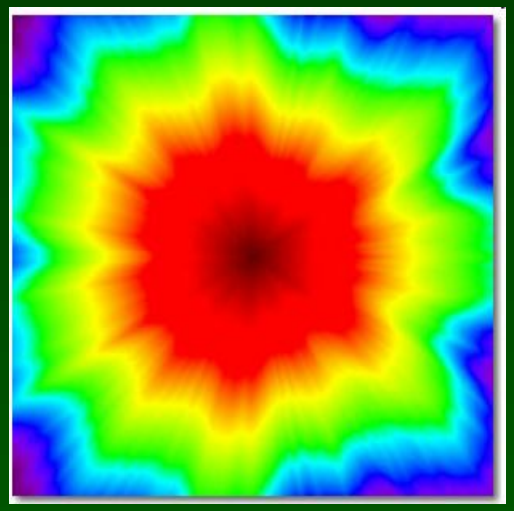
Generative art

„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.jhlabs.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 fulfieled 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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Deep Art

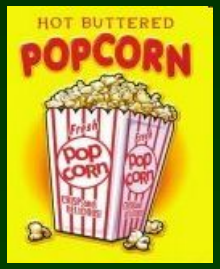
https://deepart.io/latest/ Deep Neural Networks, Deep Dream,
LA Gatys, AS Ecker, M Bethge, A Neural Algorithm of Artistic Style (2015)

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 anlyzing.

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:

Synestesia 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

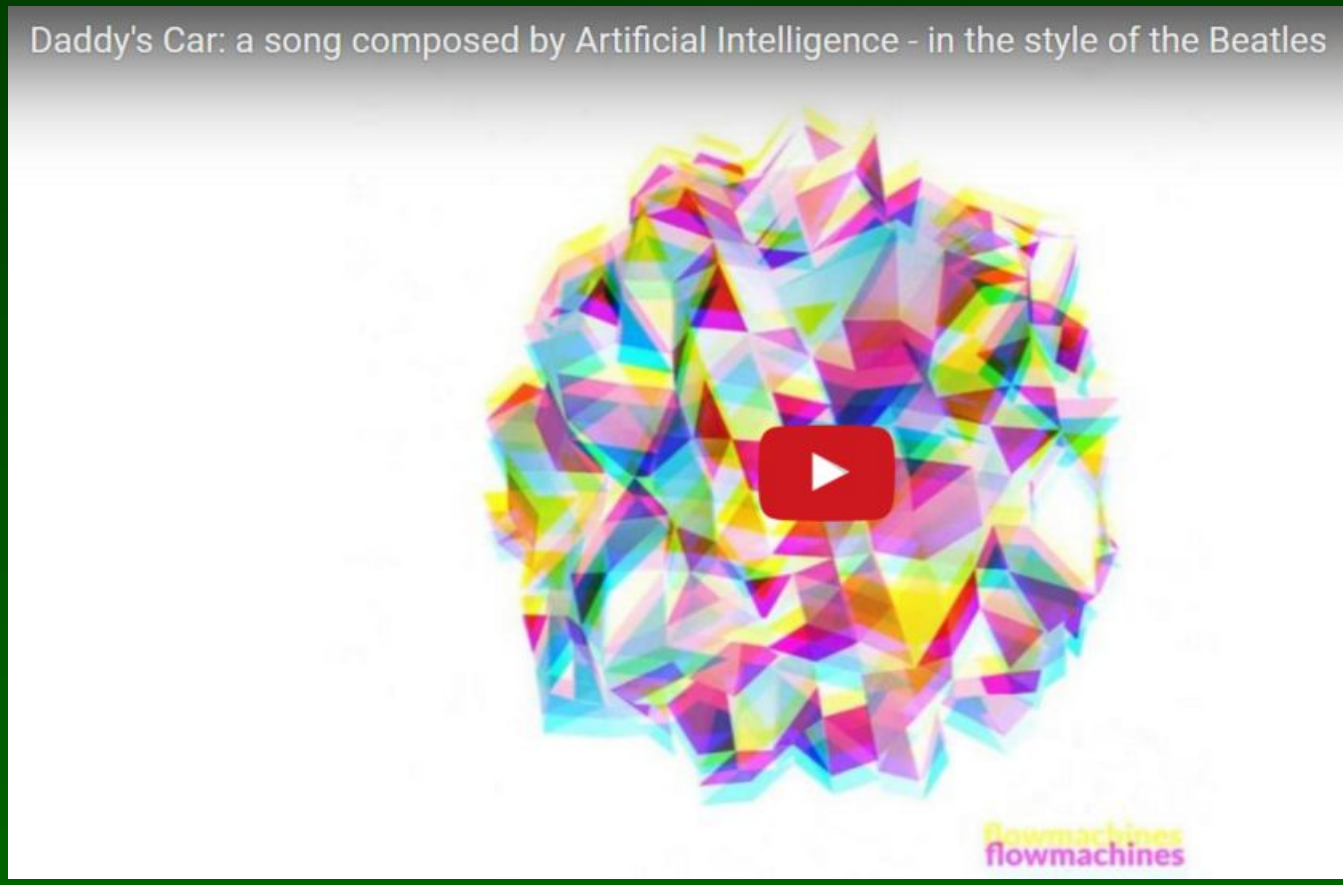
by Sony CSL

http://www.flow-machines.com

Software that learns.

What is programmed is only the motivation to learn!

Learning to Create (Lrn2Cre8) EU FP7 Project



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.

- Illustrated transformer
-

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