



# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?

# About AI Ratio

**The Company**  
**The People**  
**The Technology**

AI Ratio, July 2017

**Artificial Intelligence**  
The great Vision

**Machine Learning**  
One approach to AI,  
a class of algorithms

**Deep Learning**  
A subset of ML algos



## Consulting



**Machine Learning Projects**  
Accelerated Delivery Tool  
for Machine Learning

## Big Bet



**Betting Predictor**  
Football  
1X2 Predictions

## Products



**Sales Recommender**  
**Churn Predictor**  
**Anomaly Detector**

## CyberSecurity



**Advisory Partner**  
CyberSecurity



**Jesper Holme**  
**CEO**

M.Sc.Eng. Mathematical Modeling  
PMI PMP®



**Bo Friis**  
**CTO**

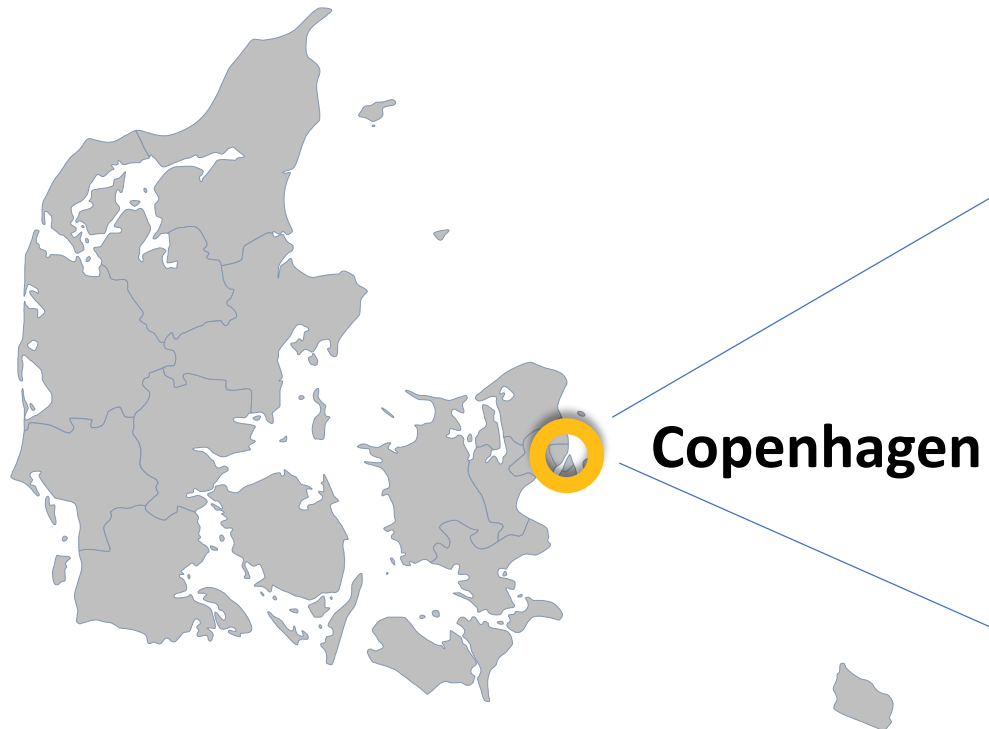
M.Sc.Eng. Signal Analysis  
M.Sc. Cryptography  
Machine Learning at Coursera | Stanford



# Location

In vibrant Startup Office Space SOHO

 **Denmark**



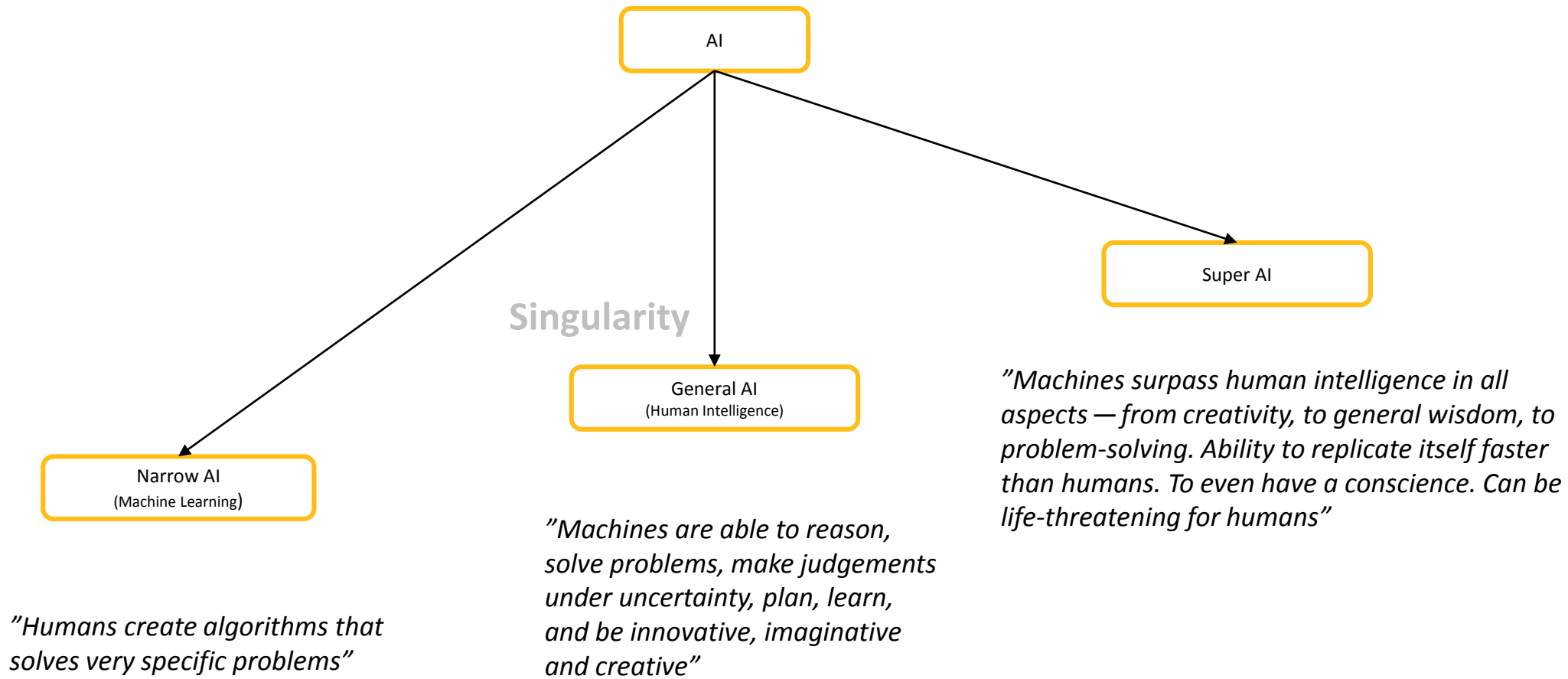
**CPH Meat Packing District**



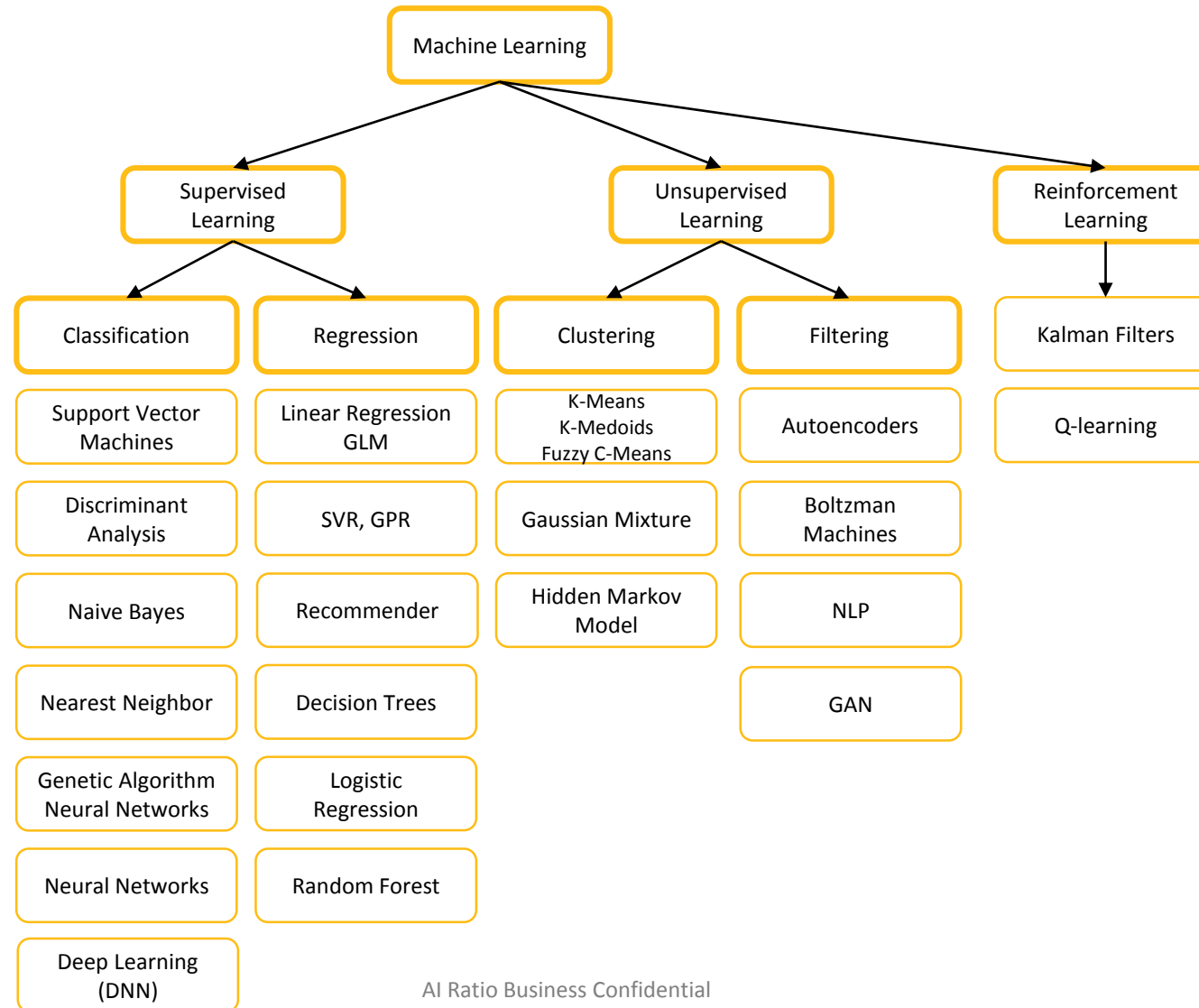
# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?

# What is AI?



# What is Machine Learning?

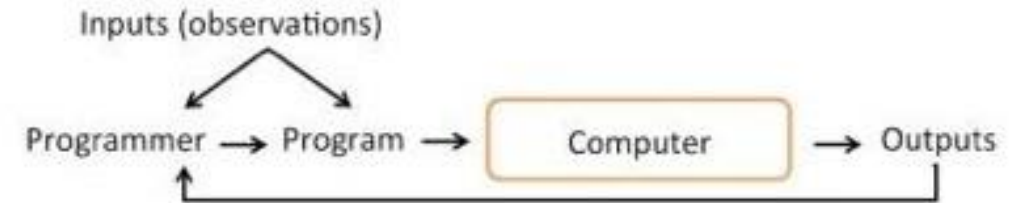


# What is AI and Machine Learning?

Stanford University defines Machine Learning as:

*“The science of getting computers to act without being explicitly programmed”*

## The Traditional Programming Paradigm



*Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed*  
 – Arthur Samuel (1959)

## Machine Learning





# What is Machine Learning good at?

**Clustering**

**Pattern Recognition**

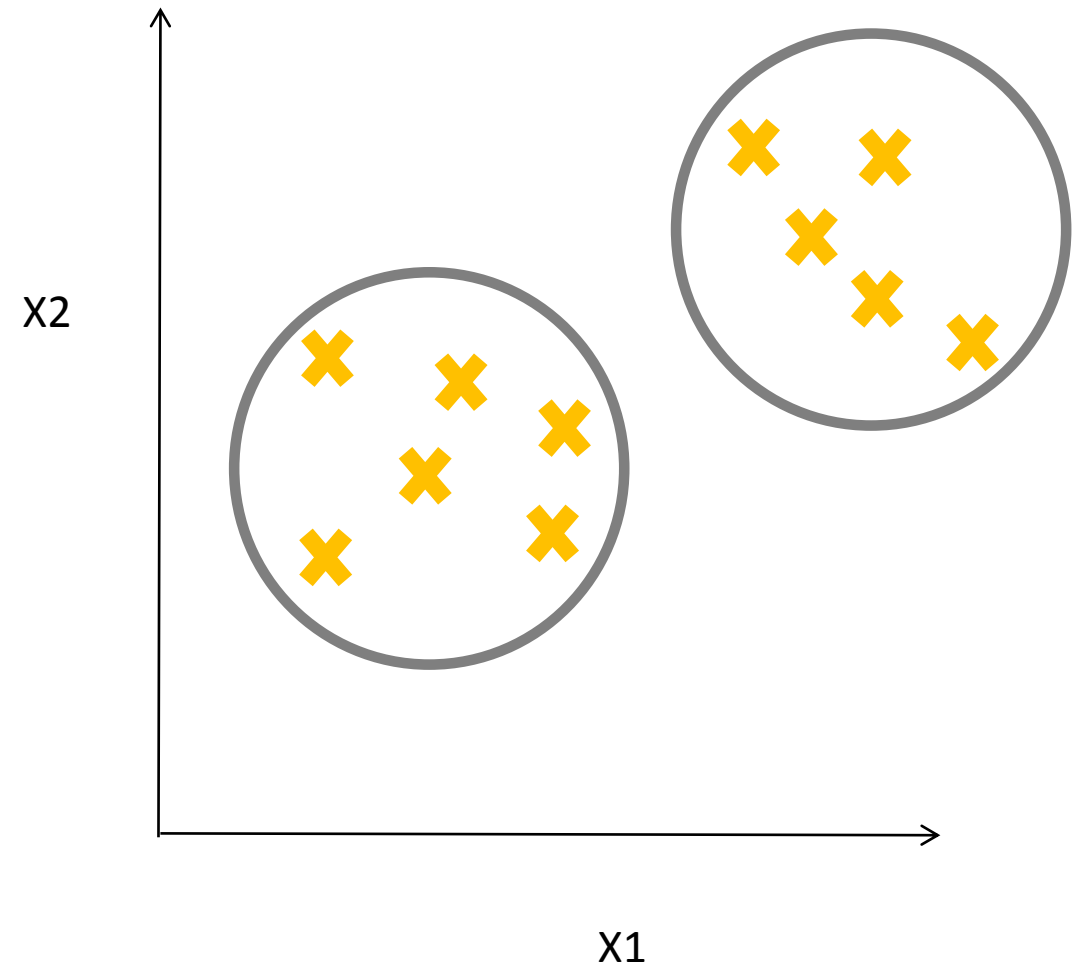
**Categorizing**

**Finding Needle-in-the-Haystack**

**Filtering**

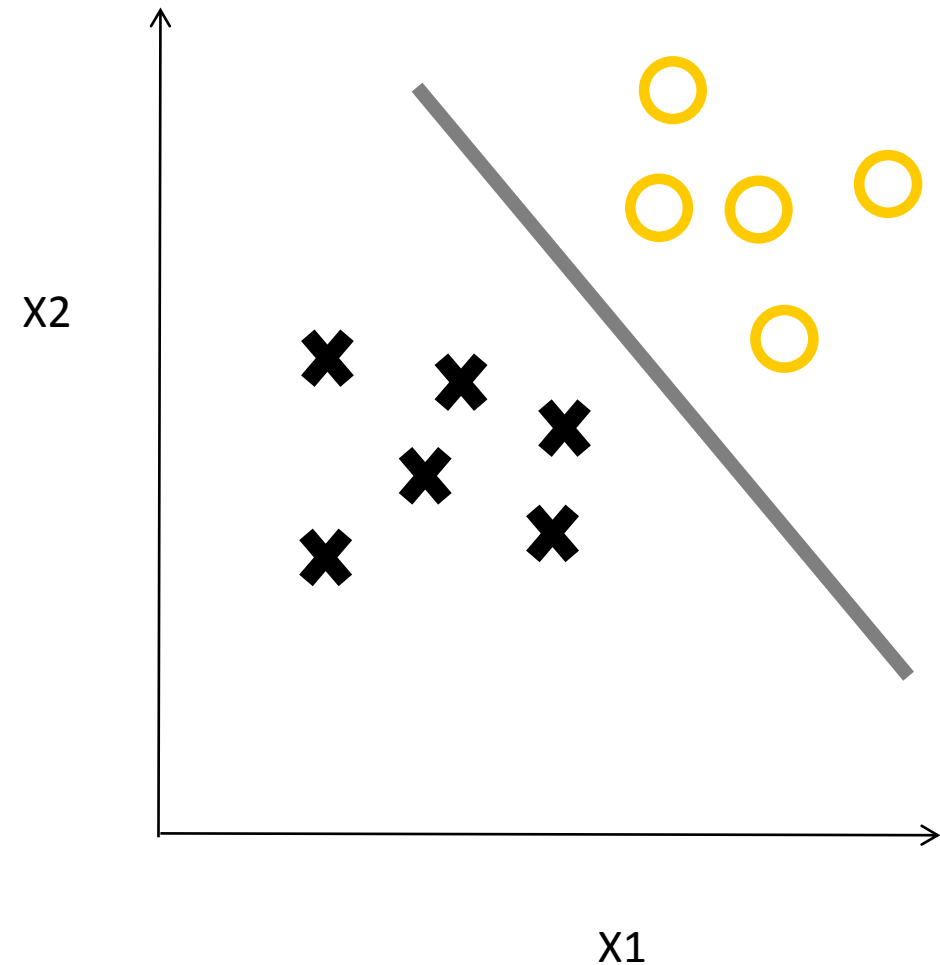
# Unsupervised learning

- Each example is "unlabeled"
- Finding patterns in unlabeled data
- Given a dataset, train the algorithm to identify some structure in the data
  - Could be identifying clusters
  - Could be a separation



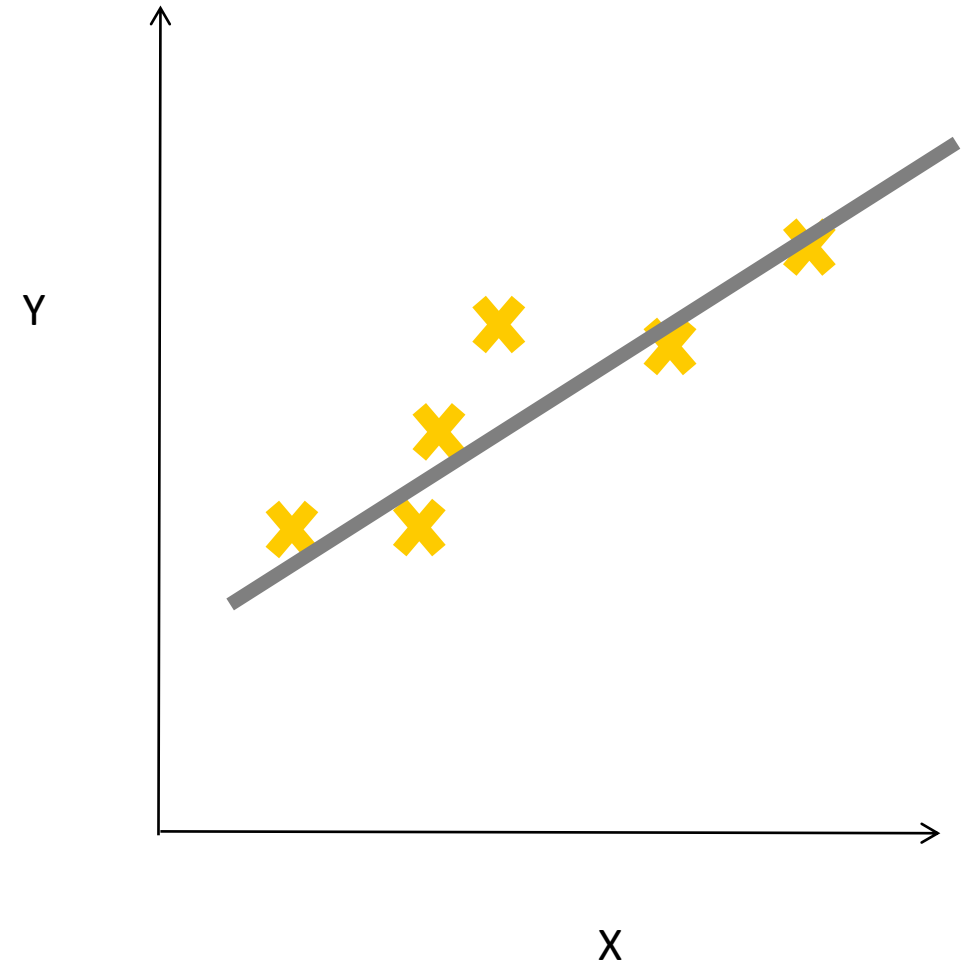
# Supervised learning - clustering

- Each sample is labeled, has a known value (ground truth)
  - Age=19, Height=182cm, Gender=Male
- Given a dataset, train the algorithm to fit the dataset as good as possible
  - minimizing the error between the prediction and the “ground truth”.



# Supervised learning - regression

- Linear regression, straight line through data points.
  - X can be multi dimensional
- Non-linear regression
  - Neural Network Regression



# Recommender Systems

A hand is shown pointing at a tablet screen. The background is dark, and the tablet is illuminated. Several yellow circles of varying sizes are overlaid on the image, containing text related to recommender systems. The largest circle is on the right, containing a definition. Four smaller circles are on the left, containing specific recommendation types. The overall aesthetic is clean and modern.

*“An information filtering system that seeks to predict rating or preference that a user would give an item”*

Top-3 items people like...

You might also like...

Other people also bought...

Relevant articles to present

Relevant Ad's to present

# Recommenders – Why do we need them?

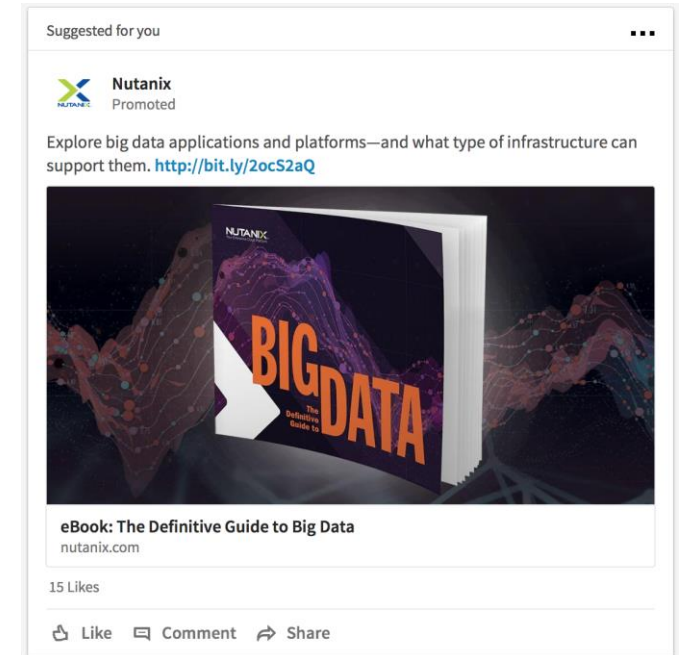
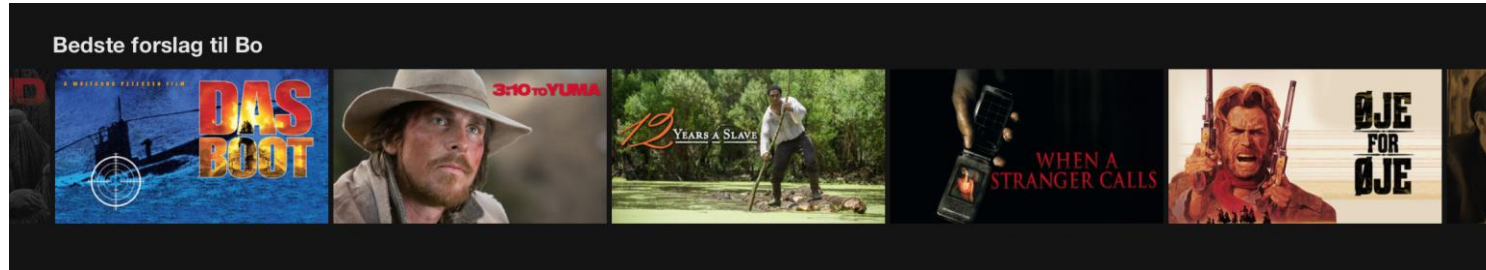
**Value for  
the  
customer**


- Find things that are interesting
- Narrow down set of choices
- Discover new things
- Higher level of relevance

**Value for  
the  
Provider**


- Unique personalized service for the customer
- Increase trust and loyalty
- Increase sales, click-through-rates
- Relevant ad's and promotions
- Obtain knowledge about customers

# Recommenders in Action – Examples





**OSSIC** Sponsoreret • 




Immerse yourself in the sounds of your favorite music, games, and VR with 3D audio.



**Save \$200 When You Pre-Order Today**  
Experience the future of audio with OSSIC X

INDIEGOGO.COM Læs mere

 32 5 kommentarer 

 Synes godt om  Kommenter  Del

Inspired by your shopping trends



# Recommender Systems – The Netflix Prize

- In 2006, Netflix created a competition
  - with a price of \$1 mill. to a Recommender System that *“performed 10% better than the existing Netflix proprietary algorithm”*
- Netflix algo based on a classic linear approach with a lot of tweaks
- 20.000 teams from 150 countries
- 3 years later, in 2009, a team reached to 10% improvement and won the Grand prize.





# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?

# You consume a lot of AI every day...



# Why?

**Ability to generate completely new insights**

**A way to digest Big Data**

**Can provide huge business benefits**

**Can outperform humans x100**

**Cost-effective in operations**

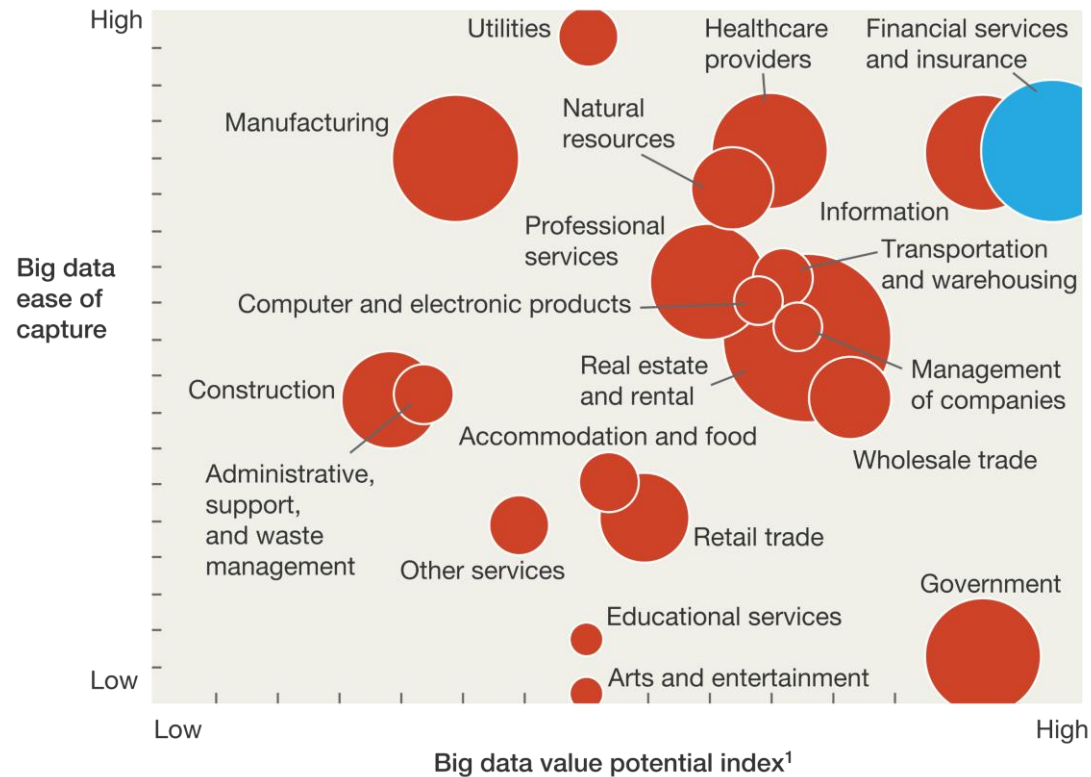
**Relevant cross-industry**

# AI potentials by industry

By McKinsey&Company

Big data and advanced analytics will affect virtually every part of the economy, especially financial services.

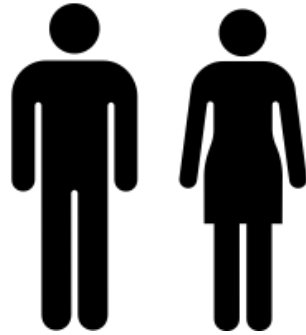
● Bubble sizes denote relative sizes of GDP



<sup>1</sup>Determined by industry average of transaction intensity, amount of data per firm, variability in performance, customer and supplier intensity, and turbulence.

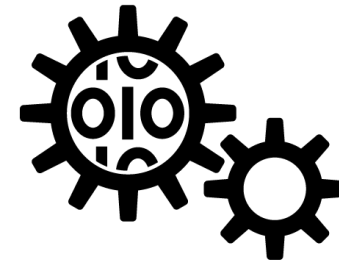
# Humans vs Machines

## Humans



- Emotions
- Irrationality
- Intuition
- Tradition
- Models
- 2D, 3D, maybe 4D
- 09:00-16:00
- Vacations/Leave/Sickness/Terminations

## Machines



- Facts
- Rational
- Computing power
- Logic
- Patterns
- 50-100D
- 24/7
- Always-on

# Two main ways to utilize AI

## Decision Support

- Machine Learning as your co-pilot
- Predictions as recommendations

**Mature**

## Automated Decisions

- Integrated 100% in automated business flows
- Super-fast decision cycle
- Monitored

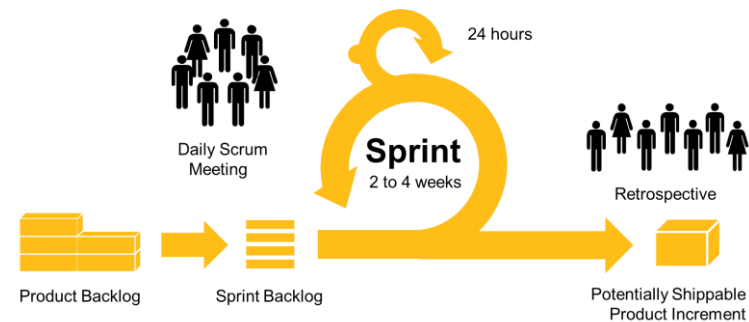
**Trusted**

# The key to **applied** Machine Learning



**Andrew Ng** ✓  
 @AndrewYNg  
 Co-Founder of Coursera; Stanford CS adjunct faculty. Former head of Baidu AI Group/Google Brain. #ai #machinelearning, #deeplearning #MOOCs  
 Palo Alto, CA  
[andrewng.org](http://andrewng.org)

**Andrew Ng** of Stanford University teaches you to **iterate** your way forward to find the good model



## Core of AI Ratio

Summary of iteration in real-world machine learning

- Human Level: Repeatedly practice to improve your skills.
- Meta Level: Continue to improve your data and features.
- Macro Level: Explore different model families and ensembles.
- Micro Level: Cross-validation to tune model hyperparameters.
- Model Level: Gradient descent to fit model parameters.

# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?



# Cases

# Case Overview



*Football Betting Predictor*



*Recommender "Next book to read"*



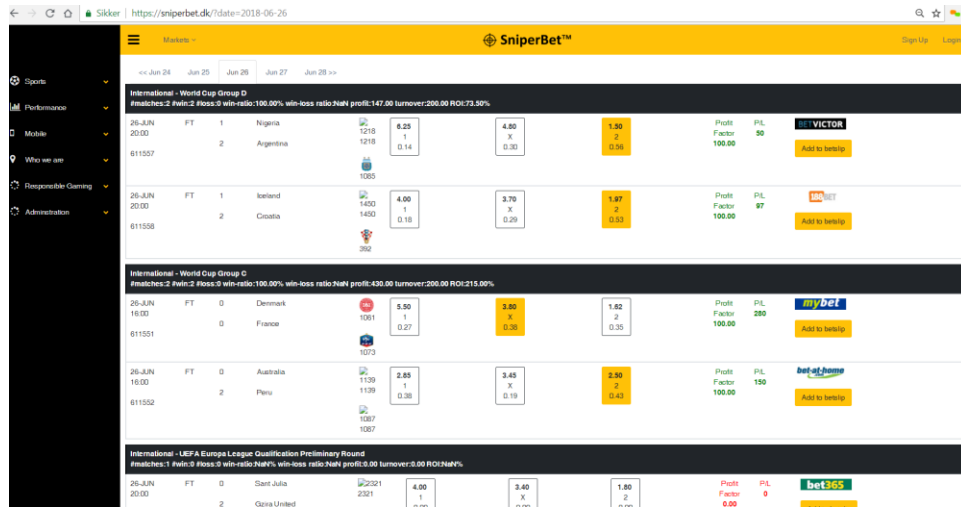
*AI for CyberSecurity*

# Case 1



# SniperBet Channels

## Web



International - World Cup Group D  
Matches: 2 Wins: 2 Loss: 0 Win-ratio: 100.00% win-loss ratio Net profit: 147.00 turnover: 200.00 ROI: 73.50%

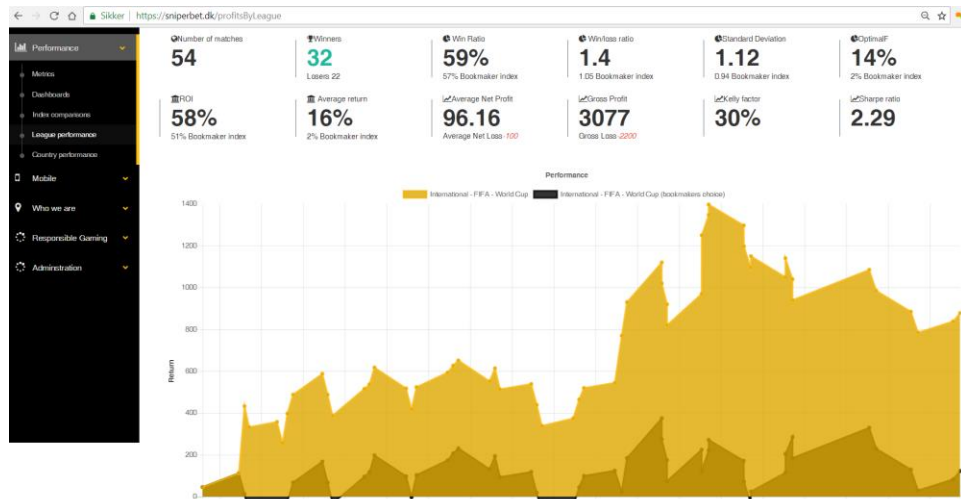
26-JUN 20:00	FT	1	Nigeria	1215	1	4.25	4.80	1.30	Profit Factor 50	PL 100.00	VICTOR
611557		2	Argentina	1215	0.14	0.30	0.30	10.35			Add to bet slip

International - World Cup Group D  
Matches: 2 Wins: 2 Loss: 0 Win-ratio: 100.00% win-loss ratio Net profit: 430.00 turnover: 200.00 ROI: 215.00%

26-JUN 20:00	FT	0	Denmark	1051	1	5.50	3.90	1.82	Profit Factor 280	PL 100.00	mybet
611551		0	France	1051	0.27	0.38	0.35	0.35			Add to bet slip

International - UEFA Europa League Qualification Preliminary Round  
Matches: 1 Wins: 0 Loss: 0 Win-ratio: 0% win-loss ratio Net profit: 0.00 turnover: 0.00 ROI: 0%

26-JUN 20:00	FT	0	Slavia Praha	2201	1	4.00	3.40	1.80	Profit Factor 0	PL 0.00	bet365
611552		2	Qia United	2201	0.00	0.00	0.00	0.00			Add to bet slip



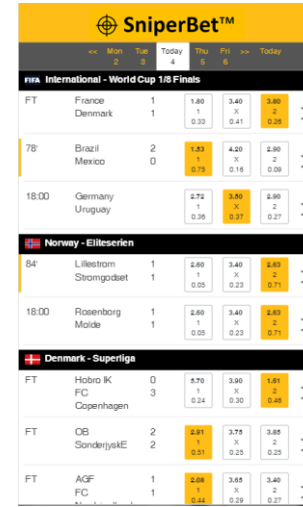
Number of matches: 54  
Wins: 32  
Win Ratio: 59%  
Win-loss ratio: 1.4  
Standard Deviation: 1.12  
OptimalF: 14%

ROI: 58%  
Average return: 16%  
Average Net Profit: 96.16  
Gross Profit: 3077  
Sharpe ratio: 30%

2.29

Performance  
International - FIFA - World Cup  
International - FIFA - World Cup (bookmakers choice)

## Mobile Web



International - World Cup 1/8 Finals

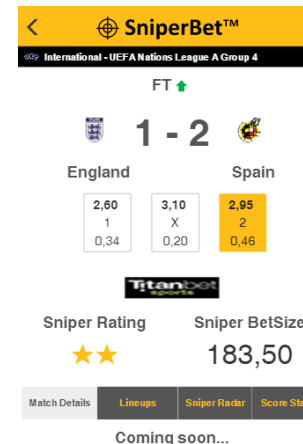
FT	France	Denmark	1	1.90	3.40	3.80	0.33	0.41	0.28
78'	Brazil	Mexico	2	1.93	4.20	2.80	0.72	0.18	0.09
18:00	Germany	Uruguay		2.72	3.90	2.80	0.35	0.27	0.27

Norway - Eliteserien

84'	Lillestrom	Strømsgodset	1	2.80	3.40	2.80	0.65	0.23	0.23
18:00	Rosenborg	Molde	1	2.60	3.40	2.80	0.65	0.23	0.23

Denmark - Superliga

FT	Hobro K	FC Copenhagen	0	3.70	3.00	1.60	0.24	0.30	0.48
FT	OB	SonderjyskE	2	2.91	3.70	3.80	0.91	0.23	0.23
FT	AGF	FC	1	2.68	3.68	3.40	0.24	0.29	0.27



International - UEFA Nations League A Group 4

FT ↑

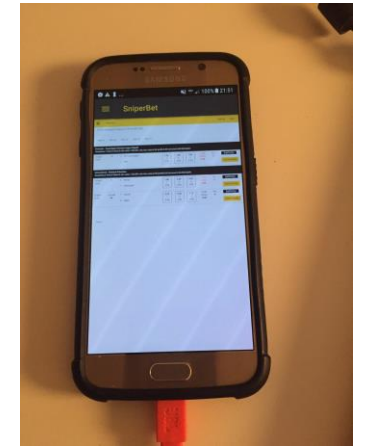
England 1 - 2 Spain

2,60	3,10	2,95
1	X	2
0,34	0,20	0,46

Sniper Rating: ★★  
Sniper BetSize: 183,50

Coming soon...

## Apps





# FIFA World Cup 2018 Russia



← → ↻ 🏠 Sikker | https://sniperbet.dk/?date=2018-06-26

🔍 ☆ 🌐

☰ Markets ▾

🎯 SniperBet™

Sign Up Login ▾

<< Jun 24 Jun 25 Jun 26 Jun 27 Jun 28 >>

**International - World Cup Group D**  
 #matches:2 #win:2 #loss:0 win-ratio:100.00% win-loss ratio:NaN profit:147.00 turnover:200.00 ROI:73.50%

26-JUN 20:00	FT	1	Nigeria		1218	6.25		4.80		1.50		Profit Factor 100.00	P/L 50	BETVICTOR	Add to betslip	➔
		2	Argentina		1218	1		X 0.30		2						
611557					1085	0.14				0.56						
26-JUN 20:00	FT	1	Iceland		1450	4.00		3.70		1.97		Profit Factor 100.00	P/L 97	188BET	Add to betslip	➔
		2	Croatia		1450	1		X 0.29		2						
611558					392	0.18				0.53						

**International - World Cup Group C**  
 #matches:2 #win:2 #loss:0 win-ratio:100.00% win-loss ratio:NaN profit:430.00 turnover:200.00 ROI:215.00%

26-JUN 16:00	FT	0	Denmark		1061	5.50		3.80		1.62		Profit Factor 100.00	P/L 280	mybet	Add to betslip	➔
		0	France		1073	1		X 0.38		2						
611551					1073	0.27				0.35						
26-JUN 16:00	FT	0	Australia		1139	2.85		3.45		2.50		Profit Factor 100.00	P/L 150	bet-at-home	Add to betslip	➔
		2	Peru		1139	1		X 0.19		2						
611552					1087	0.38				0.43						
					1087											

**International - UEFA Europa League Qualification Preliminary Round**  
 #matches:1 #win:0 #loss:0 win-ratio:NaN% win-loss ratio:NaN profit:0.00 turnover:0.00 ROI:NaN%

26-JUN 20:00	FT	0	Sant Julia		2321	4.00		3.40		1.80		Profit Factor 0.00	P/L 0	bet365	Add to betslip	➔
		2	Gzira United		2321	1		X 0.00		2						
						0.00				0.00						

- 🏆 Sports ▾
- 📊 Performance ▾
- 📱 Mobile ▾
- 📍 Who we are ▾
- 🎮 Responsible Gaming ▾
- ⚙️ Administration ▾

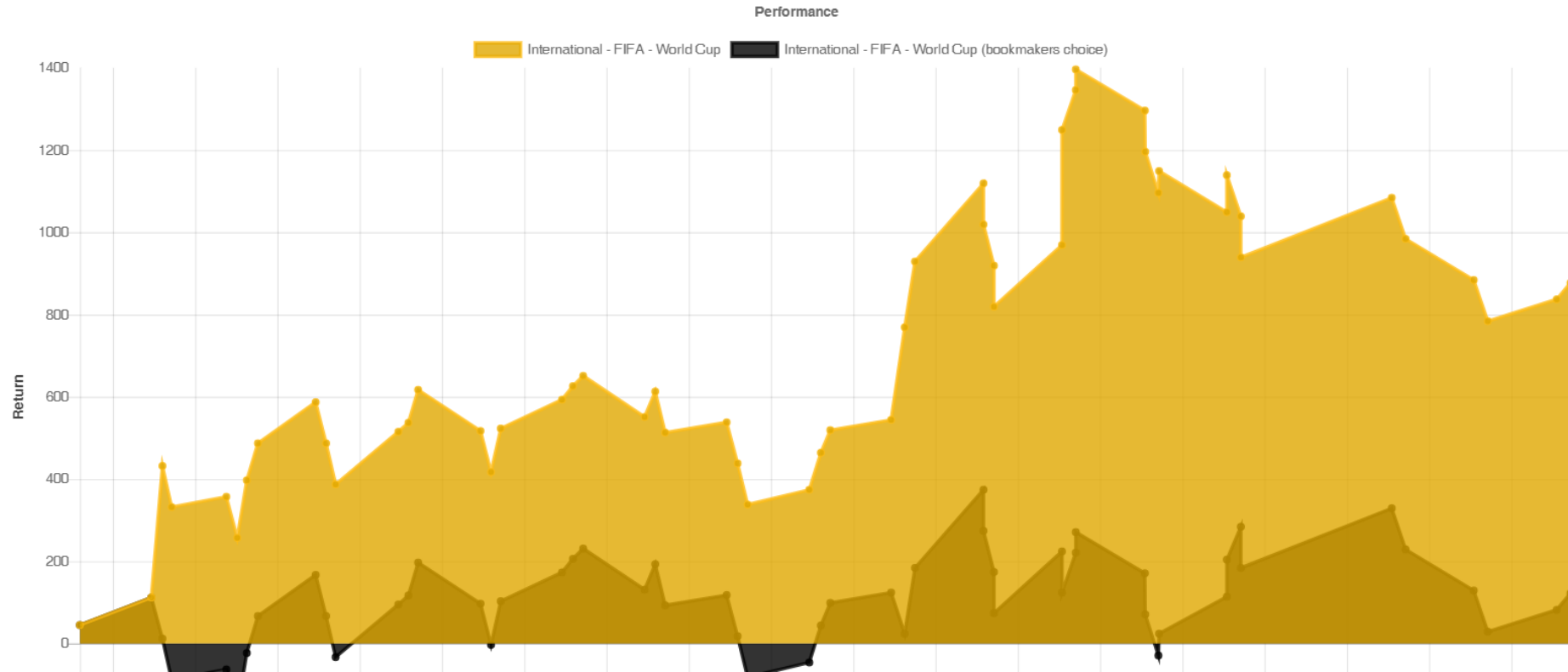


# FIFA World Cup 2018 Russia

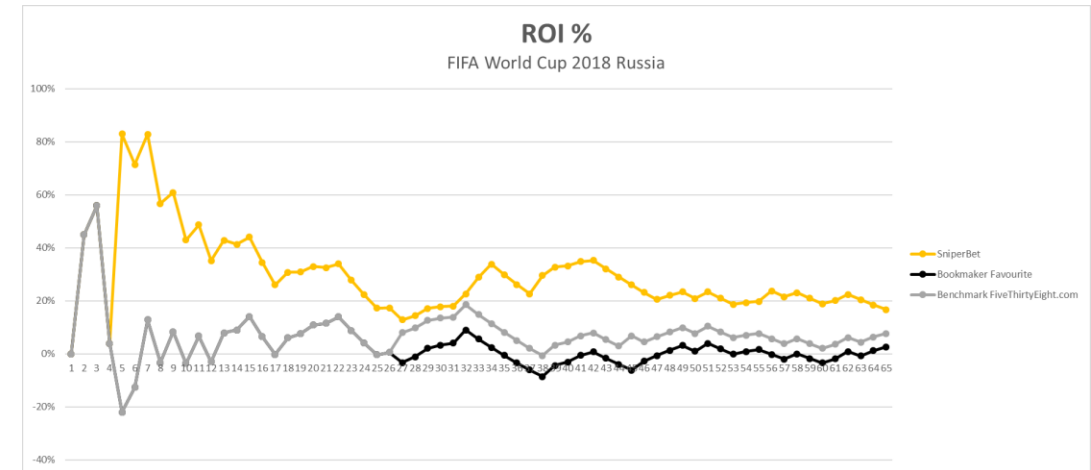
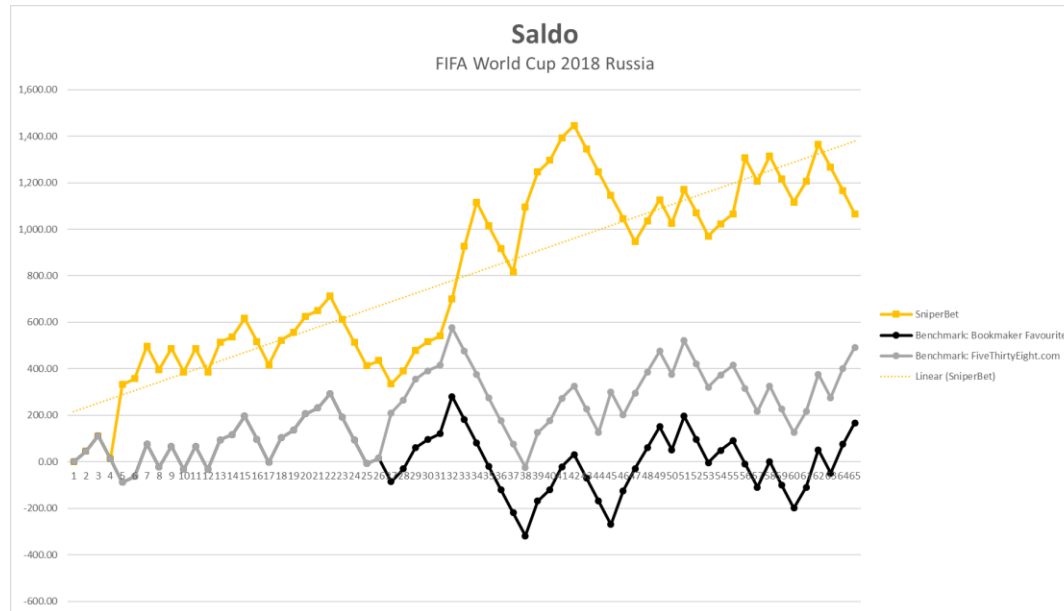
← → ↻ 🏠 Sikker | <https://sniperbet.dk/profitsByLeague> 🔍 ☆ 🇩🇰

- 📊 Performance ▾
- Metrics
- Dashboards
- Index comparisons
- League performance
- Country performance
- 📱 Mobile ▾
- 📍 Who we are ▾
- ⚙️ Responsible Gaming ▾
- ⚙️ Administration ▾

📊 Number of matches <b>54</b>	🏆 Winners <b>32</b> Losers 22	📈 Win Ratio <b>59%</b> 57% Bookmaker index	📊 Win/loss ratio <b>1.4</b> 1.05 Bookmaker index	📊 Standard Deviation <b>1.12</b> 0.94 Bookmaker index	📊 OptimalF <b>14%</b> 2% Bookmaker index
📊 ROI <b>58%</b> 51% Bookmaker index	📊 Average return <b>16%</b> 2% Bookmaker index	📊 Average Net Profit <b>96.16</b> Average Net Loss -100	📊 Gross Profit <b>3077</b> Gross Loss -2200	📊 Kelly factor <b>30%</b>	📊 Sharpe ratio <b>2.29</b>



# World Cup Status





# Case 2



**No rules**

**No signatures**

**No assumptions**





# DARKTRACE

## The Enterprise Immune System

P 653

7657

$$10^3x^2 + 75^3x - 125$$

$$y=2+5(x-1)$$

$$y=4^3x^2 - 4x$$

6. 9.775.782.544.094.770.444  
7. 8.946.797.208.894.762.261  
8. 9.005.844.981.372.846.259  
9. 991.846.718.518.832.742  
0. 154.836.382.511.822.287  
1. 7.736.828.341.448.812.739  
2. 7.880.803.378.879.806.497  
3. 8.881.891.728.551.897.167  
4. 8.475.888.947.743.878.867



35

24

35





# DEMO

# Case Maneno





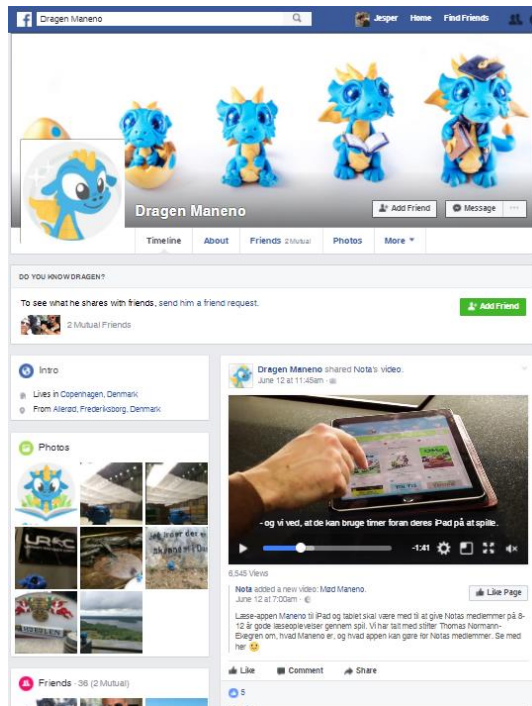
# What is Maneno?

*“Maneno is a new and different Reading App, designed to help children to grow into strong readers - using gamefication and other digital techniques”*

## Maneno had a challenge:

To suggest relevant Books for the child to read next in order to

- 1) Read more
- 2) Potentially upgrade to the premium product



# Case Maneno



## Customer-to-Item


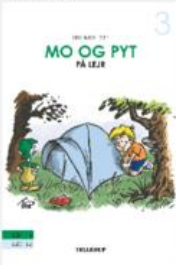



User-id: My ratings Book-id

User ID: 599

Number of Rated books: 46.0

Average rating: 0.5869565

Readers who is like me, also likes

1	2	3	4	5
Title: Rune og Rummet #2: Mars	Mo og Pyt # 3: Mo og Pyt på fælts lejr	Esme og Igor #3: Sjældne venner	Åå Batman: Dobbelt ballade	Ninja Niller #5: Den Sorte Ninja
Book ID: 397.0	496.0	196.0	472.0	618.0
Rating: 1.4390328	1.2874374	1.2267147	1.221497	1.2034369
				


## Item-to-Item

User-id: My ratings Book-id



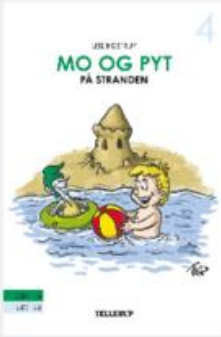
Book ID: 397

Title: Rune og Rummet #2: Mars

Rating: 0.43776825



Other users also read: 96 561 483 52 682 622 60 479 45 482 509 37 72 50 80 41 563 44 67 578 582 61 526 18 617 488 457 70 78 485 26 49 68 73 452 59 611 53 57 486 58 47 64 618 554 473 13 27 38 369 43 40 615 621

Title: Rasmus #1: Verdens bedste fodboldspiller?	Rasmus #2: Åå Verdens bedste svøfå_mmer?	Mo og Pyt #4: Mo og Pyt på fælts stranden
Book ID: 381	382	51
Rating: 0.8221258	0.85286105	0.7342282
		

# Case Maneno – Behind the scenes

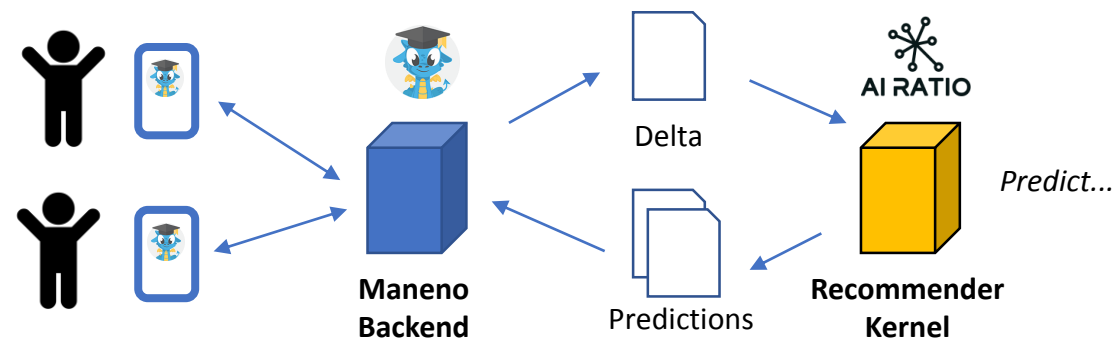
File exchange every night (GB's)

## Customer-to-Item

```
{ "topRated": [198, 333, 289, 165, 167],
  "users": [
    { "userid": 39, "recommended": [26, 60, 569, 460, 612] },
    { "userid": 63, "recommended": [26, 452, 578, 607, 497] },
    { "userid": 88, "recommended": [636, 616, 460, 486, 619] },
    { "userid": 121, "recommended": [612, 62, 485, 460, 562] },
    { "userid": 234, "recommended": [198, 333, 290, 418, 289] },
    { "userid": 240, "recommended": [64, 563, 78, 333, 37] },
    ...
    ...
    ...
    { "userid": 216718, "recommended": [198, 333, 418, 452, 290] },
    { "userid": 216720, "recommended": [198, 333, 289, 269, 685] },
    { "userid": 216722, "recommended": [198, 333, 290, 289, 685] }
  ]
}
```

## Item-to-Item

```
50 ==> 49 #SUP: 178 #CONF: 0.5426829268292683
327 ==> 68 #SUP: 282 #CONF: 0.5251396648044693
42 ==> 64 #SUP: 309 #CONF: 0.5764925373134329
616 ==> 68 #SUP: 376 #CONF: 0.6911764705882353
770 ==> 68 #SUP: 467 #CONF: 0.5455607476635514
70 ==> 71 #SUP: 470 #CONF: 0.5490654205607477
615 ==> 68 #SUP: 412 #CONF: 0.7115716753022453
68 771 ==> 41 #SUP: 439 #CONF: 0.5158636897767332
...
...
...
241 71 ==> 68 #SUP: 439 #CONF: 0.6289398280802292
241 68 ==> 71 #SUP: 439 #CONF: 0.606353591160221
617 ==> 68 #SUP: 386 #CONF: 0.7161410018552876
```





# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?

# AI Killer Bots



Wide Field Cameras

Face Recognition

Tactical Sensors





# Agenda

1. Intro
2. Hvad er AI og Machine Learning?
3. Hvorfor er AI relevant for Digital Business?
4. Case: Betting
5. Case: AI CyberSecurity
6. Case: Maneno
7. Weaponizing AI
8. Er jeg klar til Machine Learning?

# Is your data AI ready?



# Q&A