6.034
What It's All About Revisited
Kimberle Koile and friends

December 11, 2019

In Memoriam

Professor Patrick H. Winston
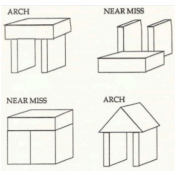

What We Studied

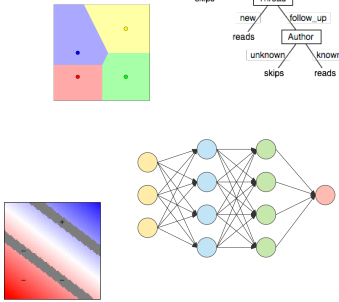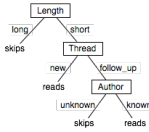| **Reasoning**	**Learning**	**Our symbolic species**
Goal trees	Nearest neighbors	Architectures
Rules	Identification trees	Representation
Basic search	Genetic algorithms	Brain-mind connection
Optimal search	Sparse spaces	Language and vision
Games	Near miss	Merge
Constraints	Neural Networks	Stories
Bayes	Bayes nets	Human-machine connection
	SVM	
	Boosting	

Machine Learning Methods

N ≈ 1
Human-style

N ≈ ∞
Regularity

near miss
sparse spaces

kNN
ID trees
NNets
SVMs
…
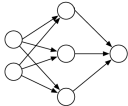
Perspectives

Scientific vs Engineering

Symbolic vs Connectionist

Numerical?

Connectionist

Symbolic

Cardon, et al. "La revanche des neurones."
Réseaux 2018/5 (n° 211), p. 173-220.

Cardon, et al. "La revanche des neurones."
Réseaux 2018/5 (n° 211), p. 173-220.
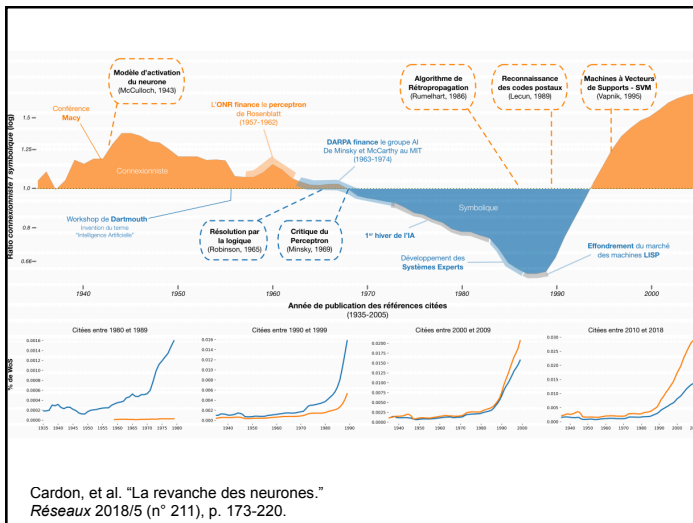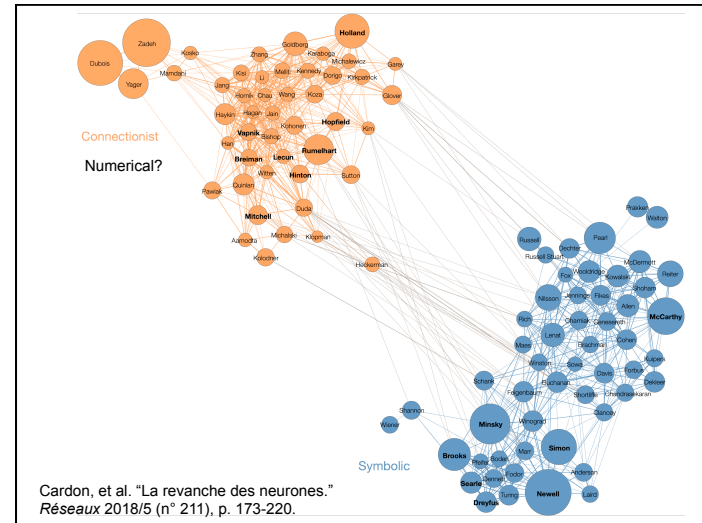
To Final or Not To Final

Lab Average

Quiz 1	Core (100)		Core	
5 ≥84				
4 ≥69				
3 ≥54				
Quiz 2	Core (94)	SRN	Core	SRN
5 ≥84				
4 ≥71				
3 ≥60				
Quiz 3	Core (100)	SRN	Core	SRN
5 ≥91				
4 ≥83				
3 ≥73				
Quiz 4	Core (100)	SRN	Core	SRN
5 ≥91				
4 ≥80				
3 ≥69				

Your computed grade: piazza @666
                                                            @667

Grading

∀ **Quiz x**

Quiz x →

Final, Quiz x →

Max

$$\frac{\sum_x \textbf{SRN, Quiz x} + \textbf{Bonus SRN}}{3}$$ → Weighted avg

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The Final Exam

| SRN Q2, Q3, Q4, Bonus |
| Q4: Boosting, Bayesian networks |
| Q3: Neural networks, SVM |
| Q2: Constraints, kNN, ID trees |
| Q1: Rules, Search, Games |
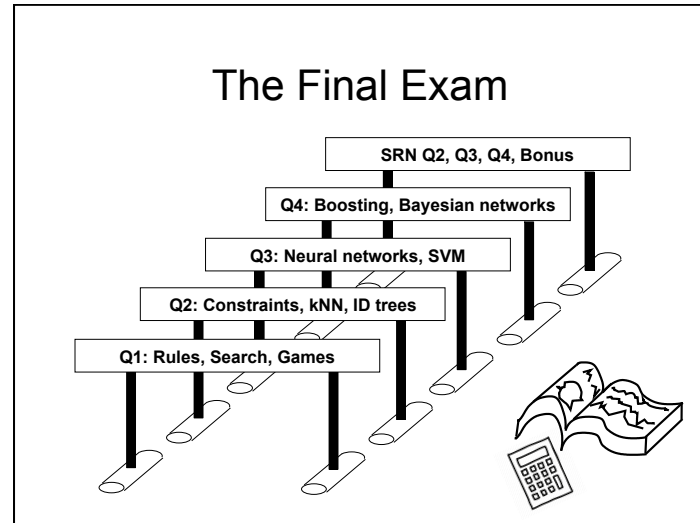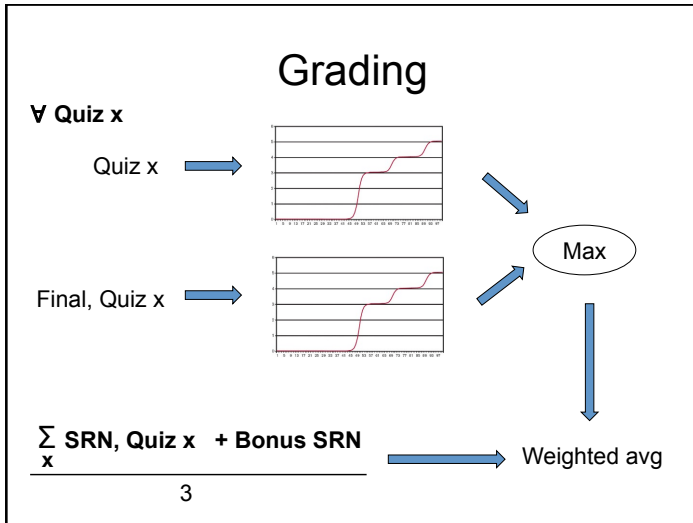
Q2

SRN (Q2) Q3, Q4, Bonus

		Topic	Quiz #
18	Wed	Constraints in interpretation, slides	2SRN
20	Fri	Holiday: Student	-
23	Mon	Constraints in resource allocation, slides	2
25	Wed	Quiz 1, solutions	-
27	Fri	Right-now: Dr. Marc Raibert, Boston Dynamics	2SRN
30	Mon	Nearest neighbor learning, slides	2
October	**Day**	**Topic**	**Quiz #**
2	Wed	Identification tree learning, boards	2
4	Fri	Right-now: Prof. Ed Boyden, Dept. of Biological Engineering	2SRN
7	Mon	Neural net learning, slides	3
9	Wed	Deep neural nets, slides	2SRN
11	Fri	Right-now: Prof. Aleksander Madry, Dept. of EECS	2SRN

Q3

SRN Q2, (Q3) Q4, Bonus

		Topic	Quiz #
18	Fri	AlphaGo and AlphaGo Zero, slides , boards	3SRN
21	Mon	Support vector machines, SVM notes, slides	3
23	Wed	Learning in sparse spaces	3SRN
25	Fri	Genetic algorithms, boards	3SRN
28	Mon	Representations, slides	3SRN
30	Wed	Learning from near misses, boards	3SRN
November	**Day**	**Topic**	**Quiz #**
1	Fri	Right-now: Prof. Nancy Kanwisher, Dept. of Brain and Cognitive Sciences	3SRN

Slide 1: Q4

Q4

SRN Q2, Q3 Q4 Bonus

4	Mon	Architectures: GPS, SOAR, Subsumption, Society of Mind, slides🔒	4SRN
6	Wed	Quiz 3, solutions🔒	-
8	Fri	Probabilistic inference (part 1), slides🔒	4
11	Mon	Holiday: Veteran's day	-
13	Wed	Probabilistic inference (part 2)🔒, slides🔒	4
15	Fri	Right-now: Dr. Gill Pratt, Toyota Research Institute	4SRN
18	Mon	Boosting notes🔒 , Winston and Ortiz boosting notes🔒, Shapire boosting paper, slides🔒	4
20	Wed	Natural language processing, Dr. Boris Katz	4SRN
22	Fri	Merge: Language and evolution, Prof. Robert Berwick	4SRN
25	Mon	Why merge matters: Story understanding🔒 , Dylan Holmes	4SRN

Slide 2: Bonus

Bonus

piazza @590

SRN Q2, Q3, Q4 Bonus

December	Day	Topic	Quiz #
2	Mon	Right-now: Prof. Randall Davis, Dept. of EECS	bonus final SRN
4	Wed	Quiz 4🔒, solutions🔒	-
6	Fri	Right-now: Prof. Peter Szolovits, Dept. of EECS; slides	bonus final SRN
9	Mon	Right-now: Prof. Pattie Maes, Media Lab	bonus final SRN
11	Wed	What it's all about revisited, the final, follow-on classes	bonus final SRN

Slide 3: MIT Classes

MIT Classes

EECS (course 6)

HCI: 6.835 Intelligent Multimodel User Interfaces (Davis)

Healthcare: 6.871J Machine Learning for Healthcare (Szolovits, Sontag)

Advanced Programming Methods: 6.817J, 6.885, 6.945

Biology: 6.047/6.878J, 6.049J, 6.802J

Cognitive Science: 6.804J, 6.863J

Hardware: 6.812/6.825

Leadership: 6.S976

Machine Learning, Inference: 6.036, 6.435, 6.437, 6.862, 6.867, 6.881, 6.883, 6.S979

Natural language, Speech: 6.806/6.864, 6.345, 6.863J

Robotics: 6.141J, 6.832, 6.834J, 6.881, 6.882

BCS (course 9), BE (course 20), Media Lab (MAS)

Slide 4: Reemergence of AI

Reemergence of AI

AI is everywhere!

Wearables

Deep learning

Robotics

Autonomous vehicles

Artificial general intelligence: speech understanding, image recognition, NL processing, story understanding

What can I help you with?

Slide 1:

Robots need civil rights, too

OK Google, stop terrifying my toddler: When smart homes make life miserable

Amazon workers are listening to what you tell Alexa

Facial recognition may reveal things we'd rather not tell the world. Are we ready?

Facial recognition zeroes in on genetic disorders

The State Police know every time you drive on or off Cape Cod

Can these researchers catch cancer much earlier than ever before?

Researchers are developing artificial intelligence that can detect moods, sarcasm, even mental illness

Teaching self-driving cars to read minds

Slide 2:

"We can see only a short distance ahead, but we can see that much remains to be done."

1950   Turing

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

M I N D

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 the meaning of the terms '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.

Slide 3:

YOU CAN DO IT   ONLY YOU CAN DO IT   YOU CAN'T DO IT ALONE