Sztuczna Inteligencja
Uczenie maszynowe III

Włodzisław Duch

Katedra Informatyki Stosowanej UMK
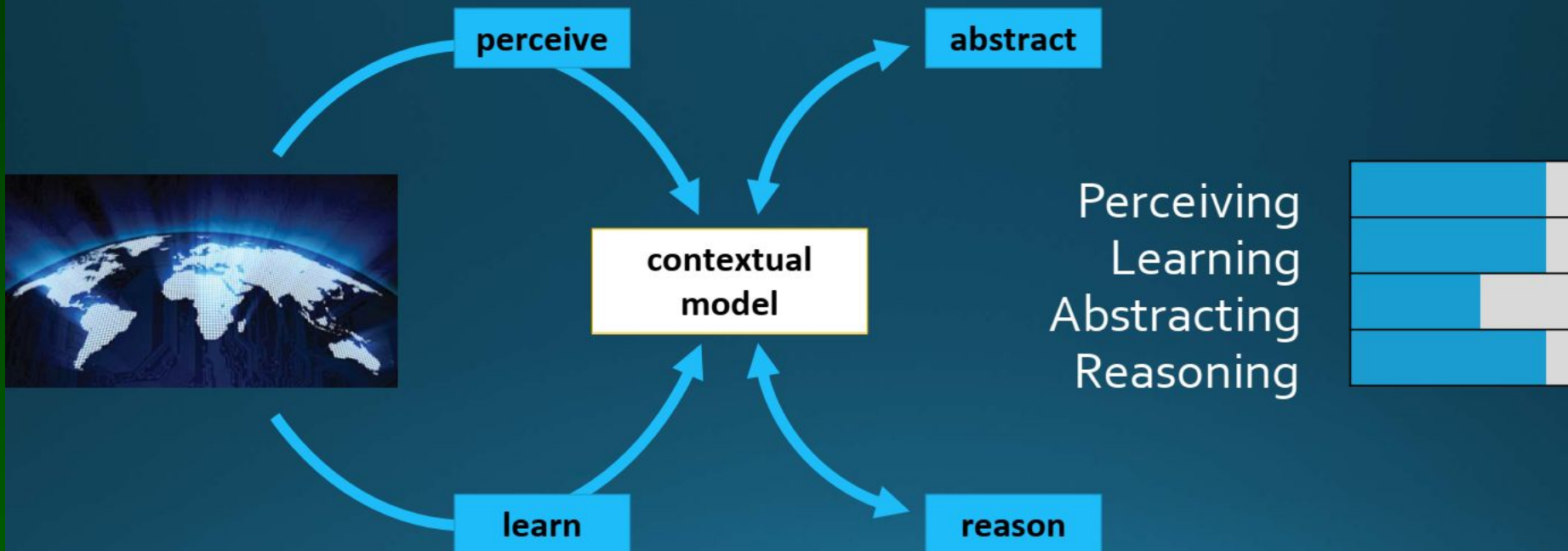
Google: Włodzisław Duch

Co będzie

- Rozwój i zastosowania dużych modeli językowych

- <u>Slajdy z referatów</u>:
  State of Artificial Intelligence, Part I & II. 4/2023
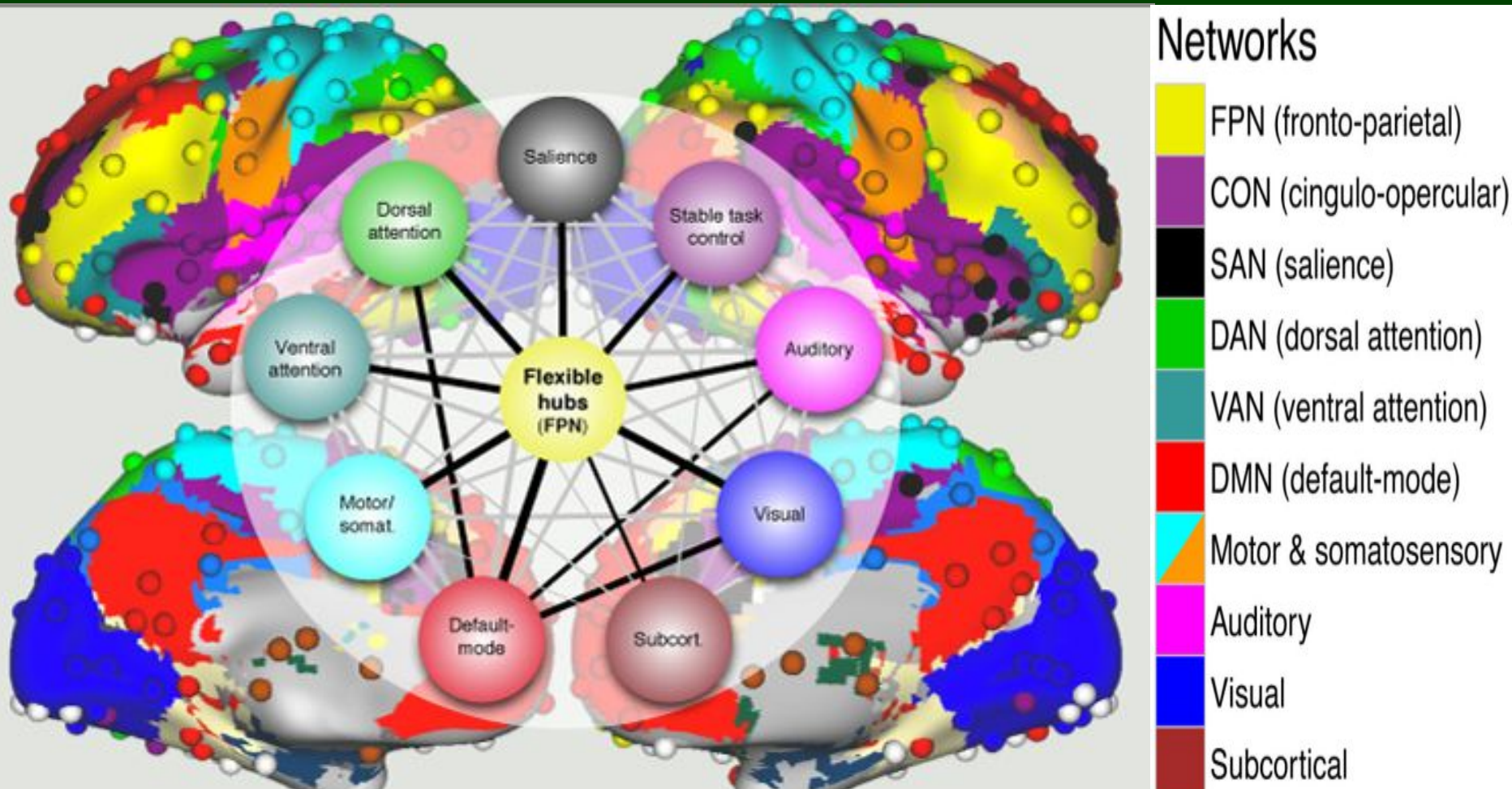- Referat dodatkowy, 1.06.2023

Third wave of AI

Final frontier: building models of objects and situations is the next step. GAN, Generative Adversarial Networks, one network creates false examples distorting learning data, another network learns to distinguish them from natural ones.
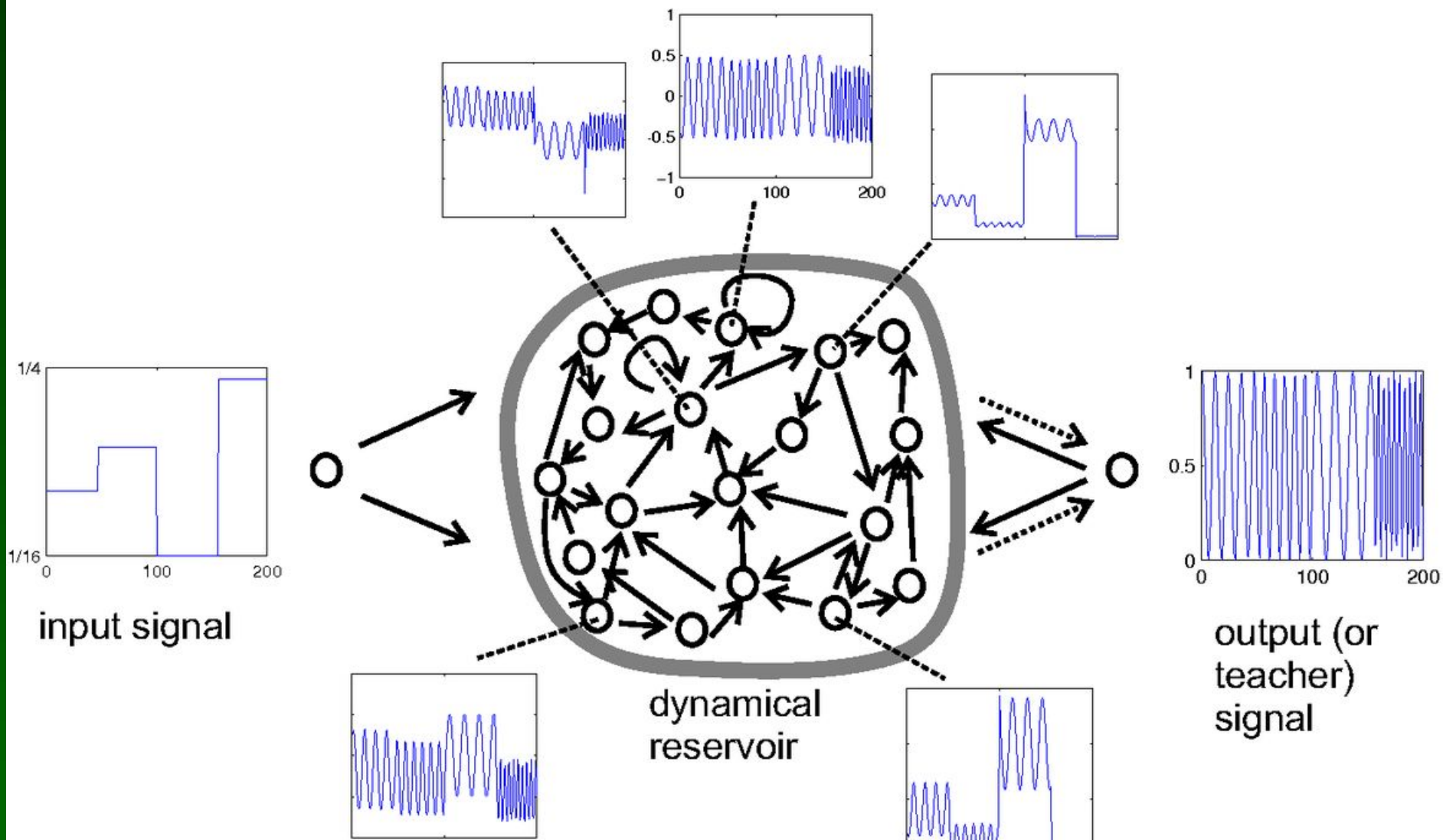
Brain activity ⇔ Mental image

fMRI activity can be correlated with deep CNN network features; using these features closest image from large database is selected. Horikawa, Kamitani, Generic decoding of seen and imagined objects using hierarchical visual features. Nature Comm. 2017.


Networks

- FPN (fronto-parietal)
- CON (cingulo-opercular)
- SAN (salience)
- DAN (dorsal attention)
- VAN (ventral attention)
- DMN (default-mode)
- Motor & somatosensory
- Auditory
- Visual
- Subcortical

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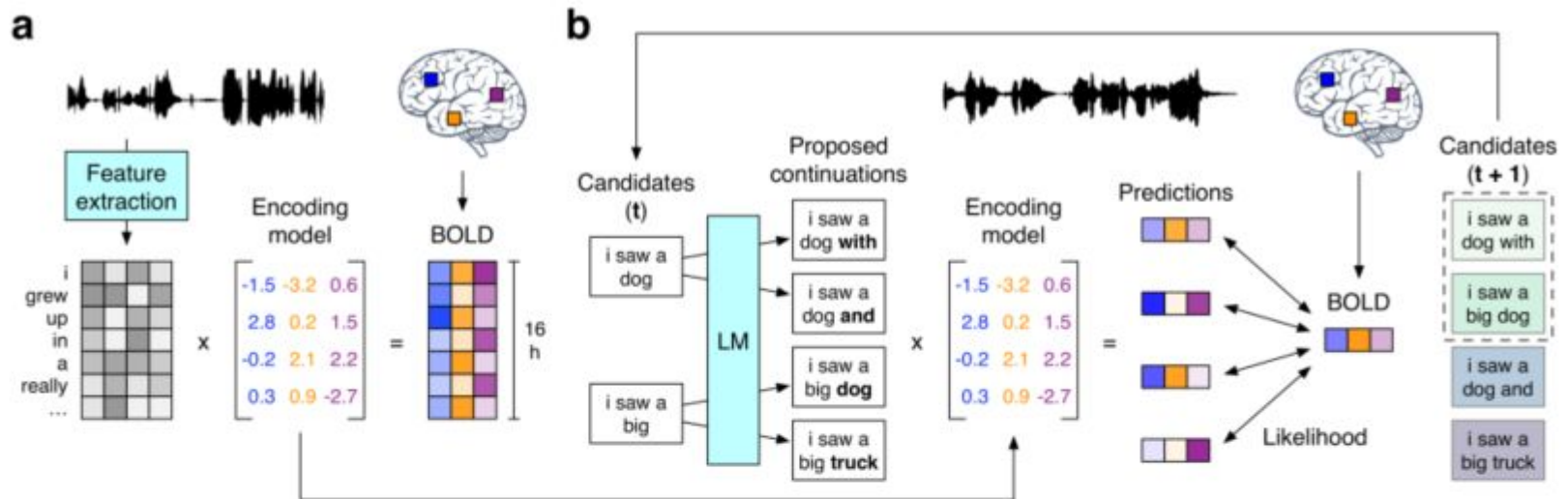Horikawa, Kamitani, Generic decoding of seen and imagined objects using
hierarchical visual features. Nature Comm. 2017.
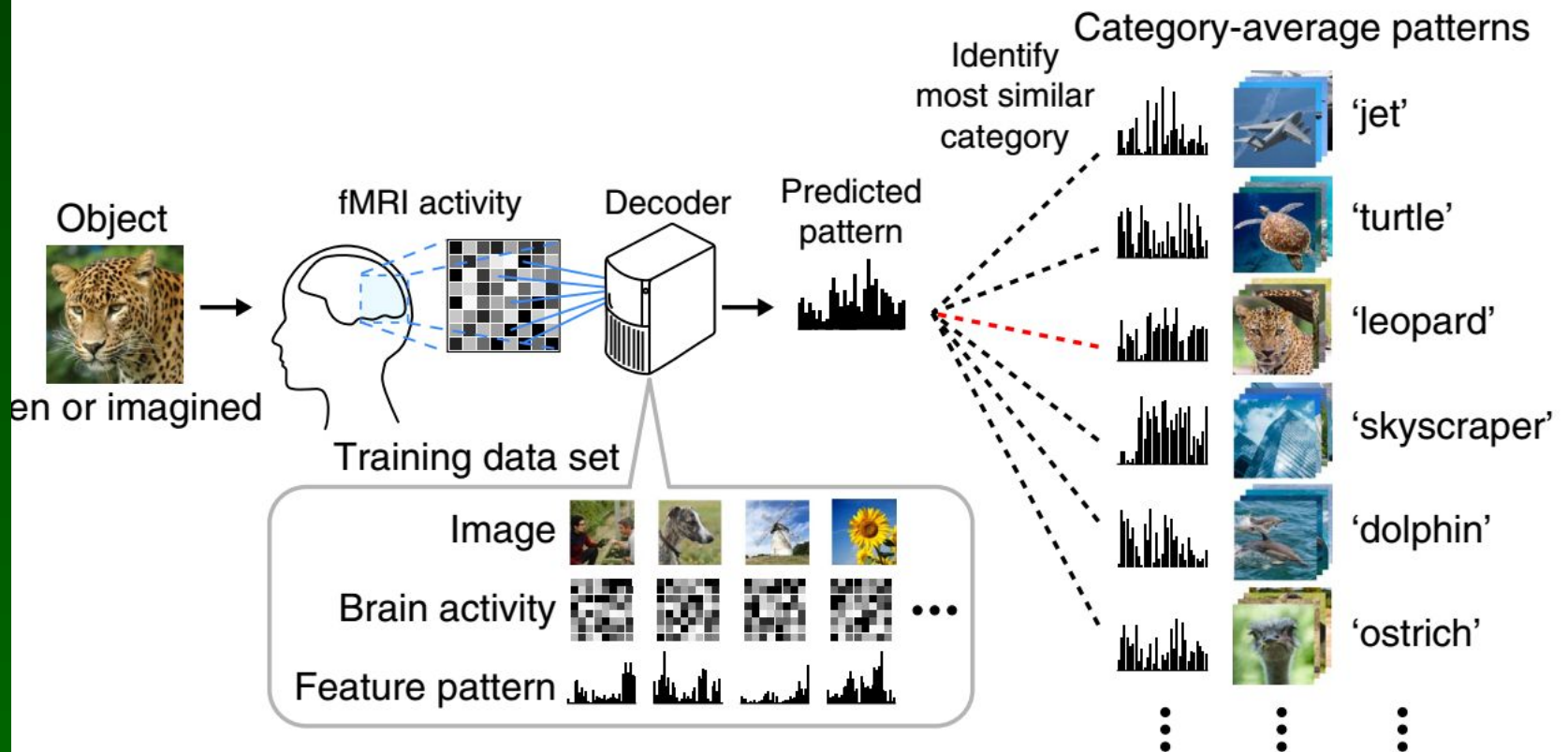
Semantic reconstruction of continuous language

Tang, J., LeBel, A., Jain, S., & Huth, A. G. (2023). Semantic reconstruction of continuous language from non-invasive brain recordings. Nature Neuroscience, 26(5)

fMRI ⇔ CNN

Convert activity of the brain into the mental images that we are conscious of.

Try to estimate features at different brain areas/cortical layers.

8-layer convolution network, ~60 mln parameters, feature vectors from randomly selected 1000 units in each layer are used to represent images at different level of processing.

Output: vector of features that may be used to reconstruct image.
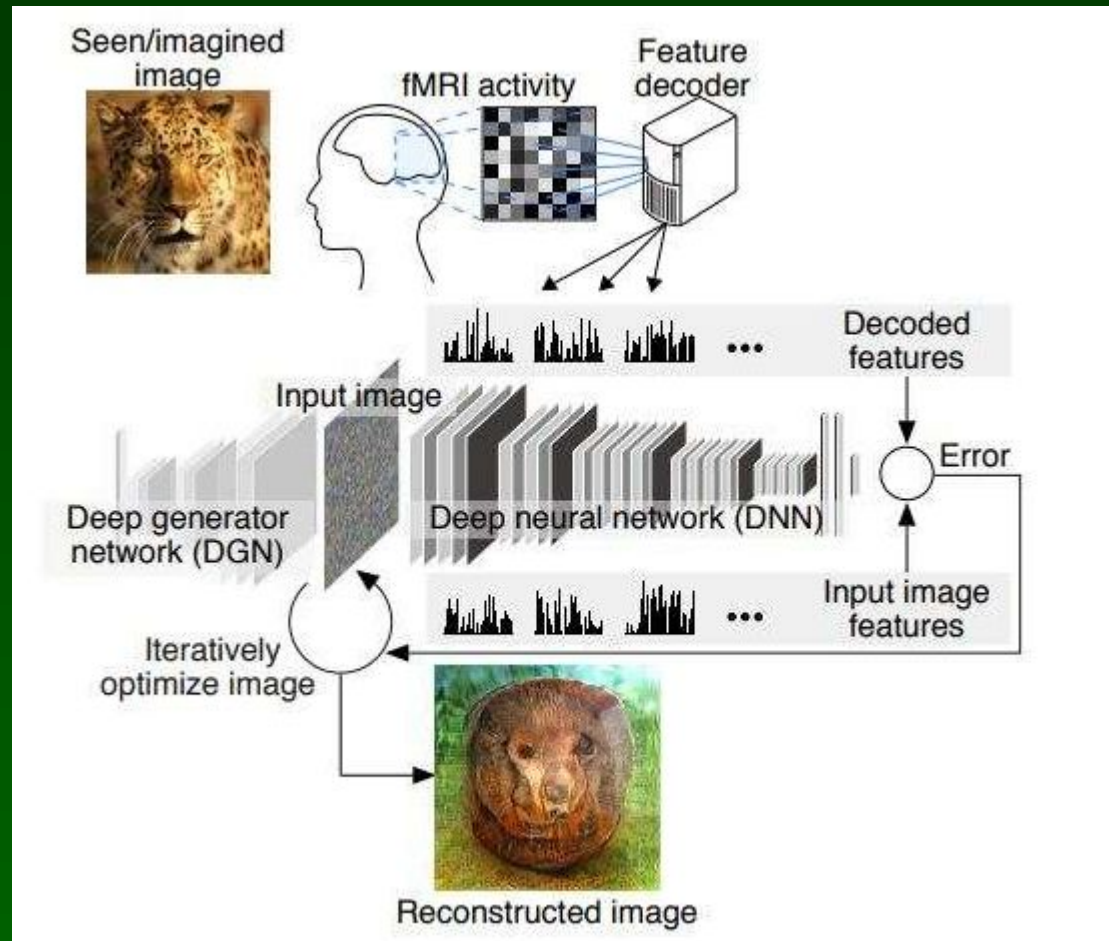
Interfejs mózg-robot

Australia, UTS: VR to control robotic dogs using EEG.
Dry graphene sensors, not as accurate as wet.
Przydatny?

Na zakończenie

Why are we confident that machines will pass Turing test ...
                —Rodney Brooks, director of the MIT AI Lab

There's this stupid myth out there that A.I. has failed, but A.I. is everywhere around you every second of the day. People just don't notice it. You've got A.I. systems in cars, tuning the parameters of the fuel injection systems. When you land in an airplane, your gate gets chosen by an A.I. scheduling system. Every time you use a piece of Microsoft software, you've got an A.I. system trying to figure out what you're doing, like writing a letter, and it does a pretty damned good job. Every time you see a movie with computer-generated characters, they're all little A.I. characters behaving as a group. Every time you play a video game, you're playing against an A.I. system.
Machine Learning and Creativity (wykład mniej techniczny).
AI Links   wiele ciekawostek.

Przykładowe pytania

- Jakie mamy klasy metod uczenia maszynowego?
- Na czym polega ML?
- Przedstawić algorytm drzew decyzji, jakie granice tworzy?
- Etapy data mining
- Jaką metodę uczenia maszynowego warto stosować w sytuacji …