

2011, February;上課第十三周 Psychological complexity

Minimization of Boolean complexity in human concept learning, Jacob Feldman, Nature, vol 407, 5 October 2000, 630-632

“..explain how people learn to divide the world into discrete categories..”

Psychological complexity

Logical complexity

Kolmogorov complexity

Boolean complexity

[Algebraic mind Marcus](#) [Low-Complexity Art](#) [Super omega Ramsey](#)

[Meme](#)

Pribram hologram

The neurophysiology of remembering' by Karl H. Pribram, page 73-86

第十二周 cognitive map

1. Unsupervised learning, H. B. Barlow, Neural Computation, vol.1 page 295-311, 1989
2. Adaptation and decorrelation in the cortex, H.B. Barlow & p. Foldiak, in The computing neuron, chapter 4', Edited by Richard Durbin, Christopher Miall and Graeme Mitchison, Addison-Wesley Publishing Company, 1989
3. Finding minimum entropy codes, H.B. Barlow, T.P. kaushal, and G.J. Mitchison, Neural Computation, vol. 1, page 412-423

'Team Frankenstein' launch bid to build a human brain within decade

By [Allan Hall](#)

Read more:

<http://www.dailymail.co.uk/sciencetech/article-1387537/Team-Frankenstein-launch-bid-build-human-brain-decade.html#ixzz1MrCsayPZ>

Gene responsible for the unique development of human brains is 'discovered' By [Daily Mail Reporter](#)

:

<http://www.dailymail.co.uk/sciencetech/article-1387641/Gene-responsible-unique-development-human-brains-discovered.html#ixzz1MrDafKxe>

第十一周 Isomap <http://isomap.stanford.edu/>

A Global Geometric Framework for Nonlinear Dimensionality Reduction

Joshua B. Tenenbaum, Vin de Silva, and John C. Langford

Science 22 December 2000:

2319-2323.[DOI:10.1126/science.290.5500.2319]

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#) [Supplemental Data](#)

Video

[The days we learned to think BBC Horizon](#)

[The man who made up his mind BBS Horizon](#)

第十周 [LLE](#)

[Mirror neuron](#)

Video:

[BBC Thinking 1987](#) Minsky

[NN in BBC Thinking 1987](#) 7:30

[Marvin Minsky 2003](#) .on NN

[Minsky AI](#)

[BBC child language](#)

[Minsky society of mind](#)

第九周 SOM

[Self-organizing map](#) [發明人](#) [Algorithm](#) [algorithm](#) [package](#) [package](#)

[WEBSOM](#) SOM http://en.wikipedia.org/wiki/Self-organizing_map

vedio [Kohonen SOM](#)

Bill Joy [talks](#)

第八周 Elman network

semantic encoding : read paper [2008 J.24](#) tutorial [slides](#)

web http://red.csie.ntu.edu.tw/demo/literal/index_eng.html

EU project SIMBAD in [SIMBAD](#)

Read paper: Creative tension

[What links Aristotle, William Blake, Darwin and GM crops?](#)

Hubert L. Dreyfus's thesis, which owes a lot to Wittgenstein (1953), is that "whenever human behavior is analyzed in terms of rules (algorithm), these rules must always contain a ceteris paribus condition", that is, they apply "everything else being equal"; and what "everything else" and "equal" mean in any specific situation can never be fully spelled out without a regress. that is, they apply "everything else being equal";

第七周 Elman network

[Generalization, simple recurrent networks, and the emergence of structure,](#)

Jeffrey L. Elman, Proceedings of the 20th Annual Conference of the Cognitive Society, 1998

[Commentary on The Algebraic Mind](#), by Gary Marcus, MIT Press

Read papers 1990 [Finding structure in time](#)

[NetTalk](#)

Video [Grey Matters: Understanding Language](#) [Video 1](#)

第六周

homework

http://red.csie.ntu.edu.tw/NN/Demo/demo_eng.html

reinforcement learning Q-learning for inverted pendulum problem

<[Q_Demo.zip](#)> <[demo code preview](#)>

About Q-learning, please refer to [q_learning/Q-learning Demo.htm](#)

or download the word file [q_learning/Q-learning_readme.doc](#)

video

[Lecture on Reinforcement Learning by Rich Sutton](#)

2:20 Not dynamic programming

5:25 Not Markov decision process

The legacy(遺產) of Gestalt psychology, Irvin Rock and Stephen Palmer,
Scientific American, page 84-90, December 1990

第五周

Reinforcement learning

Barto, A. G., Sutton, R. S., & Anderson, C. W. (1983) Neuronlike elements
that can solve difficult learning control problems. Trans. IEEE SMC, 13,
835–846

Reward and expectation, see [The neurobiology of cognition](#)
[Core systems in human cognition](#), by [Elizabeth S. Spelke](#)

Video

[The Human Spark | Preview Part 1: Becoming Us | PBS](#)
[STAIR Ng 直昇機](#) autonomous helicopter [Algorithms in Web](#)

第四周

3 papers

1. The neurophysiology of remembering by Karl H. Pribram, page 73-86
Scientific American, Vol 220(1), Jan 1969,

2. [The neurobiology of cognition](#)

The neurobiology of cognition, M. James Nichols and William T. Newsome,
Nature, vol. 402, supp, 2 December 1999, page C35-C37 [erratum](#)

3. Genetics and general cognitive ability, Robert Plomin, Nature, vol. 402, 2,
Dec. 1999

Red webs

[IBM Seeks to Build the Computer of the Future Based on Insights from the
Brain](#)

[大麥丁狗](#) http://en.wikipedia.org/wiki/Gestalt_psychology

[Hologram學派](#)

[Hologram - The Computer Of The Future](#)

[Holonomic brain theory](#)

[Holographic Laser Projection Technology @ CES 2010](#)

[Neuron Network](#)

The Miracle in Human Brain
Brain Theory & Understanding (4)

Neocortex = Integrating highly evolved 400 brain centers

The Emergence of Intelligence in the Neocortical Microcircuit Henry Markram

Henry Markram builds a brain in a supercomputer

Gadgetoff 2007 - Marvin Minsky

Emotion Machine: Commonsense Thinking, Artificial Intelligence, and the Future of the Human Mind 9:30NN 19:00~ Integrating 30:00 32:00

Edelman From Brain Dynamics to Consciousness: How Matter Becomes Imagination, UCLA

第三周

神經基因學基礎

From bird song to neurogenesis' by Fernando Nottebohm, Scientific American, February 1989, page 74-79

夜鷹 nightingale

音樂牛頓論鳥

*Psychology study 神經與心智

The neurobiology of cognition, M. James Nichols and William T. Newsome, Nature, vol. 402, supp, 2 December 1999, page C35-C37 erratum

基因與心智

Genetics and general cognitive ability g, Robert Plomin, Nature, vol. 402, 2, Dec. 1999

Video: The man who made up his mind, by Edlman

The Neurosciences Institute, 1981

人腦 與 基層蟲腦的差別

尼安德塔人 DNA序列組成

<http://sa.ylib.com/news/newsshow.asp?FDocNo=1623&CL=63>

上課前二周

(I): Hypothesis: Hebbian synapse 是至今唯一腦理論基礎

Brain theory example:

Hopfield model : see Lippmann code in web site

[Hopfield webpage Scholarpedia](#)

[Attractor Network](#)

參考文獻

Tank, D.W. and Hopfield, J.J., [Collective computation in neuronlike circuits](#), Scientific American Vol. 255 No. 12, 104-114 (1987) Genetic base for Hebbian learning

Genetic base: 改造 聰明鼠 [Building a Brainier Mouse](#), Joe Z. Tsien, Scientific American, April 2000, page 44-48.

[Cortical Columns, Modules, and Hebbian Cell Assemblies,"](#) in: The Handbook of Brain Theory and Neural Networks, edited by Michael A. Arbib (Bradford Books/[MIT Press](#)), pp. 269-272 (1995).

(II): Evolution 腦演化論 請參考 [RL, Calvin, The Emergence of Intelligence, by William H. Calvin](#), Scientific American,, Scientific American 271(4):100-107, October 1994

(III): Brain is not computer.

See video by Edlman

[Edelman cognitive computing IBM](#)

** [Brain is not a computer](#) 24:09

(IV): Some web sites 另外一些有用的聯結

EU 卓越center [希伯來大學](#)

History

Boole logic 1850's http://en.wikipedia.org/wiki/George_Boole

Turing TM 1930's

Wiener* ([cybernetics 1948](#))

Minsky AI, 1960's

[Talking nets](#)

學派

[Computationalism](#) (含 AI)

[Computationalism is the thesis that cognition is computation. It is an extreme view of functionalism, also known as machine functionalism](#)

[The Death of Computationalism](#)

[Rejecting the Computational Theory of Mind](#)

[經驗主義](#) [理性主義](#) [康德](#) 範籌