

Algorithms & EU competition law

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These are personal views. The views expressed here are not necessarily the views of the European Commission or of the Directorate-General for Competition

Digital decision-making

■ Data

- Data protection concerns?
- Data accumulation concerns?

■ Algorithms

- Collusion?
 - Horizontal/vertical
 - Explicit/tacit

■ Other public policy concerns

"Algorithms"

Artificial intelligence

Machine learning

Deep learning

Neural networks







NEW NAVY DEVICE LEARNS BY DOING

Psychologist Shows Embryo
of Computer Designed to
Read and Grow Wiser

WASHINGTON, July 7 (UPI)
—The Navy revealed the embryo of an electronic computer today that it expects will be able to walk, talk, see, write, reproduce itself and be conscious of its existence.

The embryo—the Weather Bureau's \$2,000,000 "704" computer—learned to differentiate between right and left after fifty attempts in the Navy's demonstration for newsmen.

The service said it would use this principle to build the first of its Perceptron thinking machines that will be able to read and write. It is expected to be finished in about a year at a cost of \$100,000.

Dr. Frank Rosenblatt, designer of the Perceptron, conducted the demonstration. He said the machine would be the first device to think as the human brain. As do human beings, Perceptron will make mistakes at first, but will grow wiser as it gains experience, he said.





ALPHAGO
02:00:00

LEE SEDOL
01:59:31



AlphaGo



Lee Sedol



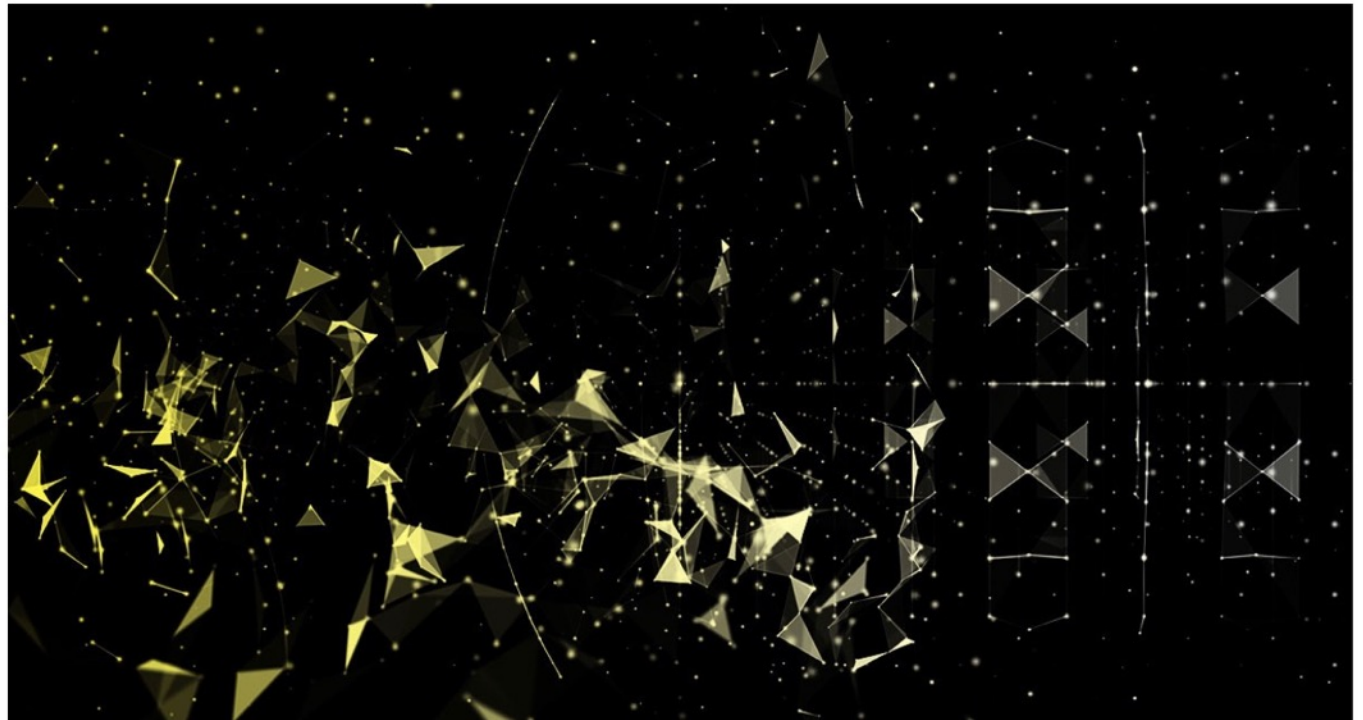


What Artificial Intelligence Can and Can't Do Right Now

by **Andrew Ng**

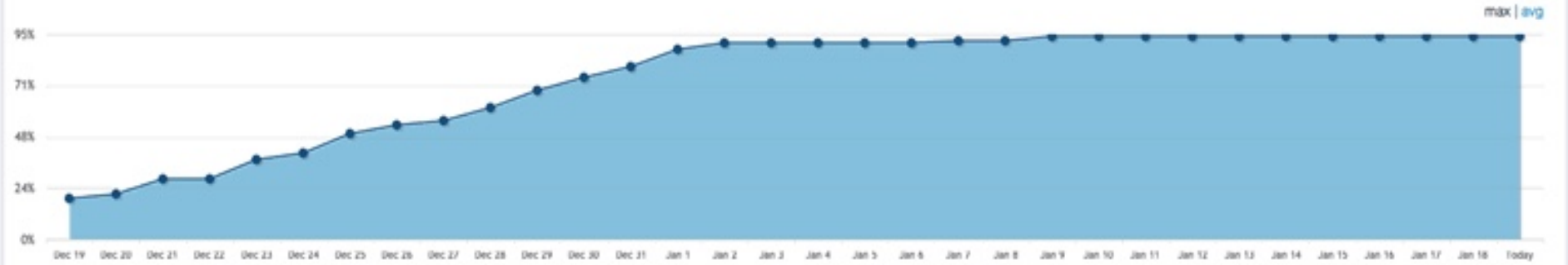
NOVEMBER 09, 2016

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Buy Boxes



Repricing Overview



Settings

Strategies

Uploads

Marketplaces

Listing Counts

17 / 19
Live / Total

17 / 20,000
Active / Limit

Subscription Details

Plan: Legacy Hourly, 20,000 Listings

Rate: \$50.00/ Month

Next Billing Date: 1/23/2015

Listing Views

Inactive (2)

Non Buy Boxes (17)

No Min Price (0)



minderest.com



Name

Search products...



English

John H. Miller



Canon Powershot SX610 HS

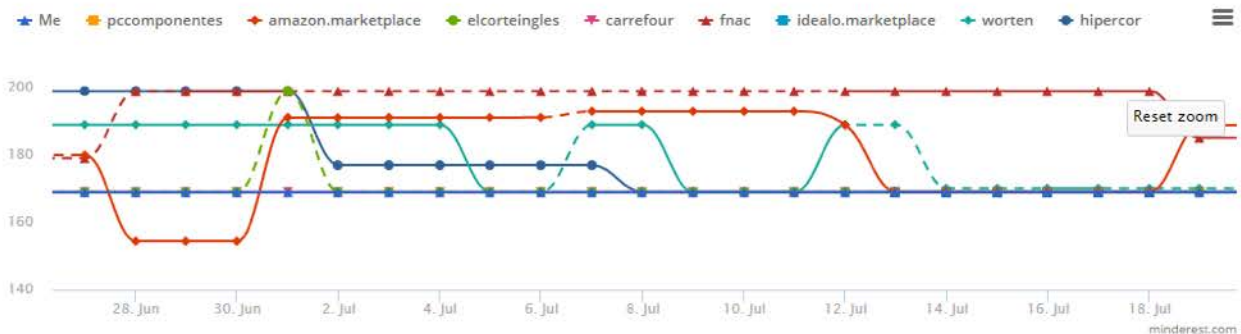


Review matching

26-06-2016

18-07-2016

Apply



ID: 10082286

Brand: canon

MPN:

EAN: 4549292030631

MAP: 169.00

Stock: In stock

Category: PHOTOGRAPHY

Display

10

records

Filter by text...

#	Web	Product	Price	B. Offer	Stock	Rating	Updated
1	amazon.marketplace	Canon sx610 hs 18x, e	163.64	-3%	In stock	★★★★☆	26-07-16 07:40
2	pccomponentes	Canon powershot sx6			Out of stock	★★★★☆	20-07-16 12:09
3	elcorteingles	Cámara digital canon	169.00	+0%	Out of stock	☆☆☆☆☆	26-07-16 10:13
4	carrefour	Canon sx610 - black	199.00	+18%	In stock	☆☆☆☆☆	26-07-16 12:01

Canon 111C012BA SX610 HS PowerShot Point and Shoot Digital Camera (20.2 MP, 18x Optical Zoom, 3 inch LCD) - Black

<http://uk.camelcamelcamel.com/product/B00RVC8550>


Pricetype	Lowest	Highest
Amazon	£99 (Oct 22, 2017)	£232.22 (Jan 30, 2015)
3rd party new	£85 (May 12, 2016)	£218.81 (Feb 3, 2015)
3rd party used	£59.99 (May 9, 2016)	£174.99 (Nov 4, 2016)

Date Range

1m 3m 6m 1y All

Price Type

- ☒ Amazon
☒ 3rd Party New
☒ 3rd Party Used

Chart Options

- ☒ Close-up View
☐ Remove Extreme Values

Amazon - Not in Stock

3rd Party New - £199.99

3rd Party Used - £135.74

3rd Party New Price History

Type	Price	When
Current	£199.99	Oct 17, 2017
Highest *	£218.81	Feb 03, 2015
Lowest *	£85.00	May 11, 2016
Average +	£176.30	-

Last 5 price changes

Date	Price
Oct 17, 2017 07:49 AM	£199.99
Oct 11, 2017 02:21 PM	£189.95
Oct 03, 2017 04:14 PM	£189.00
Oct 02, 2017 08:13 AM	£187.00



Cases

- *Eturas* (EU, 2016)
- *Posters* (US, UK, 2016)
- *Uber* (US, 2016)
- *Consumer electronics* (EU, 2017, ongoing)
- *LG* (Russia, 2018)
- *Lufthansa* (Germany, 2018, ongoing)

Algorithms in a vertical context

- E-Commerce Sector Inquiry Report: 53% track online prices of competitors, of which
 - 67% with software
 - 78% subsequently adjust prices
- At least 3 scenarios
 - Monitoring contributing to the effectiveness of RPM
 - Monitoring + pressure = turning recommended prices into RPM
 - Spreading RPM from RPM resellers to non-RPM resellers, because of price matching

Algorithms in a horizontal context

- Engaging in **explicit collusion**
 - Colluding on pricing parameters
 - Hub and spoke
 - Outsourcing pricing to common agent
 - Signalling (e.g. through coded messages)
 - Autonomous explicit collusion??
- Engaging in **tacit collusion**
 - Relevant to merger control
 - Offence under Article 101? Not currently

Algorithms: general principles

- Fact-specific, case-by-case analysis
- Apply existing principles but ready to adapt
- What's illegal offline likely to be illegal online
- Algorithm cannot shield firm from liability

References

Bibliographies

- On data: ssrn.com/paper=2845590
- On algos: ssrn.com/paper=2982397

Speeches

- Commissioner Vestager's January 2016 speech on data
- Commissioner Vestager's March 2017 speech on algos
- DG Laitenberger's Oct 2017 speech on data and algos

OECD events

- November 2016 meeting on competition and data
- June 2017 meeting on competition and algorithms

Thank you!

Questions?