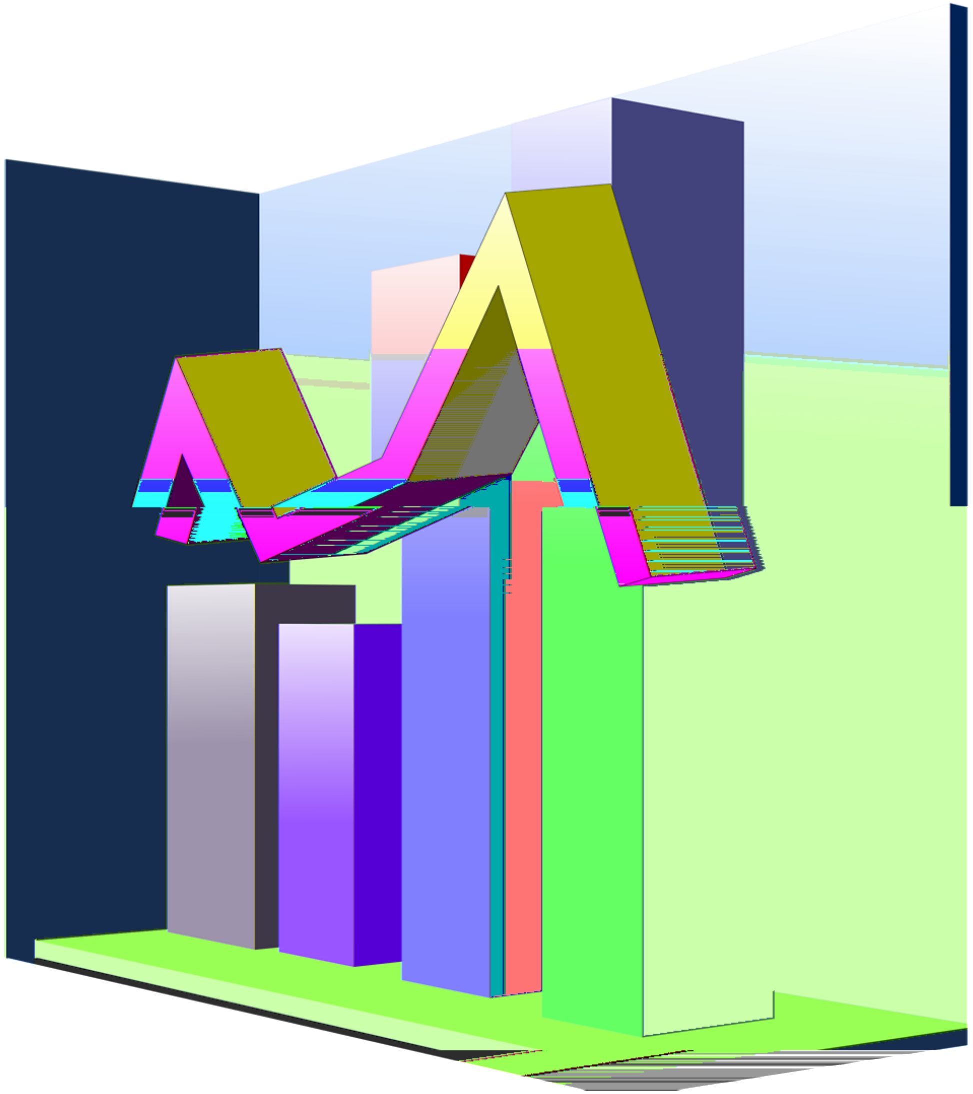
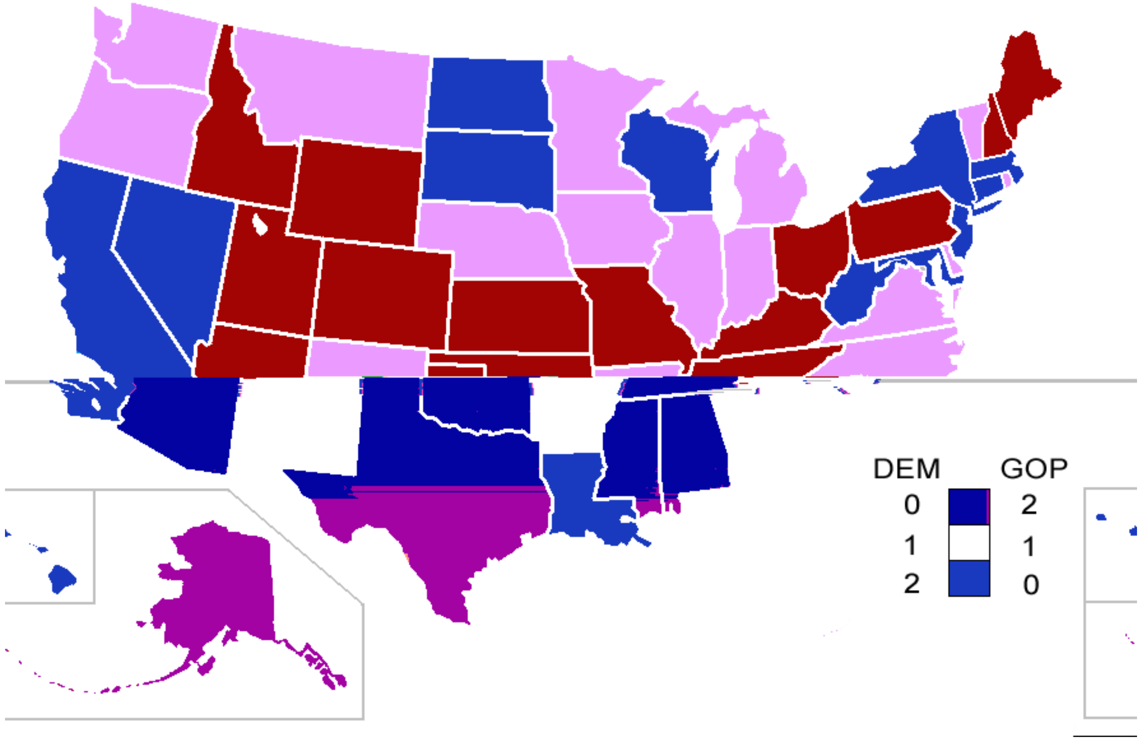
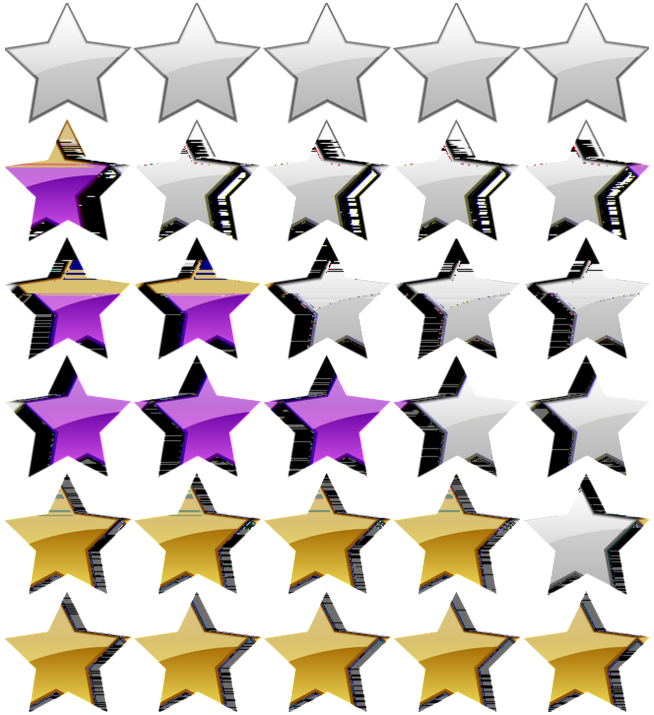
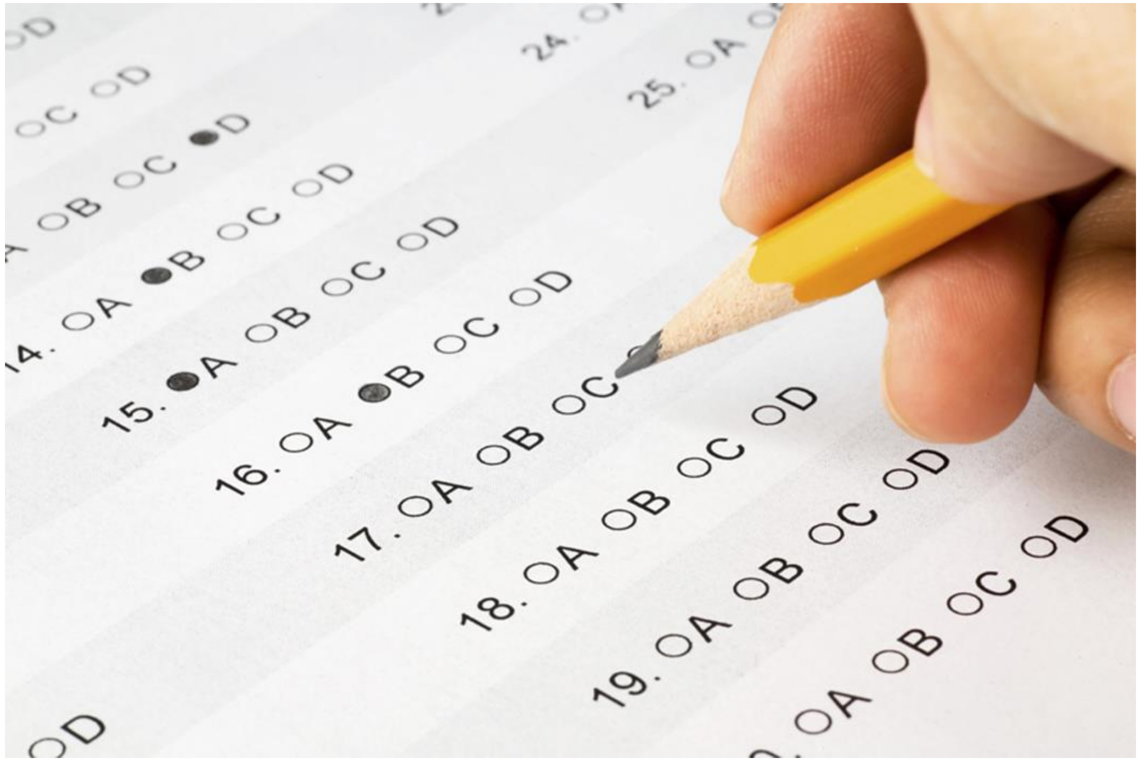

python



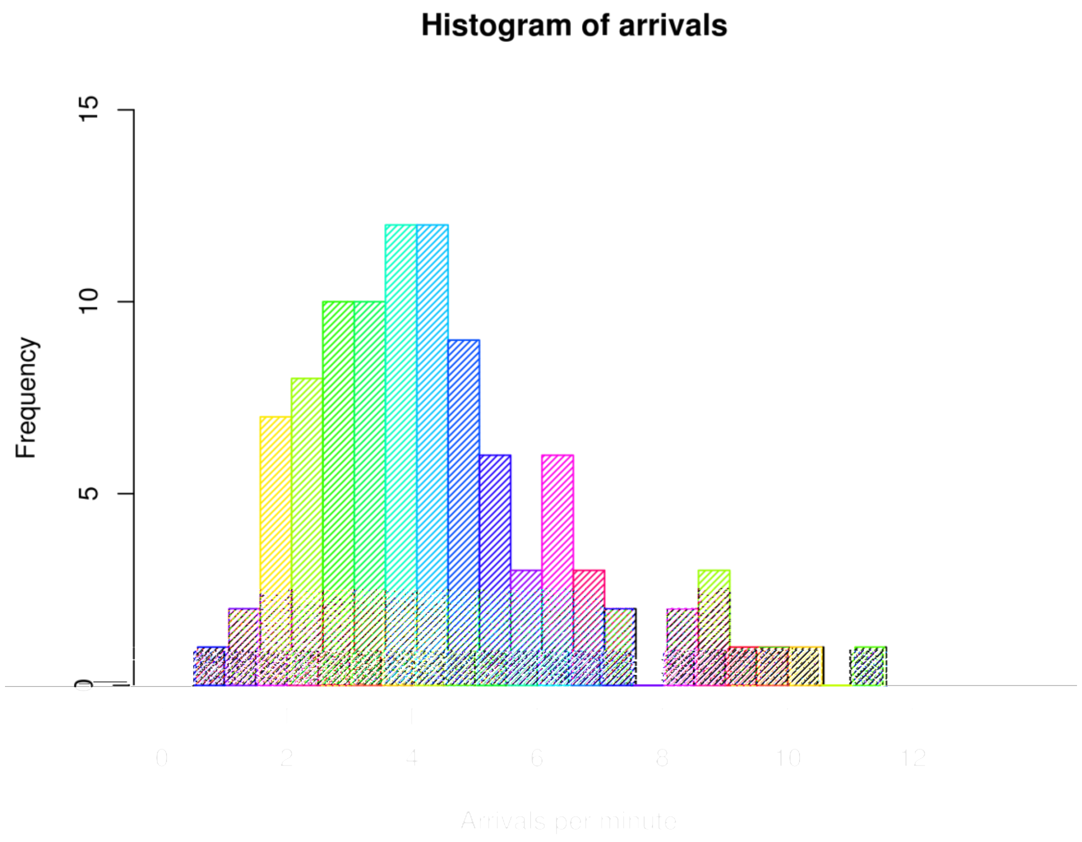

DEM
GOP
0
2
1
1
2
0




14. ○A ●B ○C ○D
15. ●A ○B ○C ○D
16. ○A ●B ○C ○D
17. ○A ○B ○C
18. ○A ○B ○C ○D
19. ○A ○B ○C ○D
24.
25. ○A

1.11

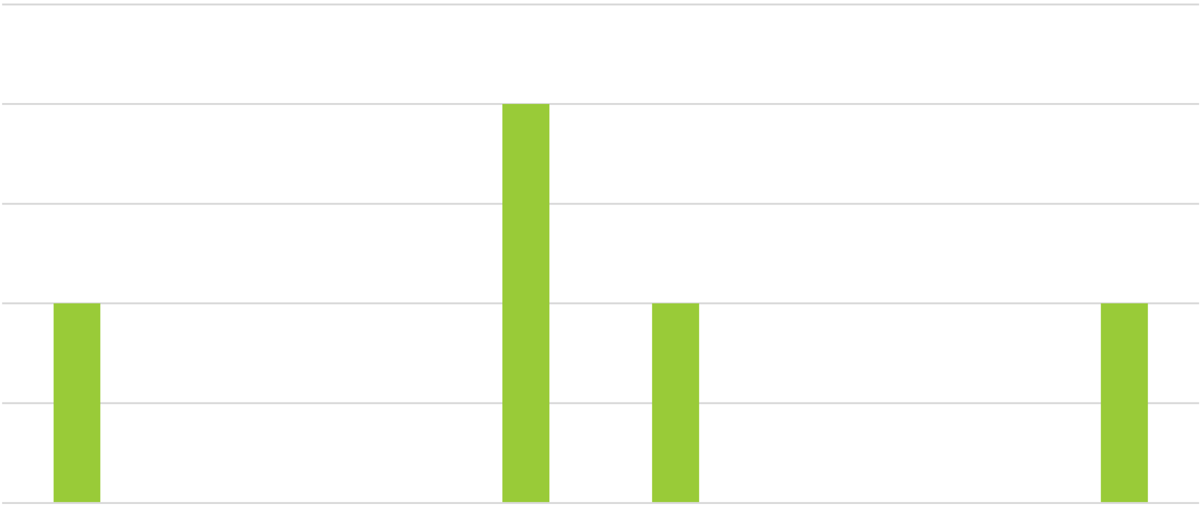

LUNA


Histogram of arrivals
Frequency
0
5
10
15
0
2
4
6
8
10
12
Arrivals per minute

- 4 **average of the squared differences from the mean**
-
    -
    -
    -
    -
        - 4

4

$\sqrt{\quad 2}$ 4 4



e *e* *fh*

e *e* *e* *fh* *e* *e*

e

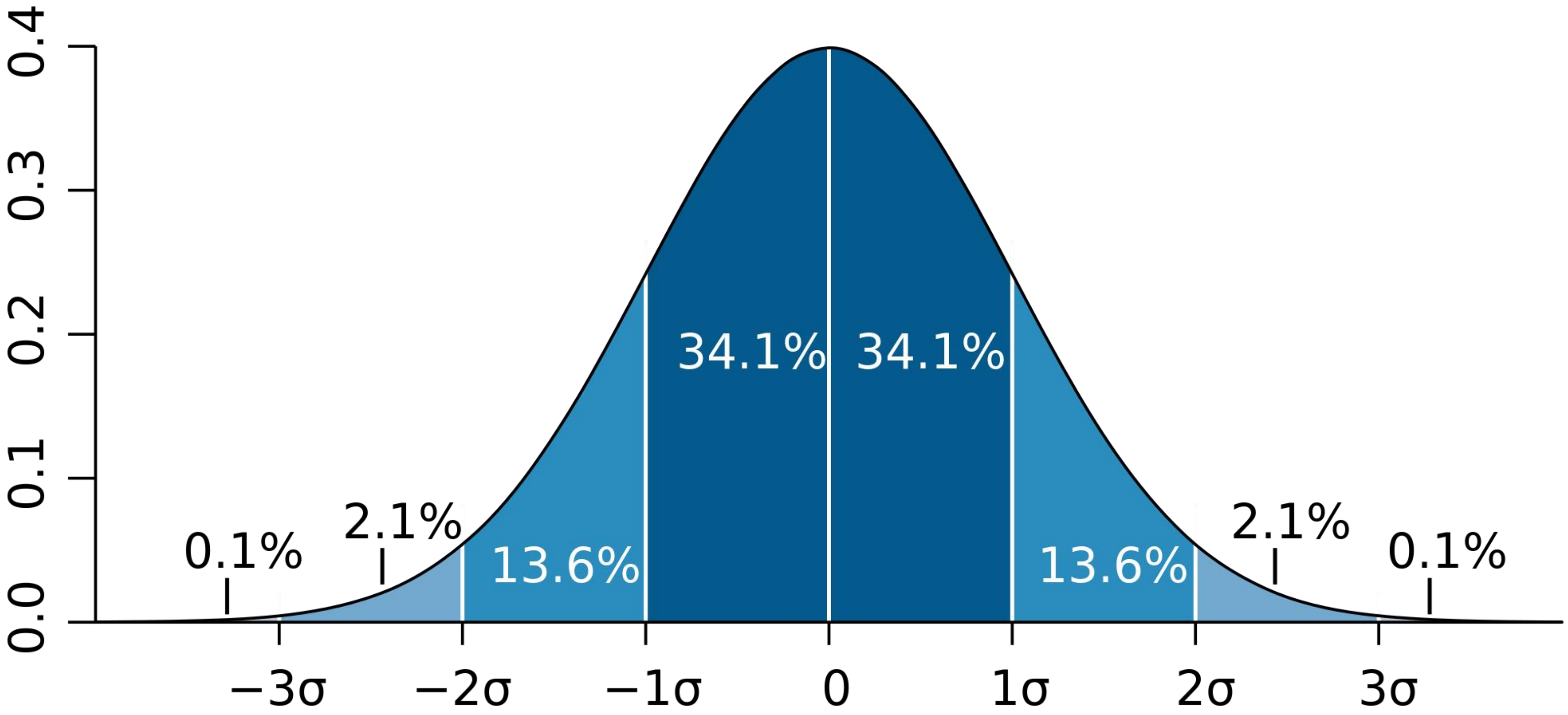
fh

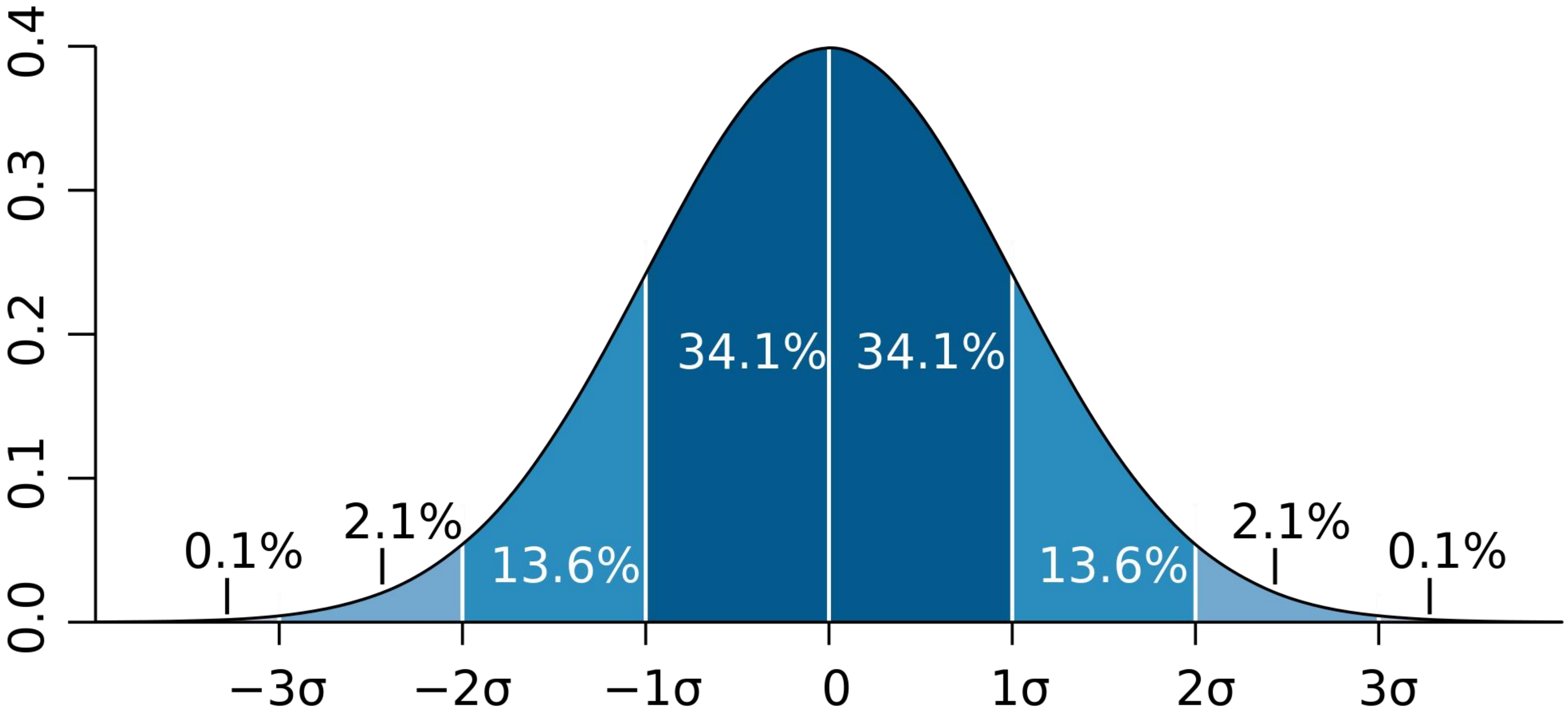
4

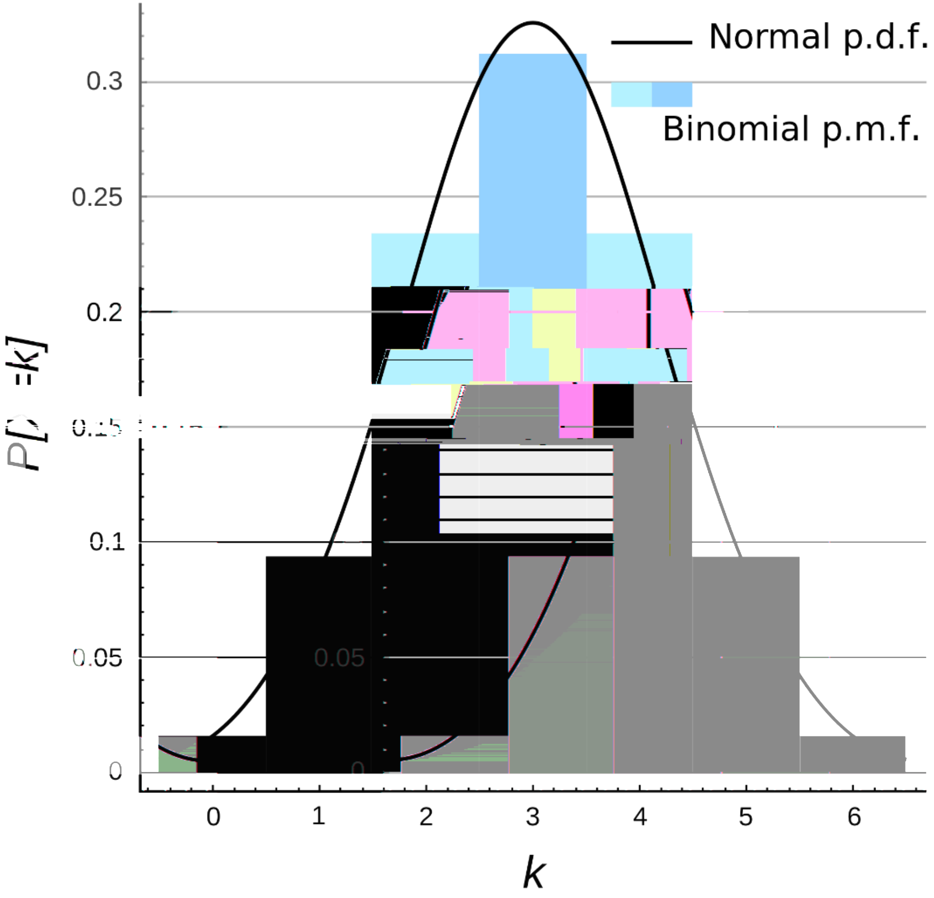
4

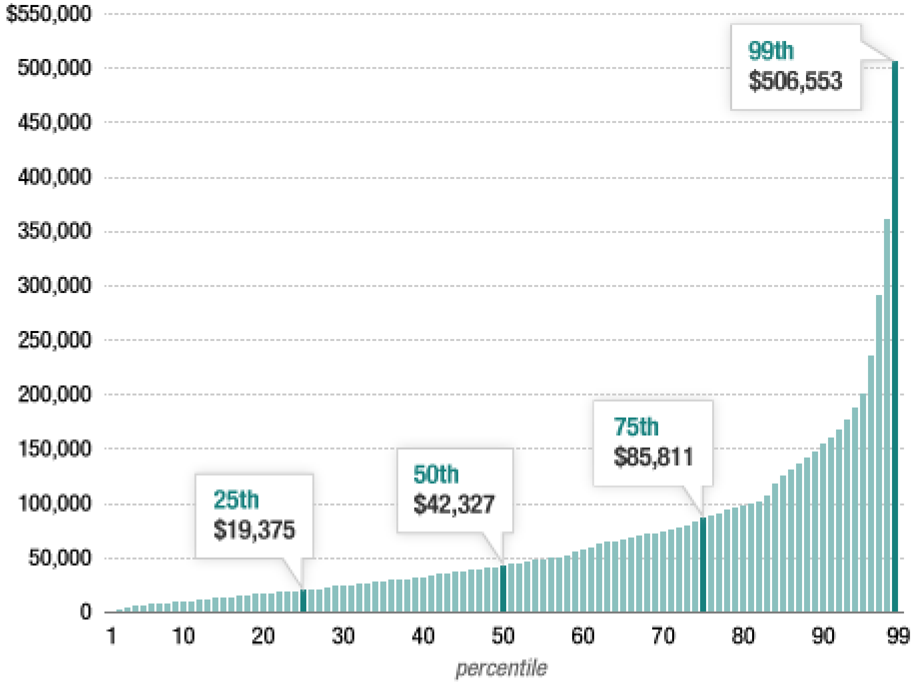
- $4 \qquad \frac{(\qquad)^4}{P}$

- $u^4 \qquad \frac{\qquad^4}{P \quad 3}$

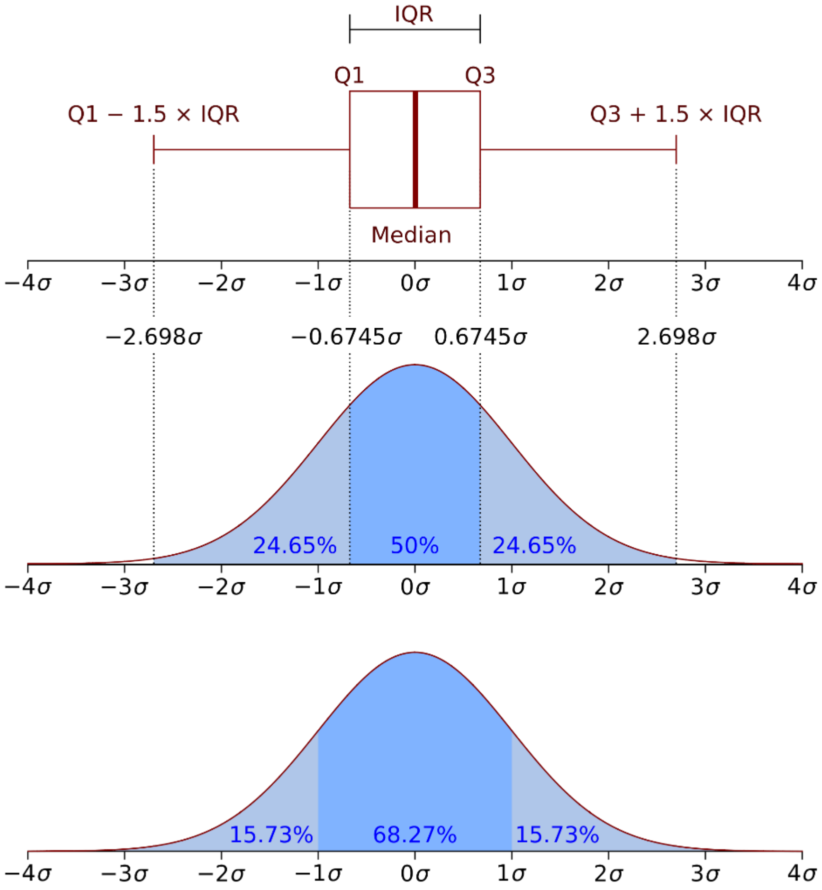

0.4
0.3
0.2
0.1
0.0
34.1%
34.1%
13.6%
13.6%
2.1%
2.1%
0.1%
0.1%
−3σ
−2σ
−1σ
0
1σ
2σ
3σ


0.4
0.3
0.2
0.1
0.0
0.1%
2.1%
13.6%
34.1%
34.1%
13.6%
2.1%
0.1%
−3σ
−2σ
−1σ
0
1σ
2σ
3σ

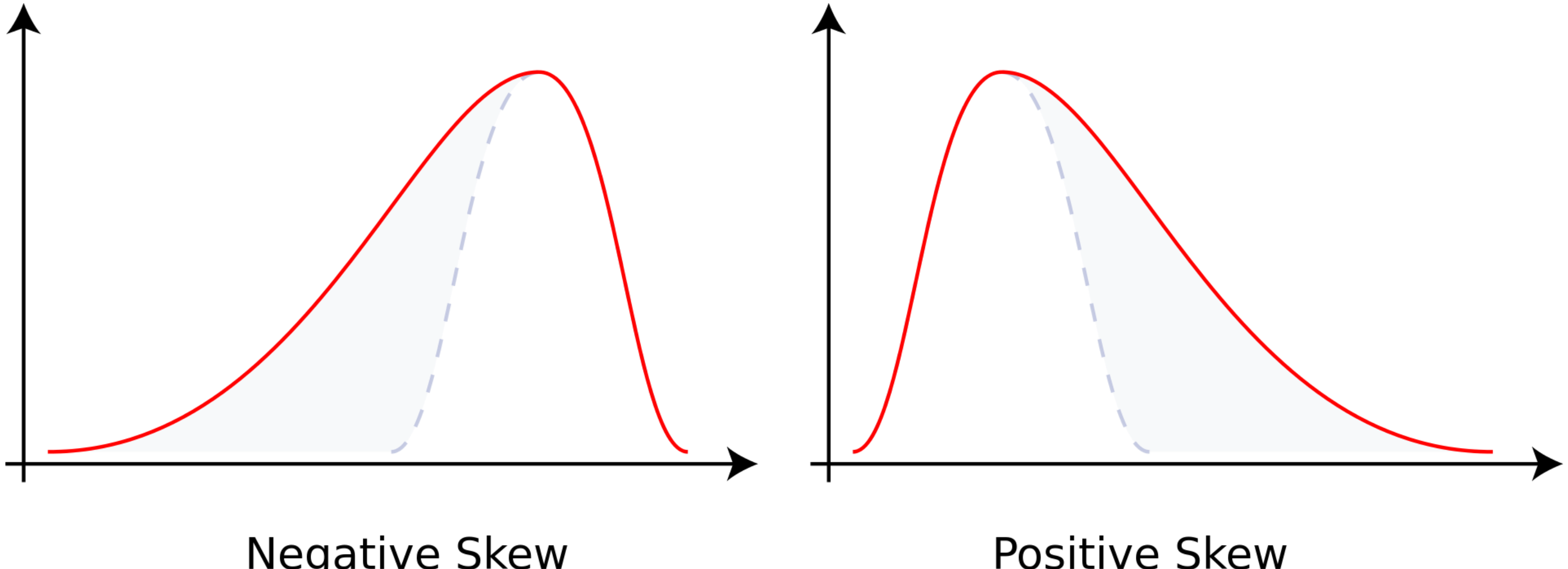

Normal p.d.f.
Binomial p.m.f.
0.3
0.25
0.2
0.15
0.1
0.05
0
P[X=k]
0
1
2
3
4
5
6
k

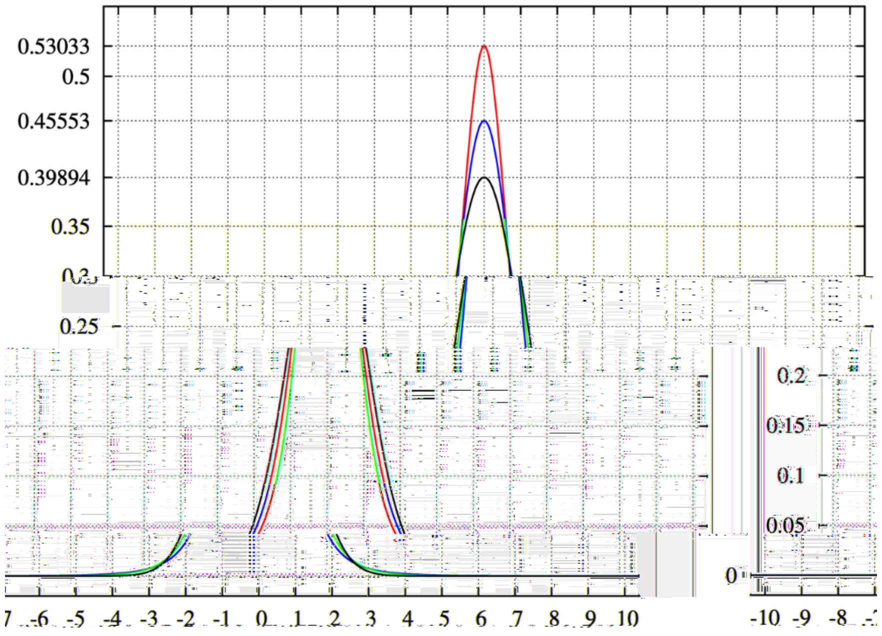


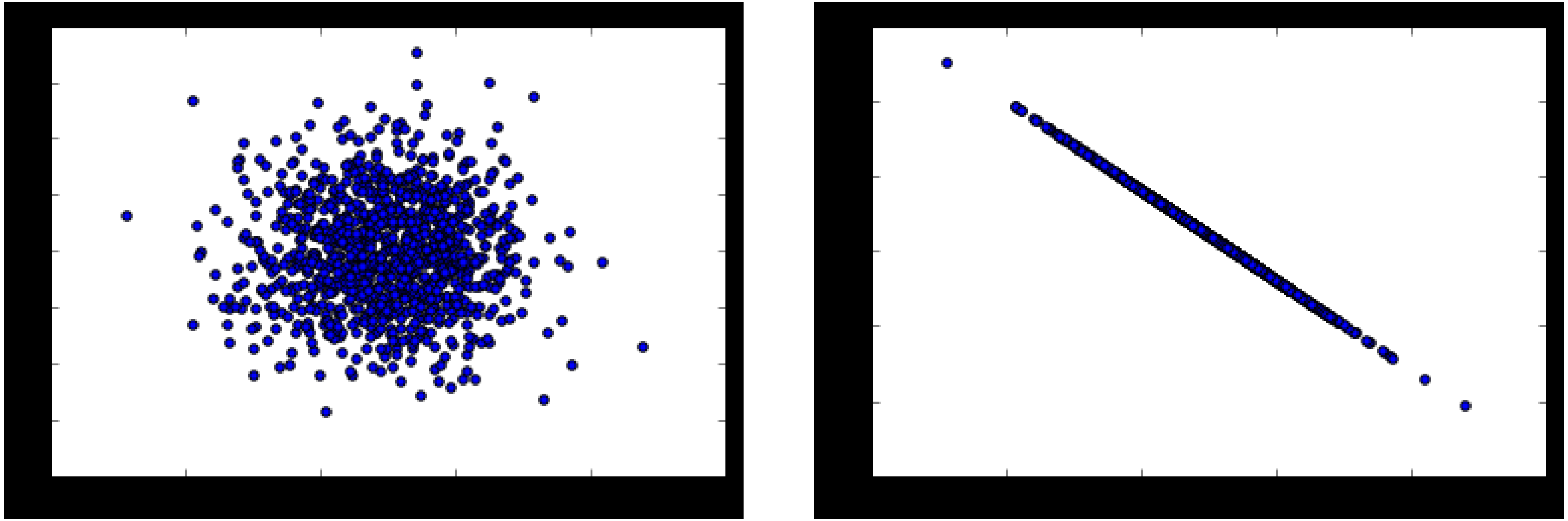
$550,000
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
99th
$506,553
75th
$85,811
50th
$42,327
25th
$19,375
1
10
20
30
40
50
60
70
80
90
99
percentile


IQR
Q1
Q3
Q1 − 1.5 × IQR
Q3 + 1.5 × IQR
Median
−4σ
−3σ
−2σ
−1σ
0σ
1σ
2σ
3σ
4σ
−2.698σ
−0.6745σ
0.6745σ
2.698σ
24.65%
50%
24.65%
15.73%
68.27%
15.73%

- p $($ $e)^p$ $(\;)f$ p e


Negative Skew
Positive Skew


0.53033
0.5
0.45553
0.39894
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
-10
-9
-8

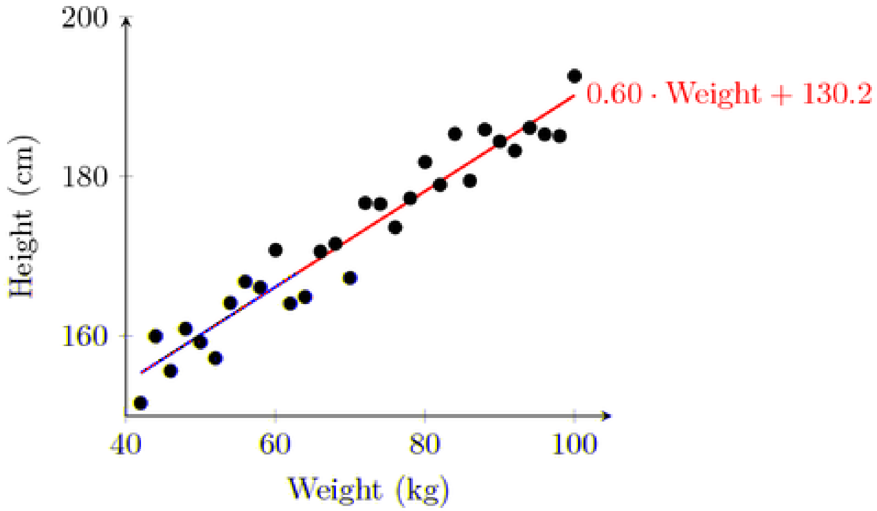


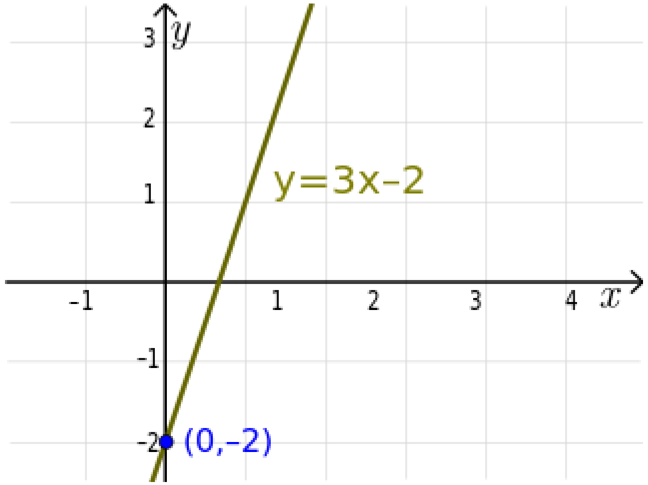
- $\frac{\qquad}{\qquad} \quad \frac{2\ 8}{2\ +}$

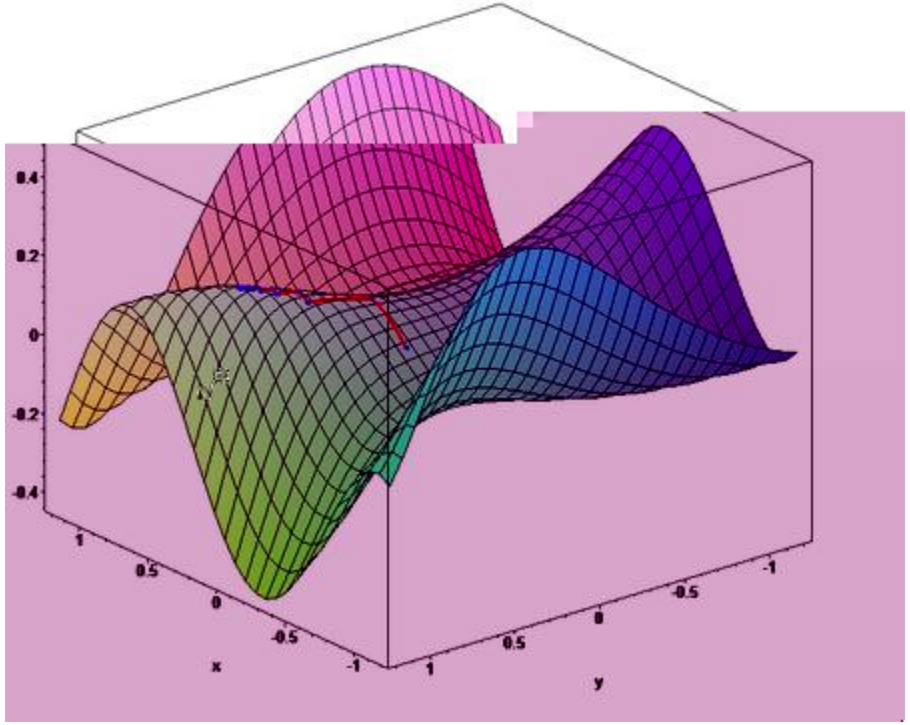
$$R(\quad|D) \qquad \frac{R(\quad)R(D|\quad)}{R(D)}$$


20080521
KI
UPL Init

- $R(\quad|D)$ $\frac{R(\quad)R(D|\quad)}{R(D)}$ $\frac{2\ 225\quad 2\ —}{2\ 235}$


200
180
160
Height (cm)
40
60
80
100
Weight (kg)
0.60 · Weight + 130.2


y
x
y=3x–2
(0,–2)
3
2
1
-1
-2
-1
1
2
3
4



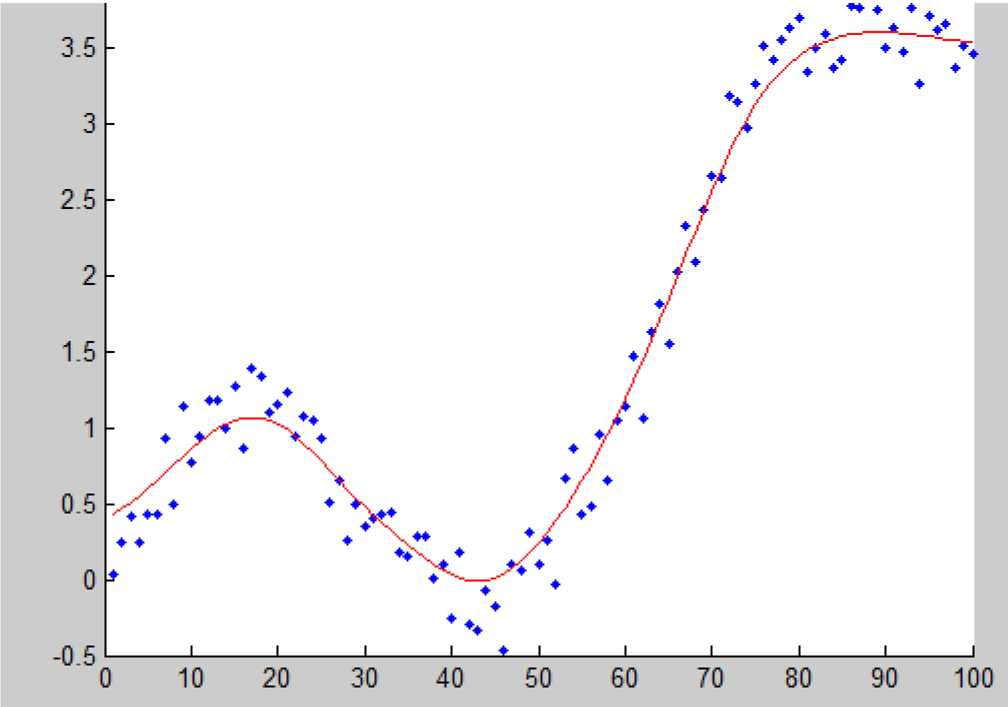
0.4
0.2
0
-0.2
-0.4
1
0.5
0
-0.5
-1
x
1
0.5
0
-0.5
-1
y

$$\frac{u\ \ o\ \ \ q\ \ \ us\ \ \ ct\ \ \ f\ \ \ ttqtu}{u\ \ o\ \ \ q\ \ \ us\ \ \ ct\ \ \ f\ xct\ \ cvqp\ \ \ tqo\ \ o\ \ \ cp}$$

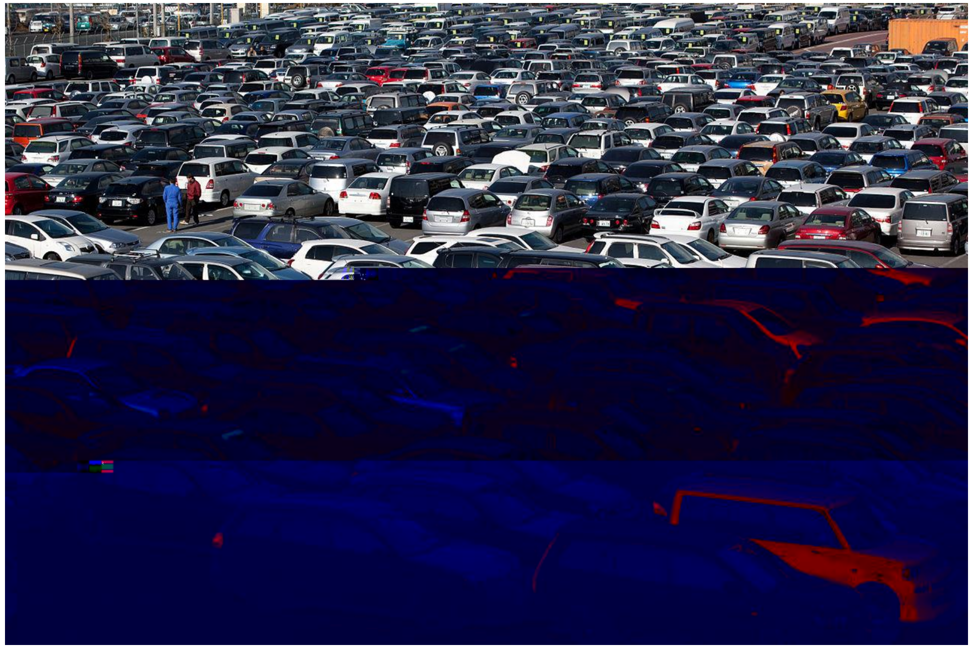
-
-
  -
- c^4

d e

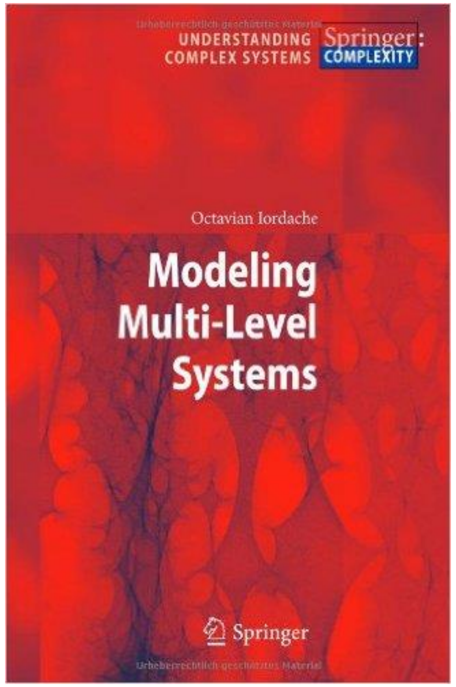
- c^5 d^4 e f
-

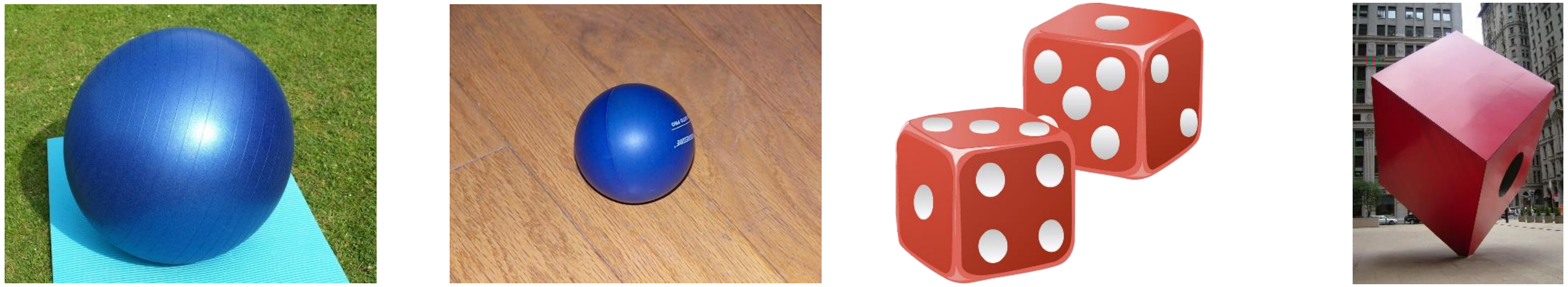


e

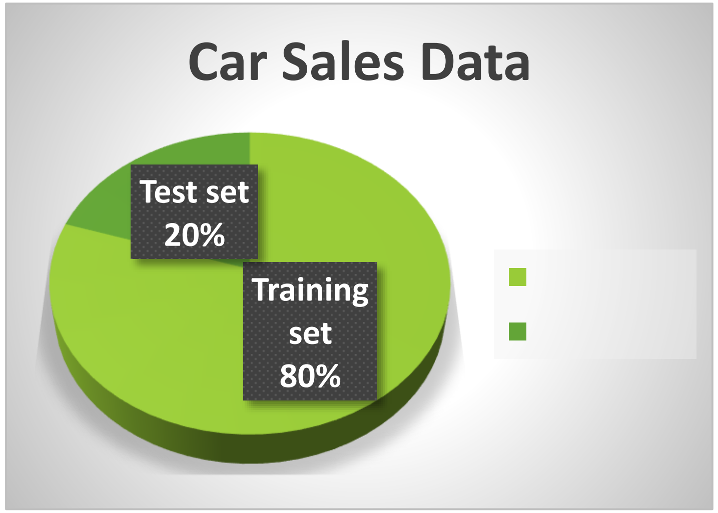


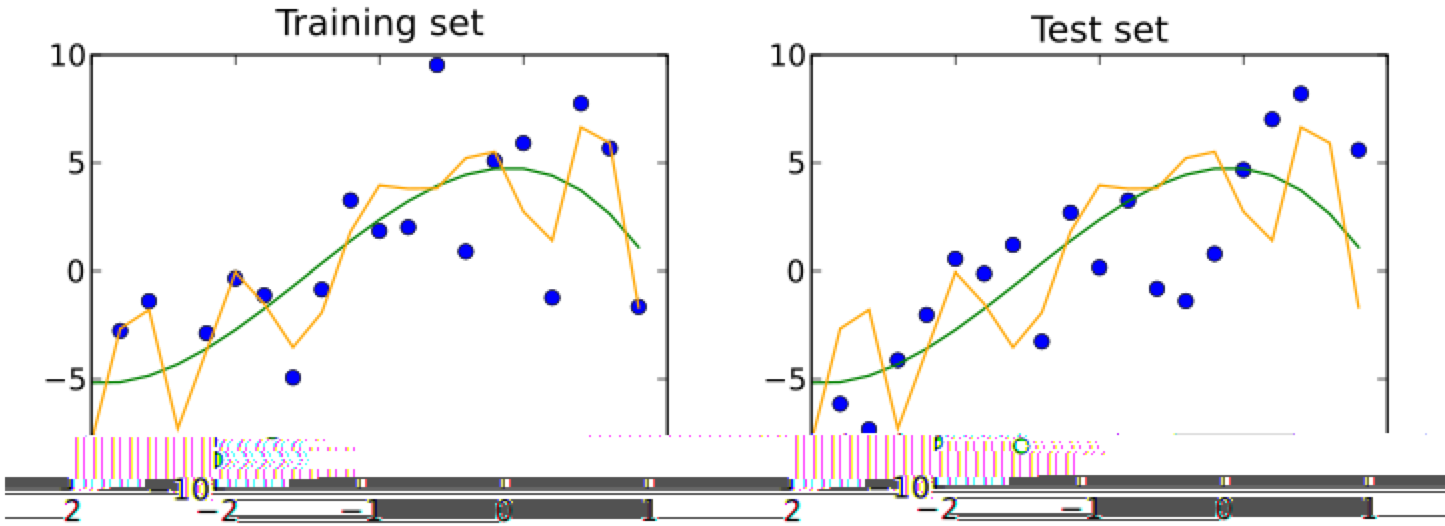
- $rt\ e$ γ 3 4 5


UNDERSTANDING COMPLEX SYSTEMS
Springer: COMPLEXITY
Octavian Iordache
Modeling Multi-Level Systems
Springer



e


Car Sales Data
Test set 20%
Training set 80%



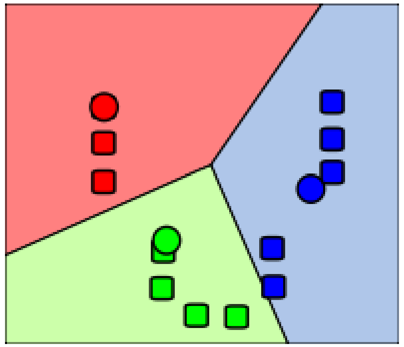
Training set

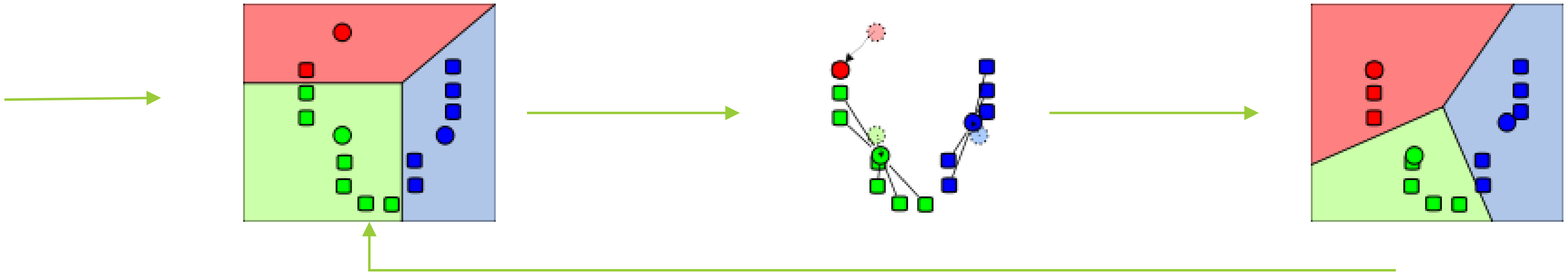
Test set

- *fh e* *e*

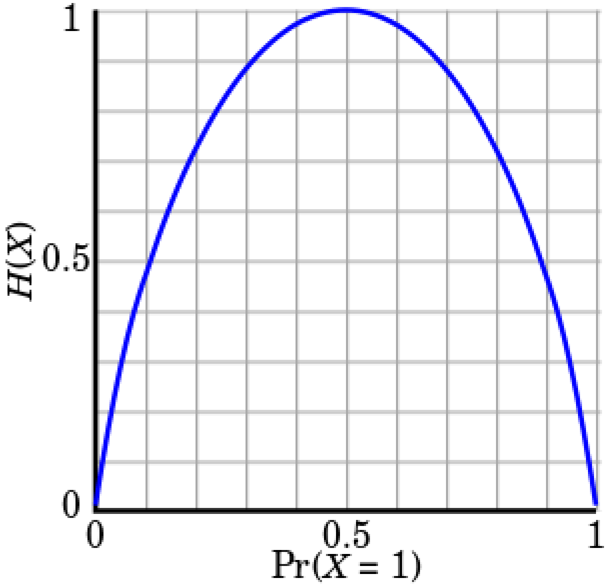
- $R(\ \ |D)\qquad \frac{R(\ \ )R\ \ D}{R(D)}$
-
-
- $R(\ \ r\,c\,o\ \ |\,Ht\qquad \frac{R(\ \ r\,c\,o\ \ )R(Ht\ \ \ \ |\ \ r\,c\,o}{R(Ht\ \ \ \ )}$
-
-
-

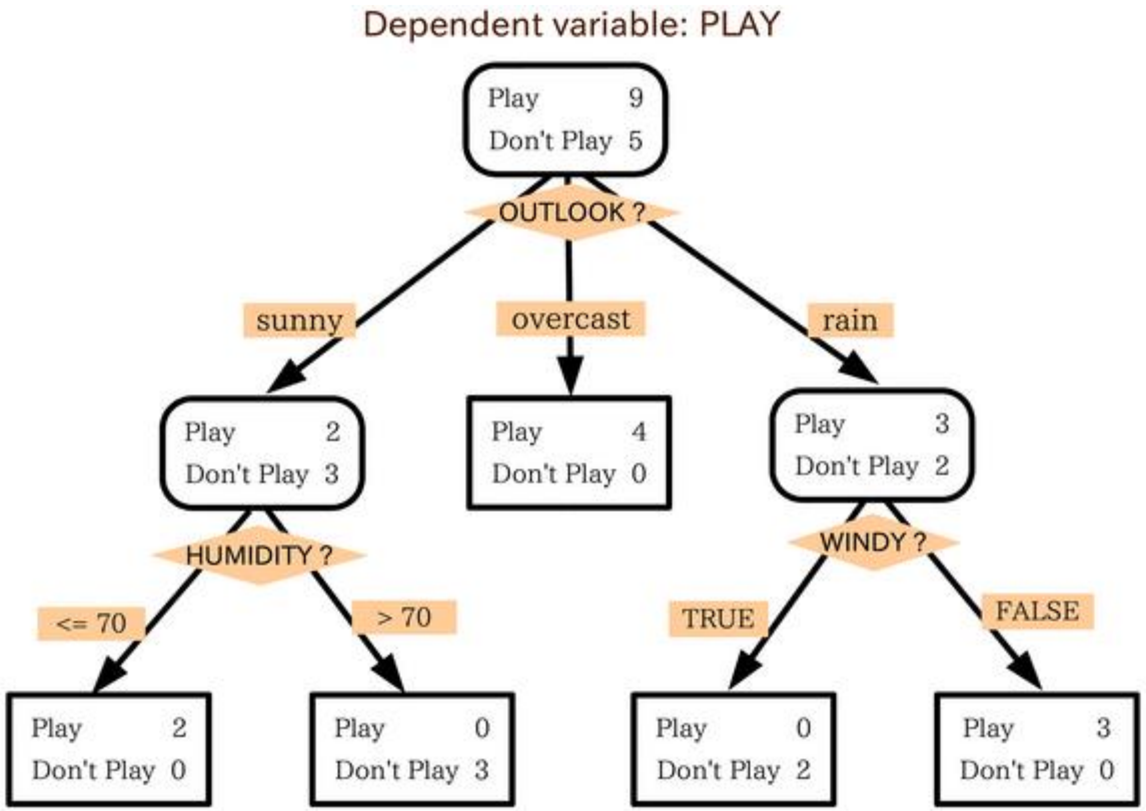
SPAM





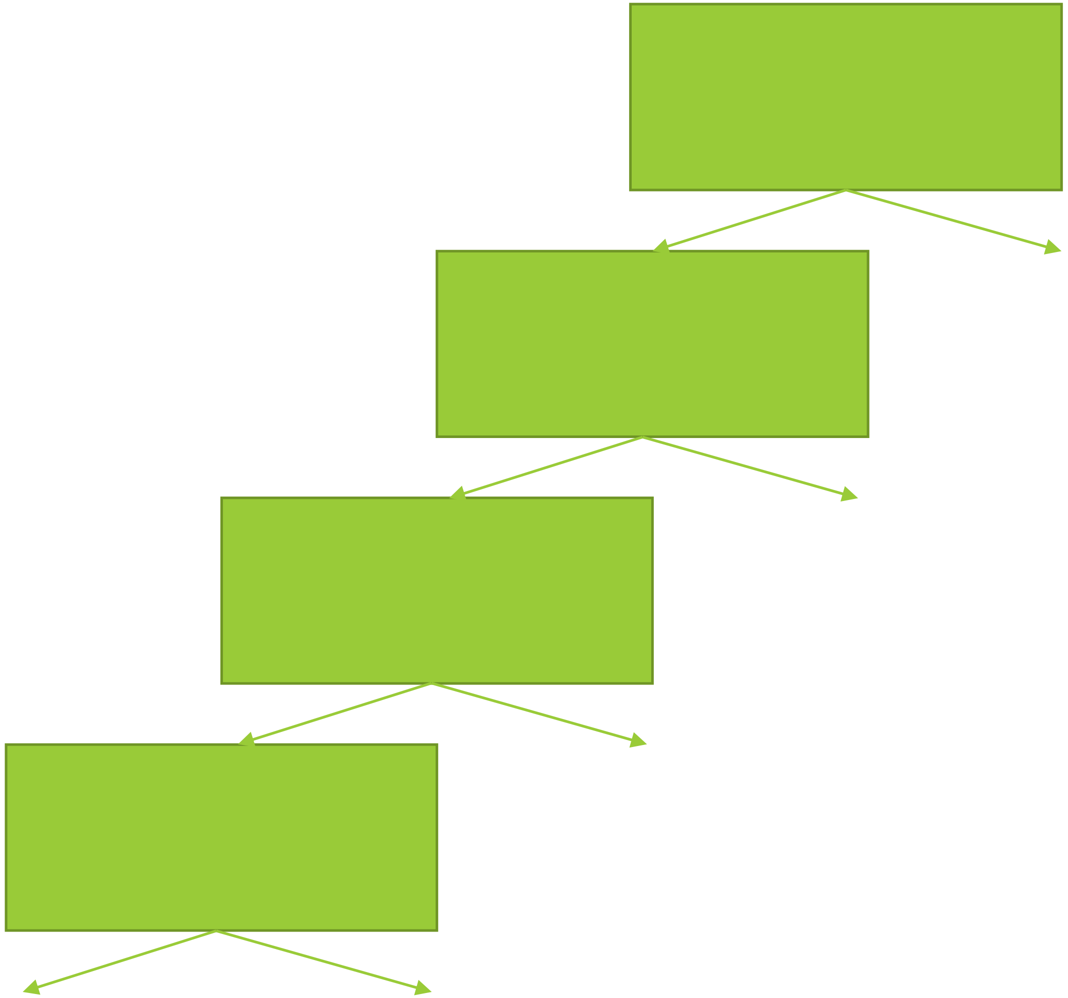
- ( ) r_3 n r_3 r_p n r_p
- r
-





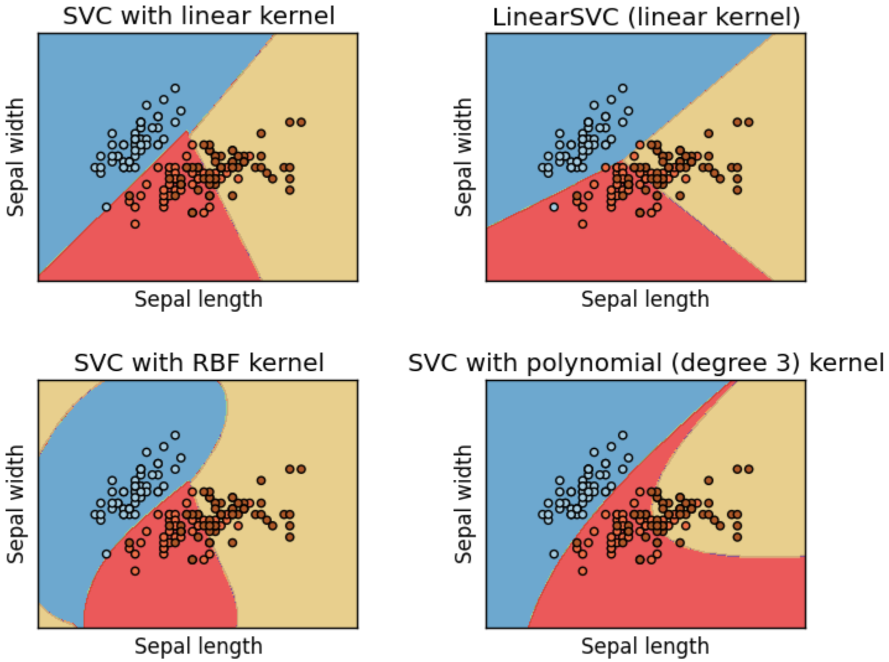
Dependent variable: PLAY

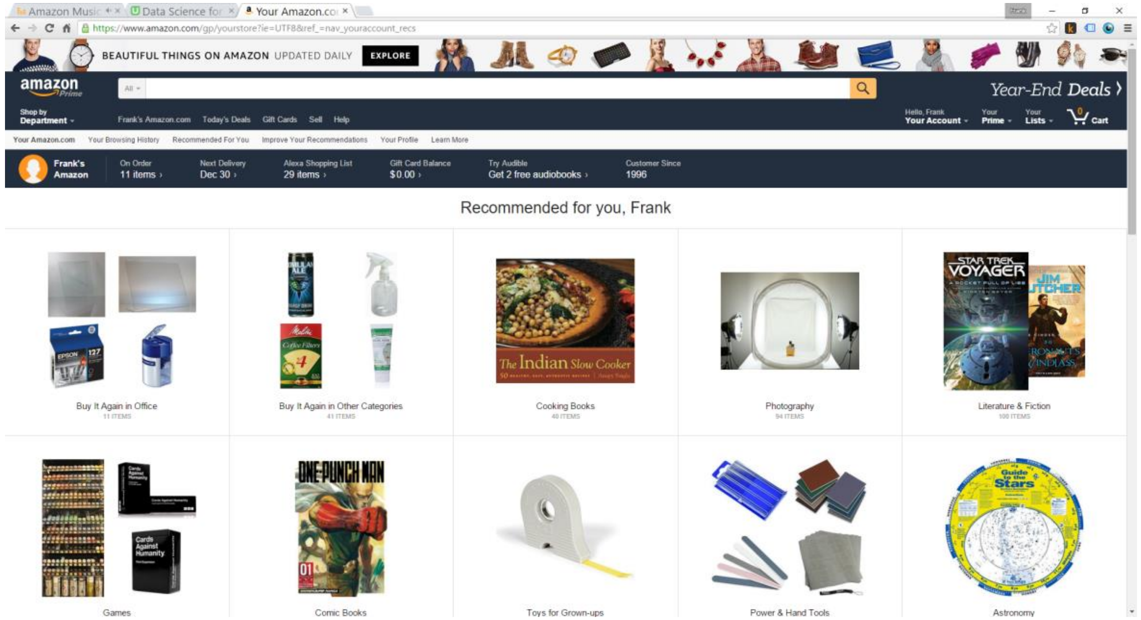
Candidate ID	Years Experience	Employed?	Previous employers	Level of Education	Top-tier school	Interned	Hired
0							
1							
2							
3							
4							

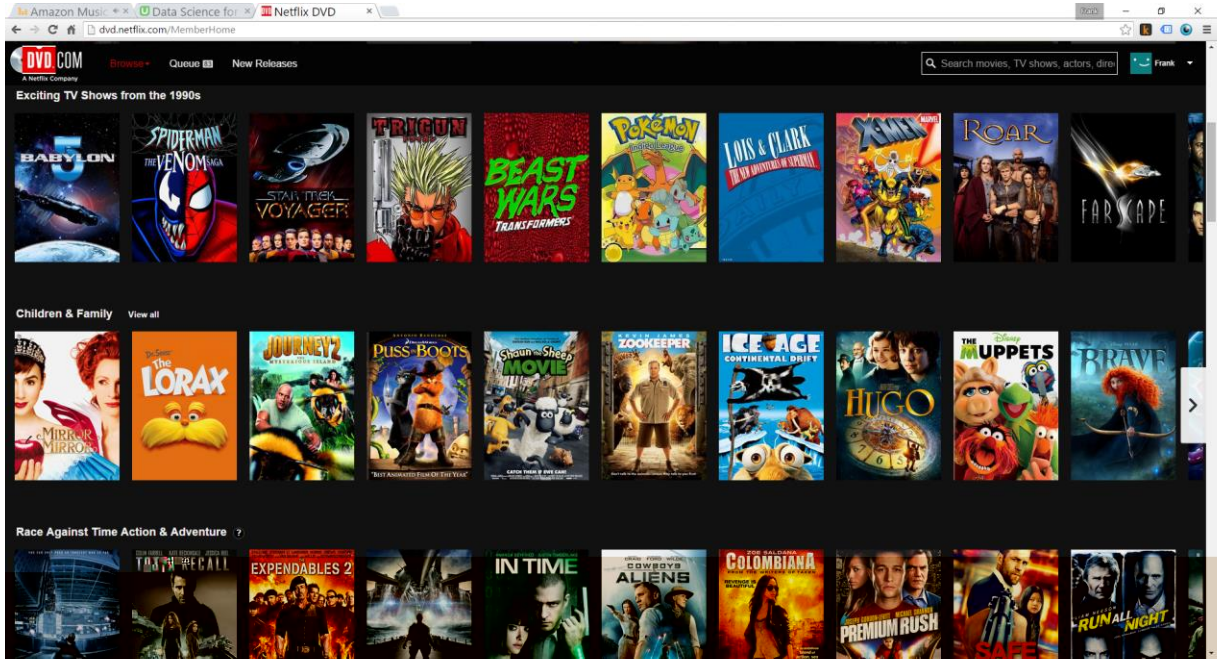


e

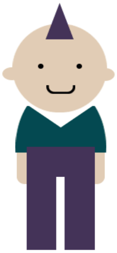
- *fh* *e*

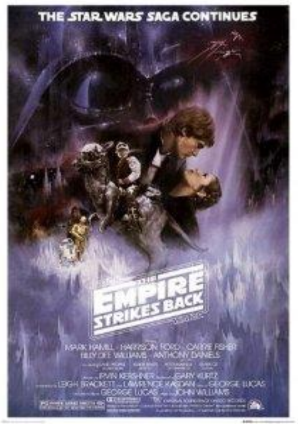

SVC with linear kernel
LinearSVC (linear kernel)
SVC with RBF kernel
SVC with polynomial (degree 3) kernel
Sepal width
Sepal length

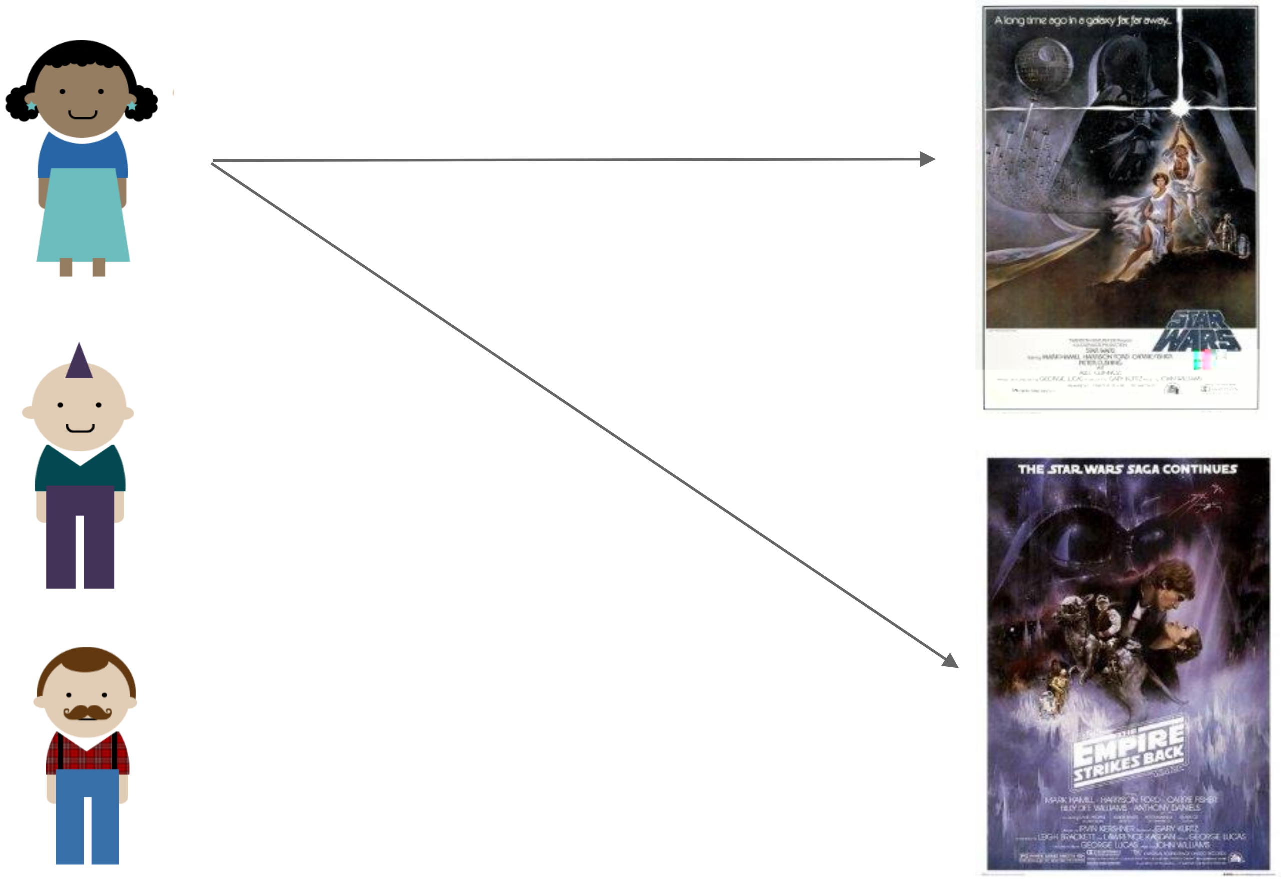

Amazon Music
Data Science for
Your Amazon.com
https://www.amazon.com/gp/yourstore?ie=UTF8&ref_=nav_youraccount_recs
BEAUTIFUL THINGS ON AMAZON UPDATED DAILY
EXPLORE
amazon Prime
Year-End Deals
Shop by Department
Frank's Amazon.com
Today's Deals
Gift Cards
Sell
Help
Hello, Frank Your Account
Your Prime
Your Lists
Cart
Your Amazon.com
Your Browsing History
Recommended For You
Improve Your Recommendations
Your Profile
Learn More
Frank's Amazon
On Order 11 items
Next Delivery Dec 30
Alexa Shopping List 29 items
Gift Card Balance $0.00
Try Audible Get 2 free audiobooks
Customer Since 1996
Recommended for you, Frank
Buy It Again in Office
Buy It Again in Other Categories
Cooking Books
Photography
Literature & Fiction
Games
Comic Books
Toys for Grown-ups
Power & Hand Tools
Astronomy

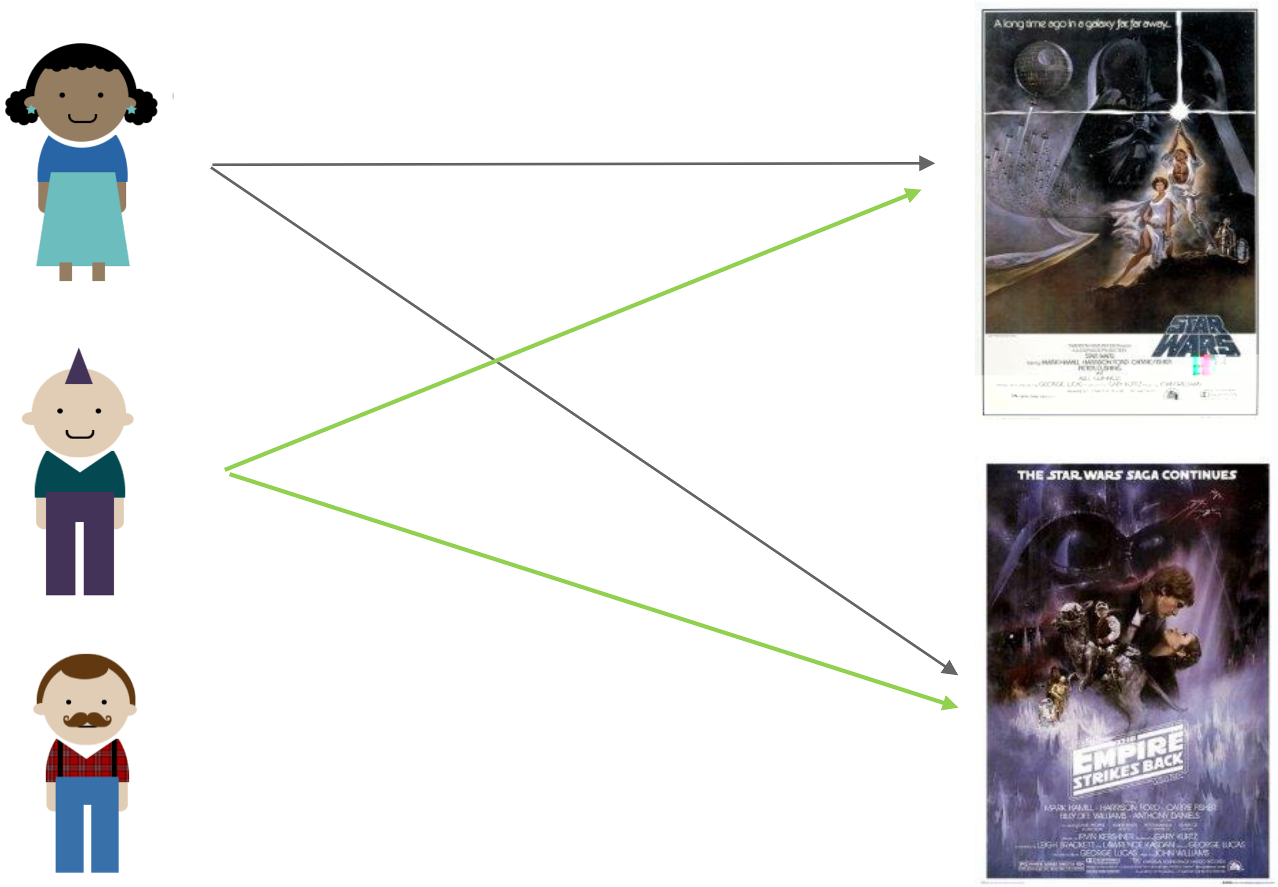

Amazon Music
Data Science for
Netflix DVD
dvd.netflix.com/MemberHome
DVD.COM A Netflix Company
Browse
Queue
New Releases
Search movies, TV shows, actors, dire
Frank
Exciting TV Shows from the 1990s
Children & Family
View all
Race Against Time Action & Adventure

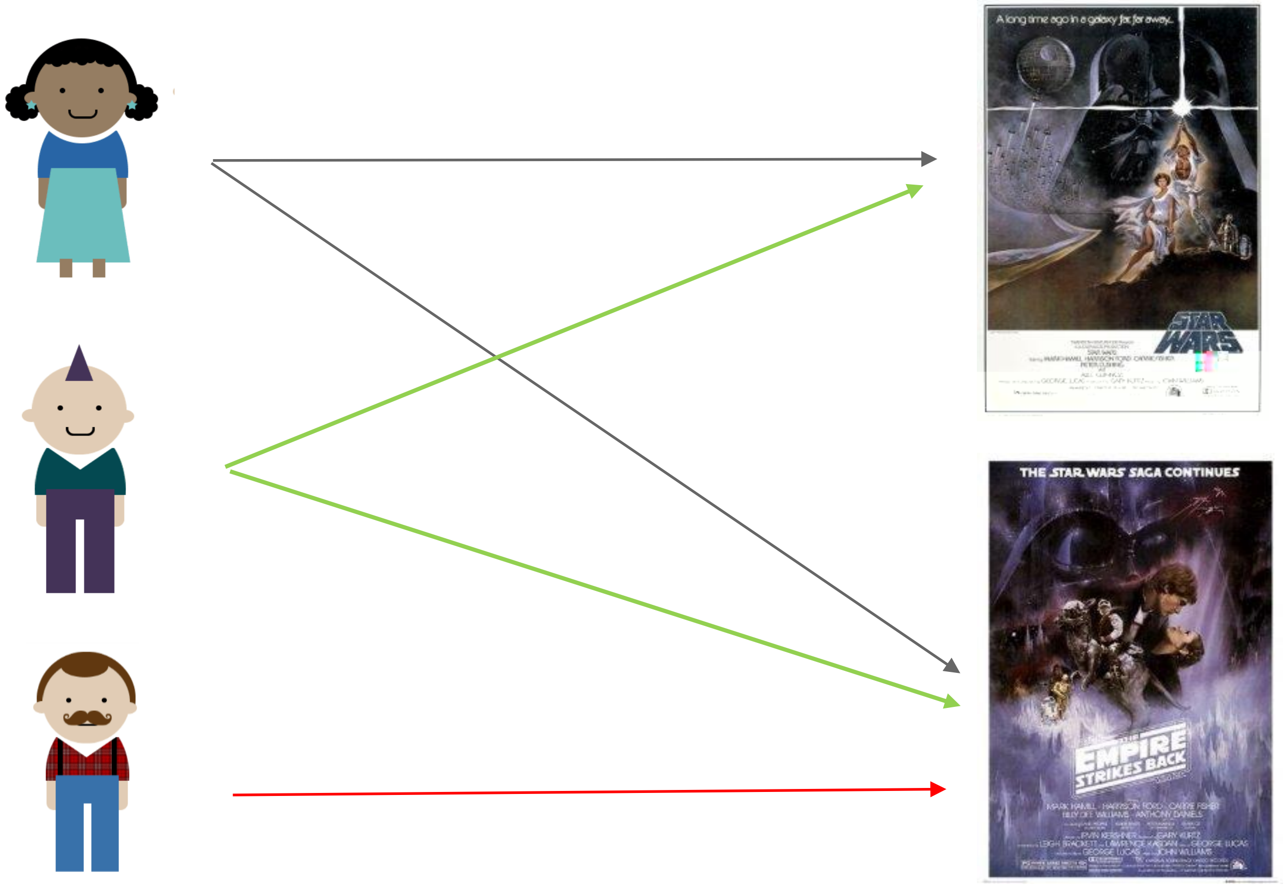

A long time ago in a galaxy far, far away....
STAR WARS
THE STAR WARS SAGA CONTINUES
THE EMPIRE STRIKES BACK
A long time ago in a galaxy far, far away....
STAR WARS

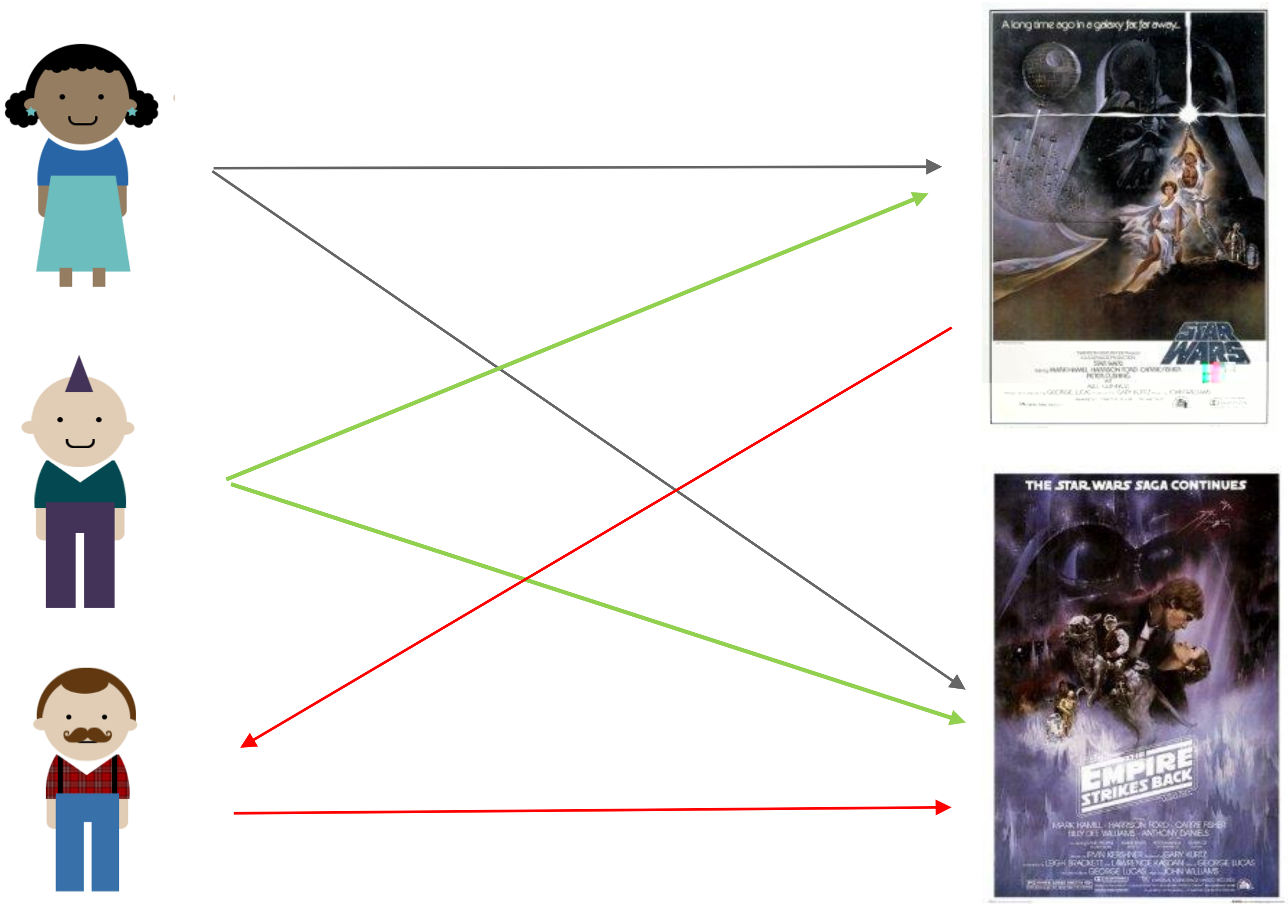


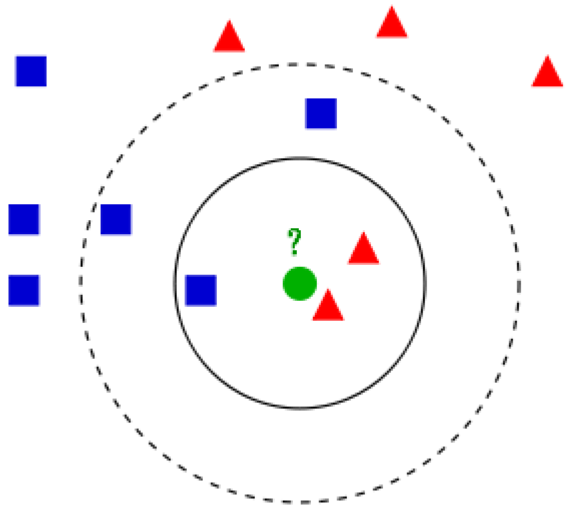

THE STAR WARS SAGA CONTINUES
THE EMPIRE STRIKES BACK
MARK HAMILL · HARRISON FORD · CARRIE FISHER
BILLY DEE WILLIAMS · ANTHONY DANIELS
IRVIN KERSHNER
GARY KURTZ
LEIGH BRACKETT
LAWRENCE KASDAN
GEORGE LUCAS
GEORGE LUCAS
JOHN WILLIAMS

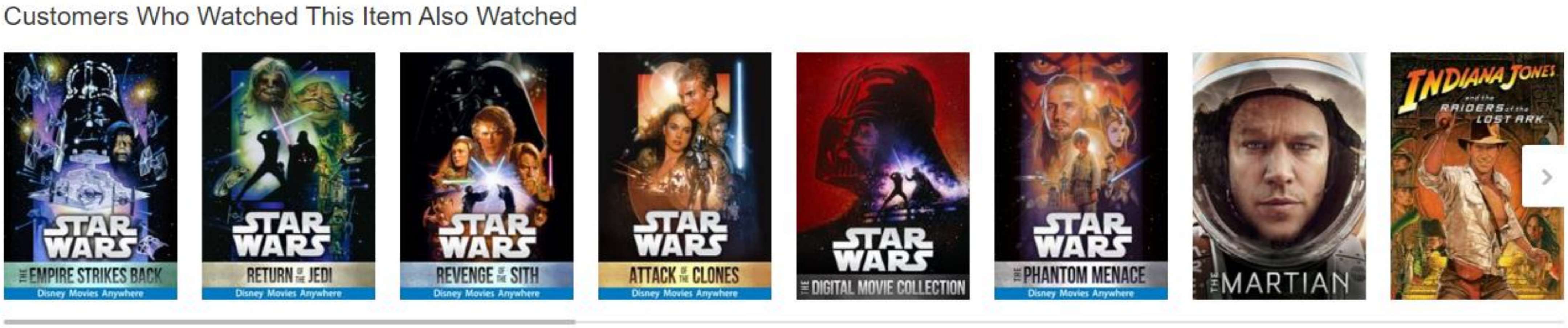

A long time ago in a galaxy far, far away....
STAR WARS
THE STAR WARS SAGA CONTINUES
THE EMPIRE STRIKES BACK


A long time ago in a galaxy far, far away....
STAR WARS
THE STAR WARS SAGA CONTINUES
THE EMPIRE STRIKES BACK


A long time ago in a galaxy far, far away....
STAR WARS
THE STAR WARS SAGA CONTINUES
EMPIRE STRIKES BACK

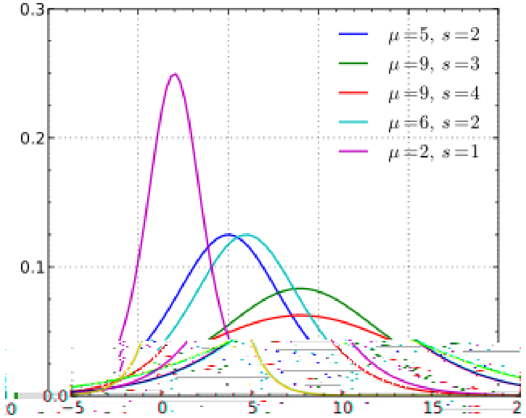

A long time ago in a galaxy far, far away....
STAR WARS
THE STAR WARS SAGA CONTINUES
THE EMPIRE STRIKES BACK





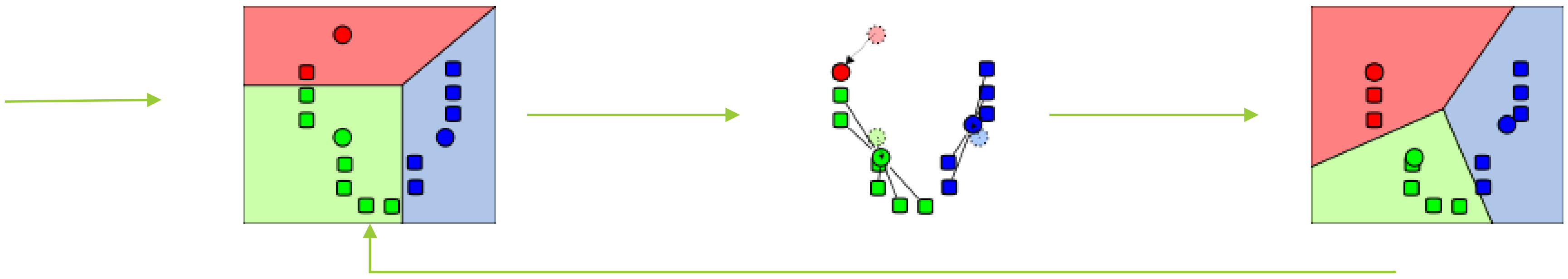
Customers Who Watched This Item Also Watched

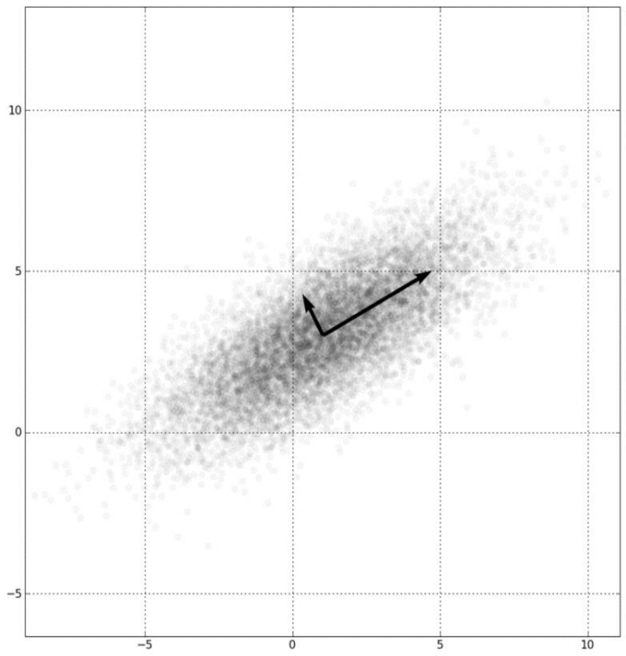

Airtel
TAXI



0.3
0.2
0.1
0.0
−5
0
5
10
15
20
$\mu=5,\ s=2$
$\mu=9,\ s=3$
$\mu=9,\ s=4$
$\mu=6,\ s=2$
$\mu=2,\ s=1$

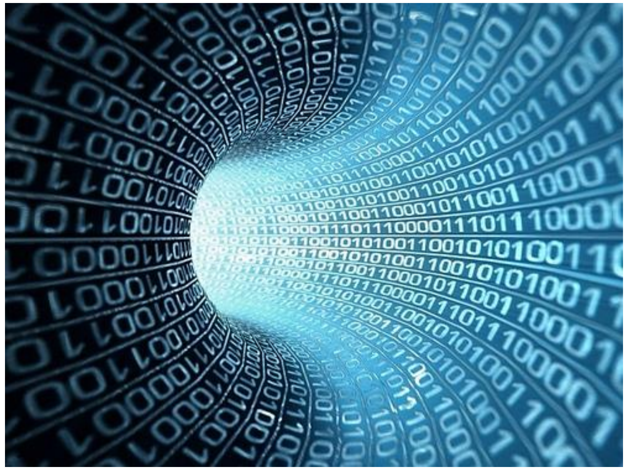
e



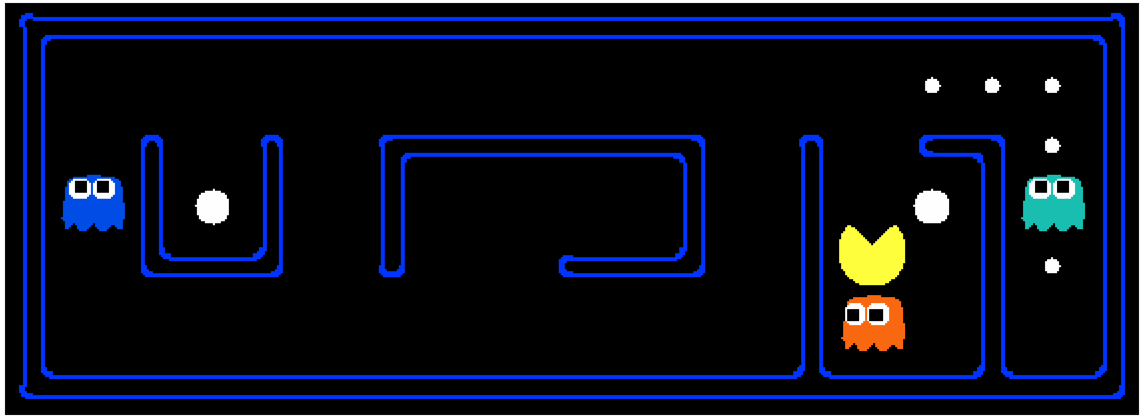

10
5
0
−5
−5
0
5
10


METROPOLITAN
STORAGE WAREHOUSE
FIRE PROOF
METROPOLITAN STORAGE WAREHOUSE
FIRE PROOF

- *e*
- *fh* *e*
- *e*




HIVE



●

●

  □

  □

  □

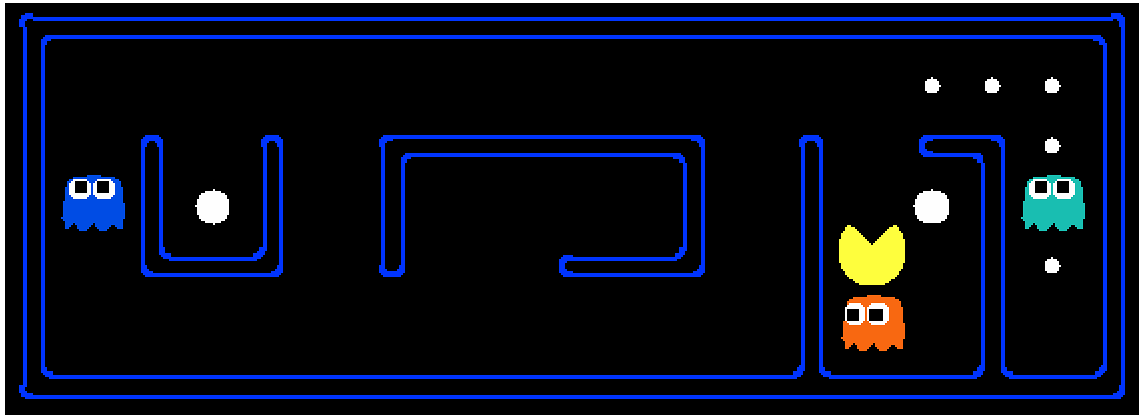
●

●

●

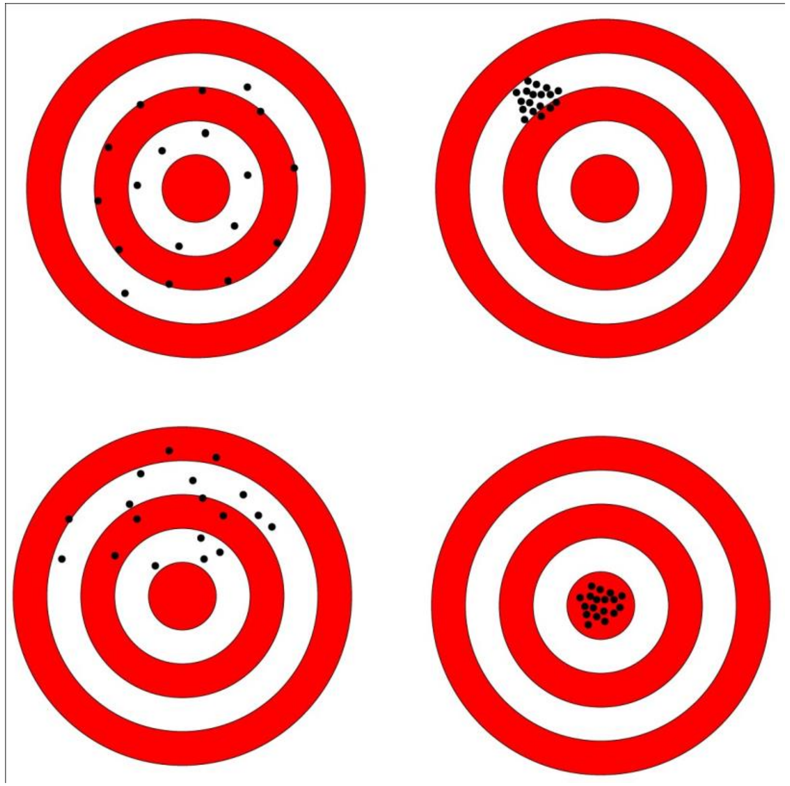
●

Q(s, a) += alpha * (reward(s,a) + max(Q(s') - Q(s,a)) where s is the previous state, a is the previous action,s' is the current state, and alpha is the discount factor (set to .5 here).



-
  - **Markov decision processes (MDPs)**
  -
  -
  - $R_c(u\ u)$
  - $T_c(u\ u)$
- e

-
  - **dynamic programming**
  -



- $ttqt \quad D\ cu^4 \quad ct\ \ cpe$

- *fh e* *e*

DECEMBER 29, 2015

NHN No-Hate News ™

News that won't crush your soul.

Technology

The Best WIRED Photo Stories of the Year

From the coldest place on earth to the secret home of the Internet, photography took us some weird and wonderful places this year. The post The Best WIRED Photo Stories of the Year appeared first on WIRED. [...]

Tue, Dec 29, 2015

Source: Wired

How a Nation of Tech Copycats Transformed Into a Hub for Innovation

China, once known more for manufacturing stuff for

Latest Stories

Reds deal Chapman to Dodgers for 2 prospects

CBS Sports

Ben Silverman Talks ‘Dream and Harsh Nightmare’ of His NBC Tenure

Variety

Iraqi state TV: Prime Minister Haider al-Abadi is in Ramadi to hail city’s liberation from IS

Washington Post World

Bennet Omalu, doctor who raised alarm bells about NFL head injuries, on racism in U.S. science

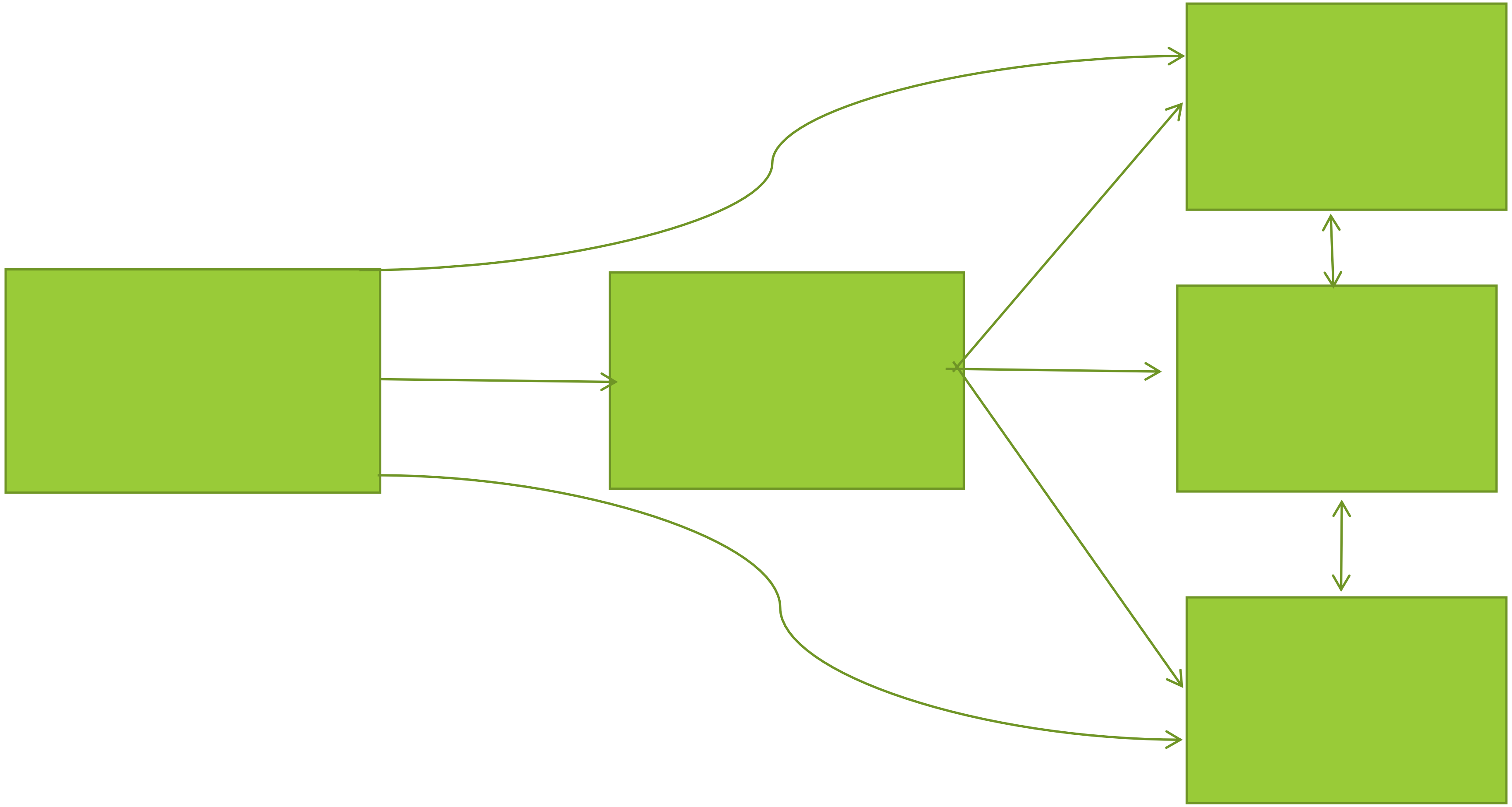
Washington Post National

Valeant CEO takes medical leave of absence

CNN Money


Spark


Spark

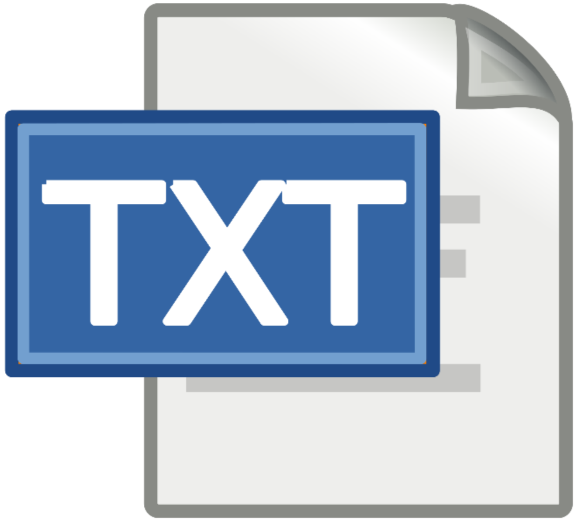


-

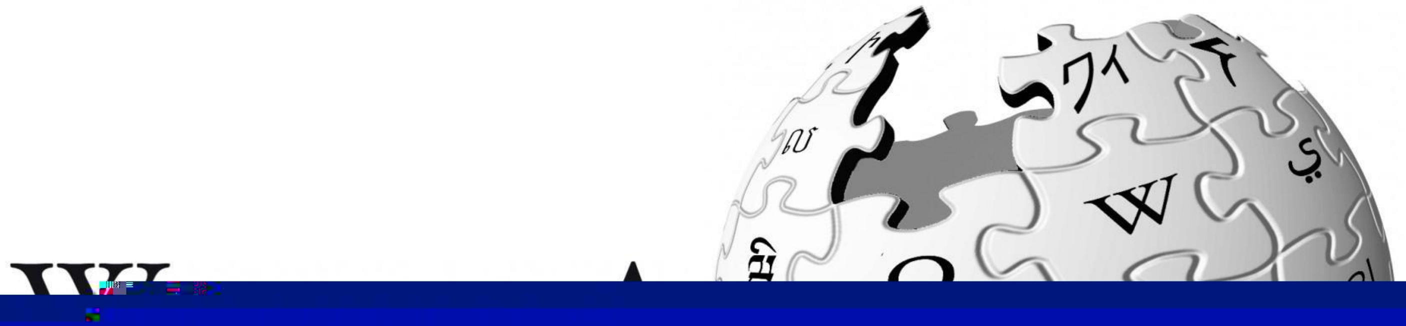
Python code to square numbers in a data set:

Scala code to square numbers in a data set:

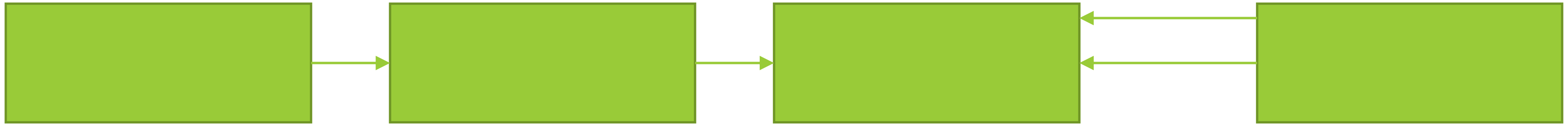
- fh

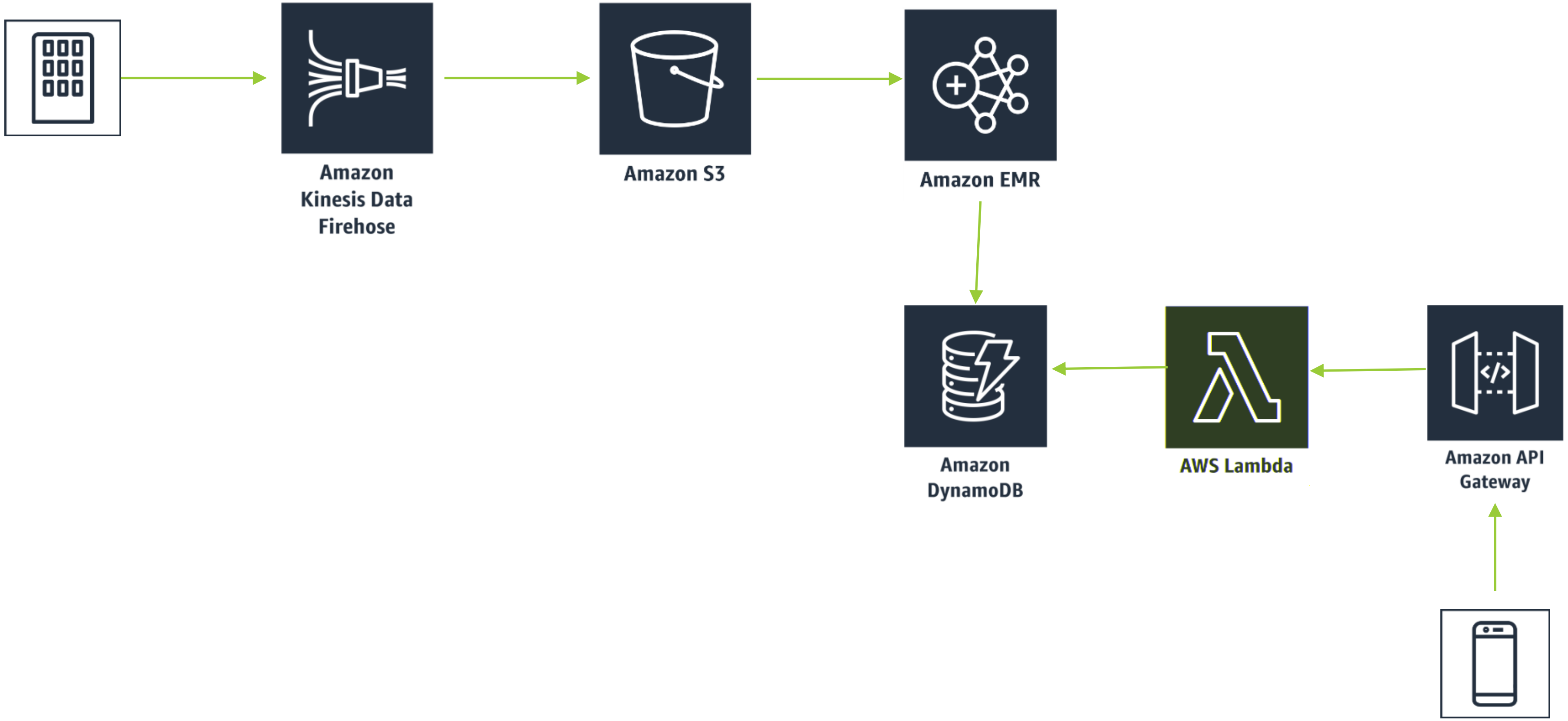


$$\frac{V\quad to\quad Ht\quad s\quad pe}{Fqe\quad o\quad p\quad Ht\quad s\quad pe}$$

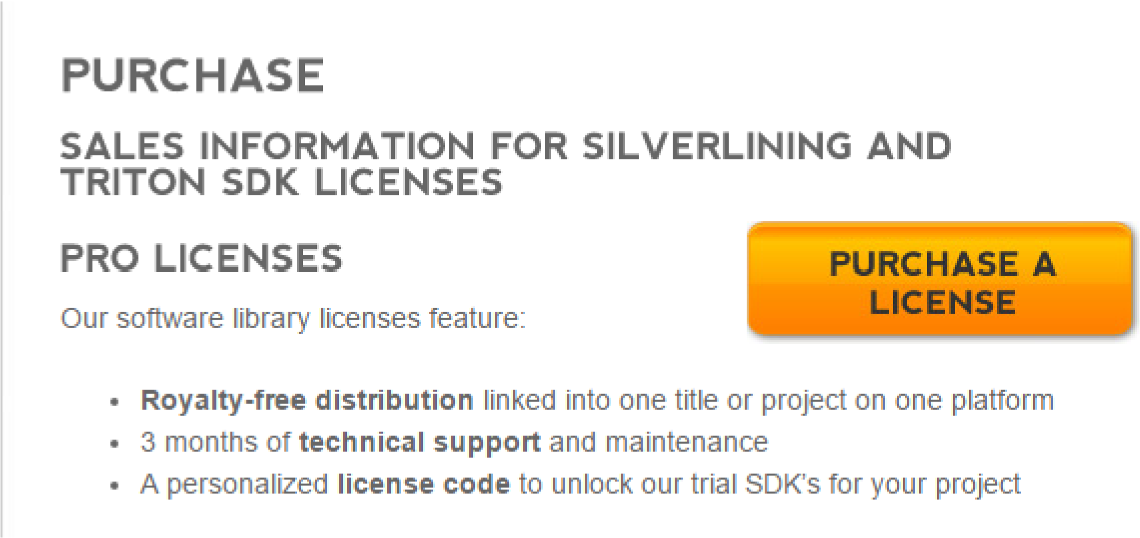


```
from sklearn.externals import joblib
joblib.dump(clf, 'model.joblib')
```




Amazon Kinesis Data Firehose
Amazon S3
Amazon EMR
Amazon DynamoDB
AWS Lambda
Amazon API Gateway

Amazon SageMaker
Amazon Comprehend
Amazon Lex
Amazon Polly
Amazon Rekognition
Amazon Rekognition Image
Amazon Rekognition Video
Amazon Translate
Amazon Transcribe
AWS Deep Learning AMIs
AWS DeepLens



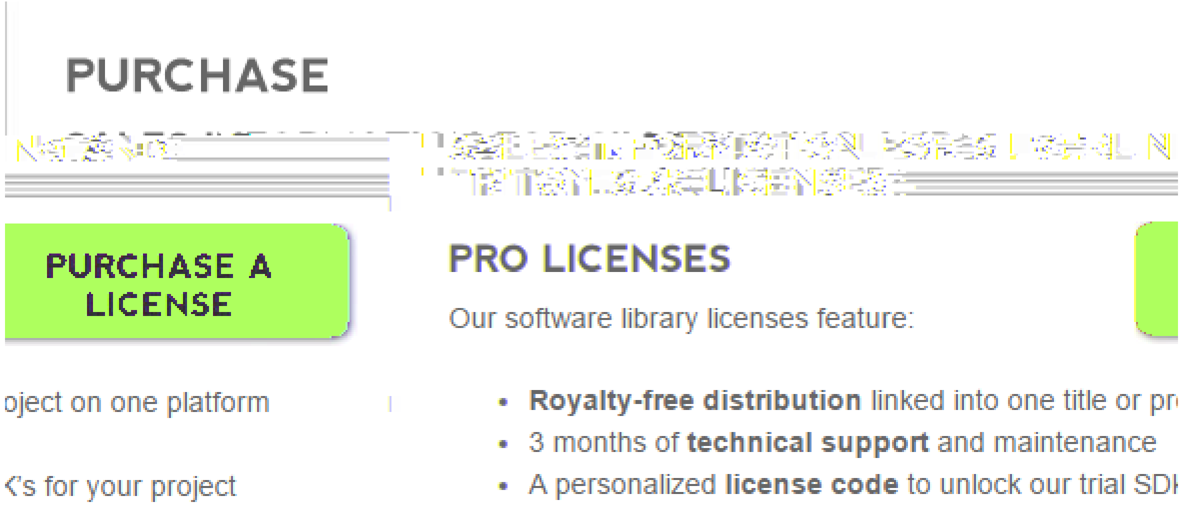
PURCHASE

SALES INFORMATION FOR SILVERLINING AND TRITON SDK LICENSES

PRO LICENSES

Our software library licenses feature:

- **Royalty-free distribution** linked into one title or project on one platform
- 3 months of **technical support** and maintenance
- A personalized **license code** to unlock our trial SDK's for your project



PURCHASE

oject on one platform

K's for your project

PRO LICENSES

Our software library licenses feature:

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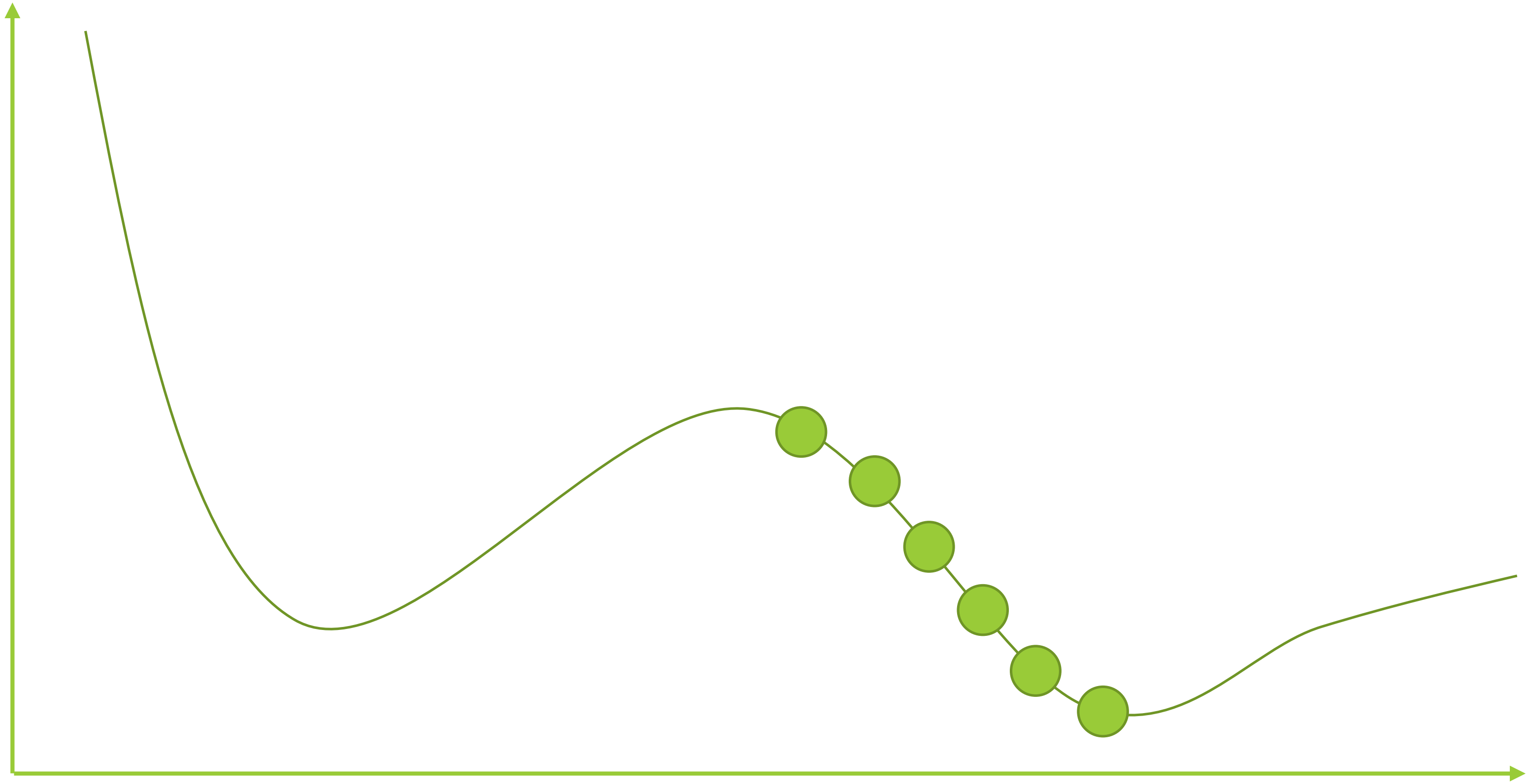
- 3 months of **technical support** and maintenance
- A personalized **license code** to unlock our trial SDI

deep learning pre-requisites

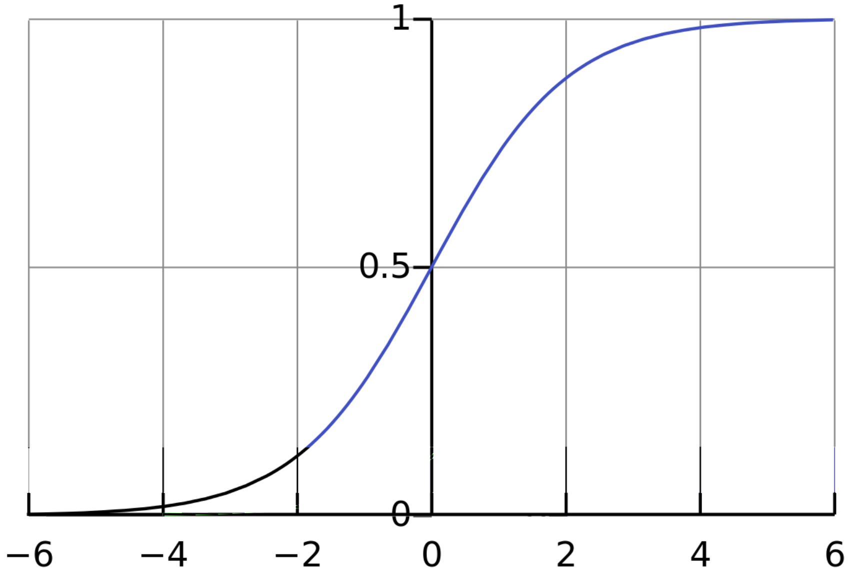
gradient descent



autodiff

softmax

$$h_\theta(x) = \frac{1}{1 + \exp(-\theta^T x)},$$



in review

introducing artificial neural networks

the biological inspiration

cortical columns

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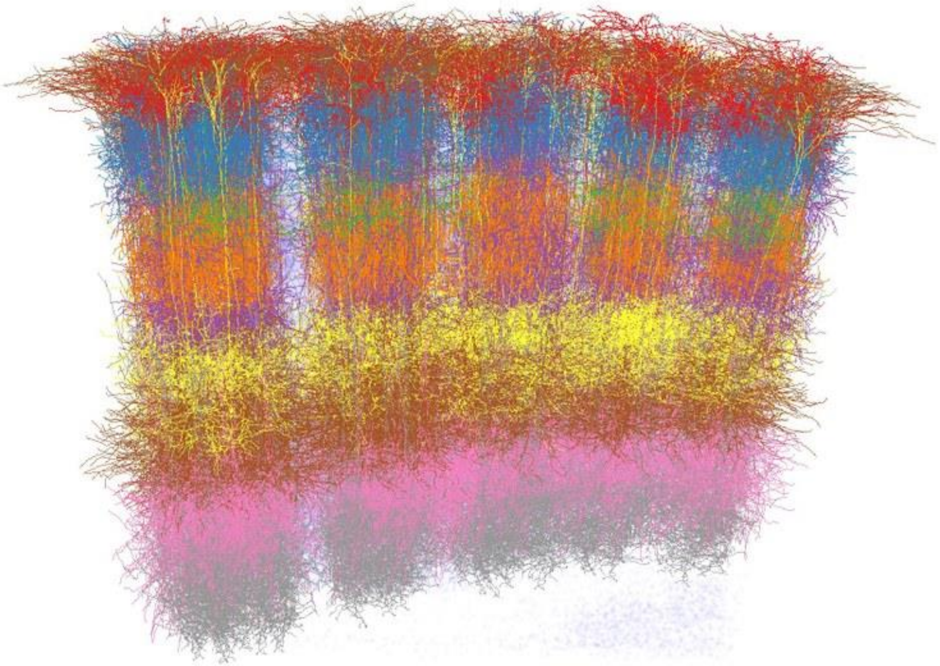

(credit: Marcel Oberlaender et al.)

the first artificial neurons

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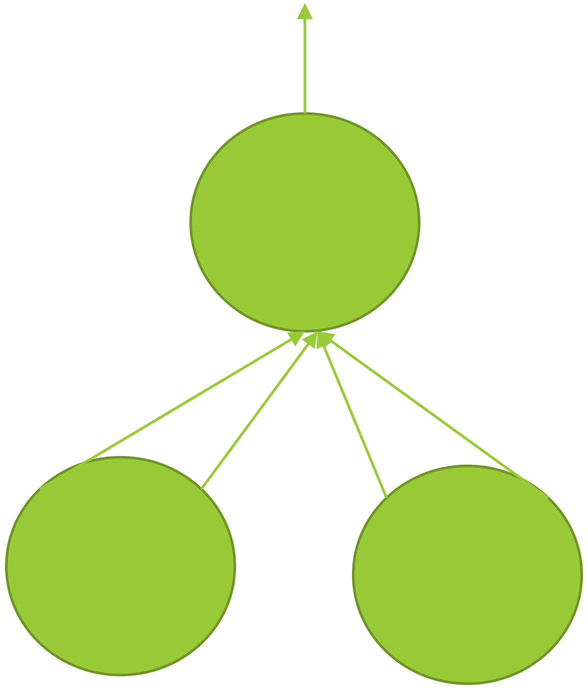

the linear threshold unit (ltu)

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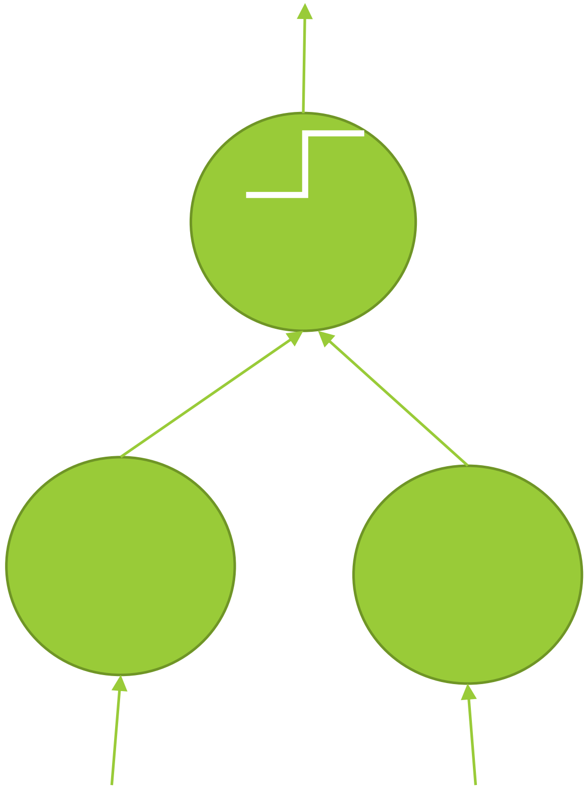
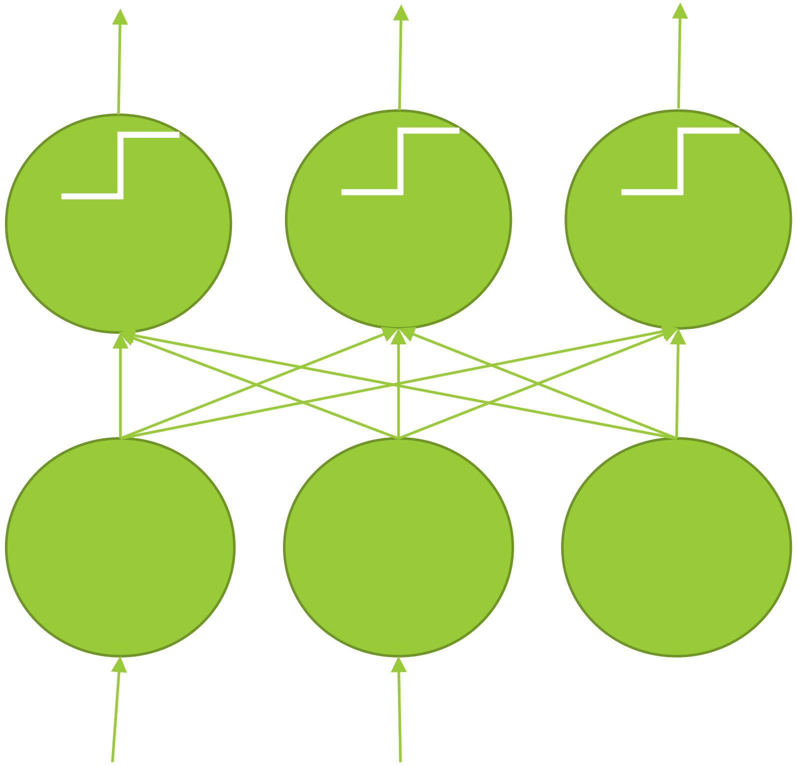


the perceptron



multi-layer perceptrons

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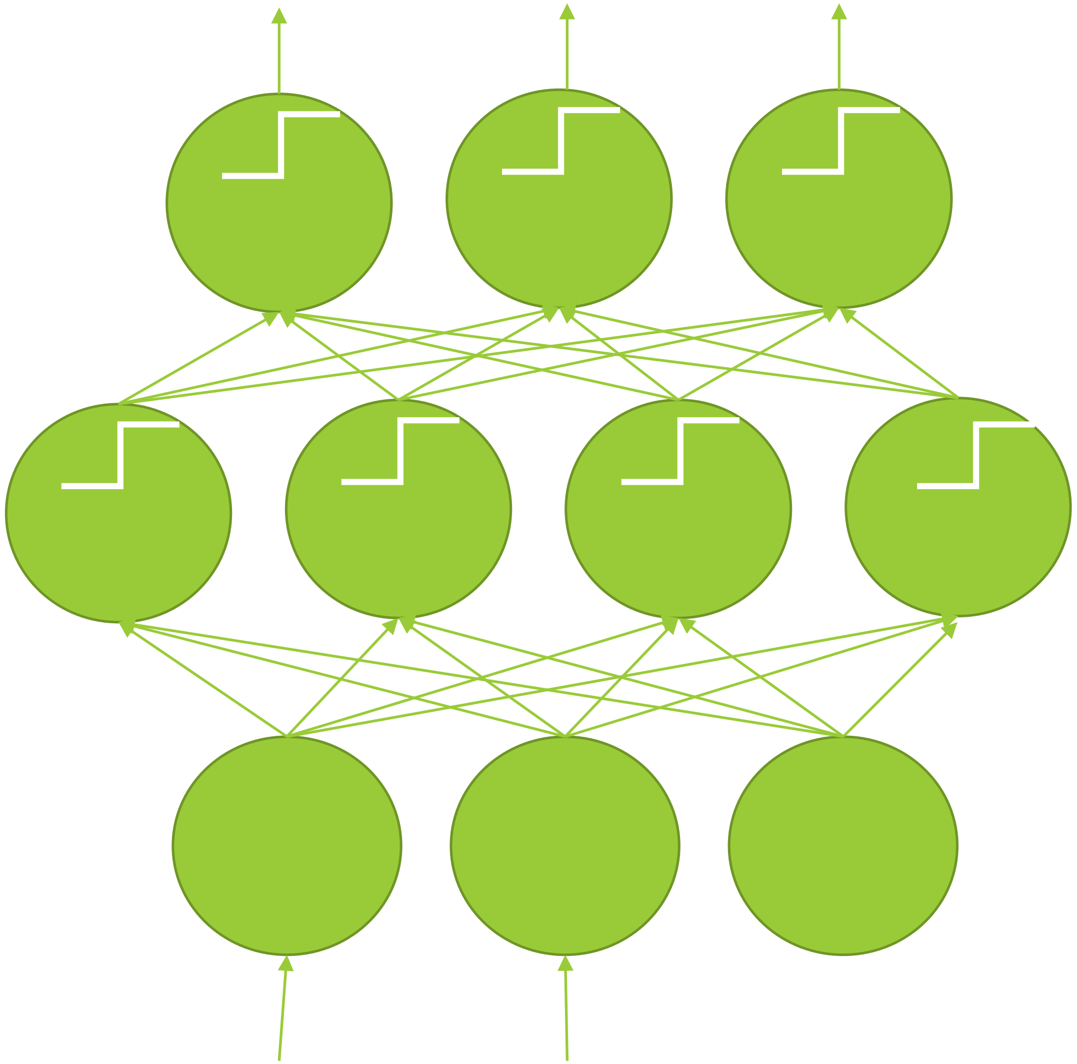

a modern deep neural network

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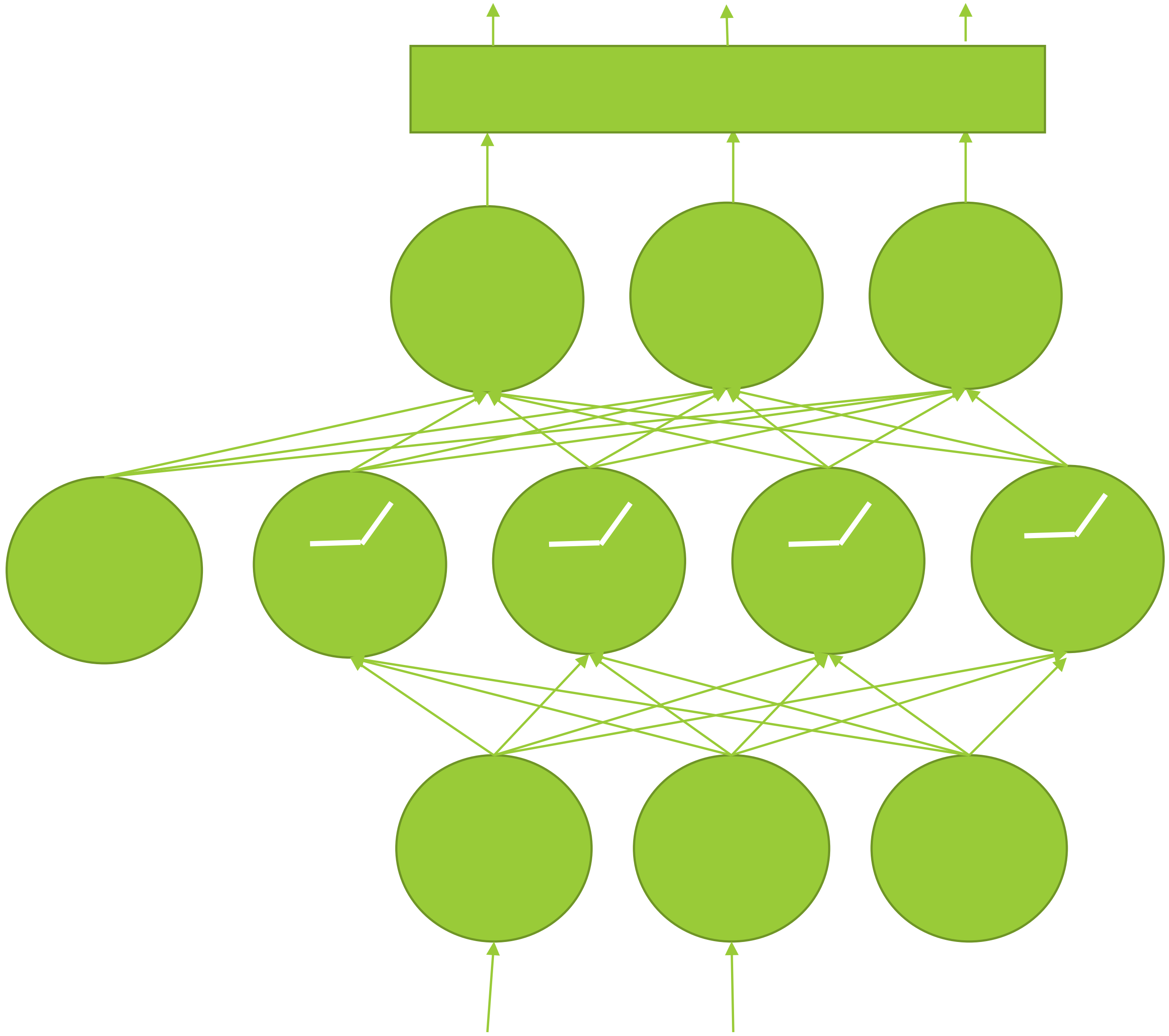
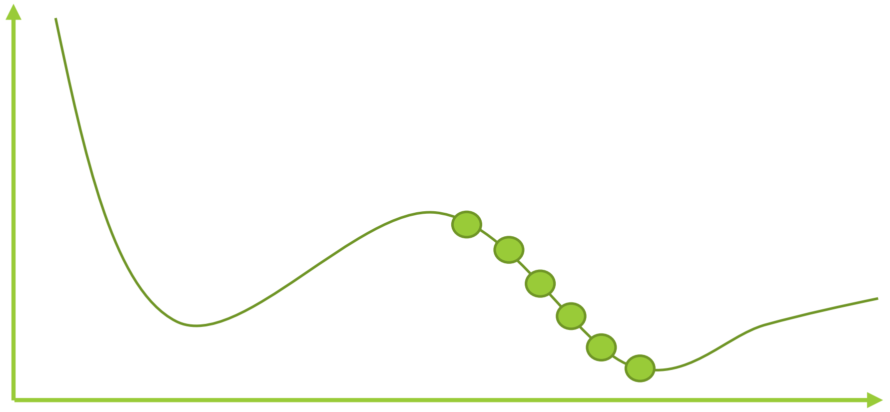


let’s play

deep learning

backpropagation

- learn



activation functions

(aka rectifier)

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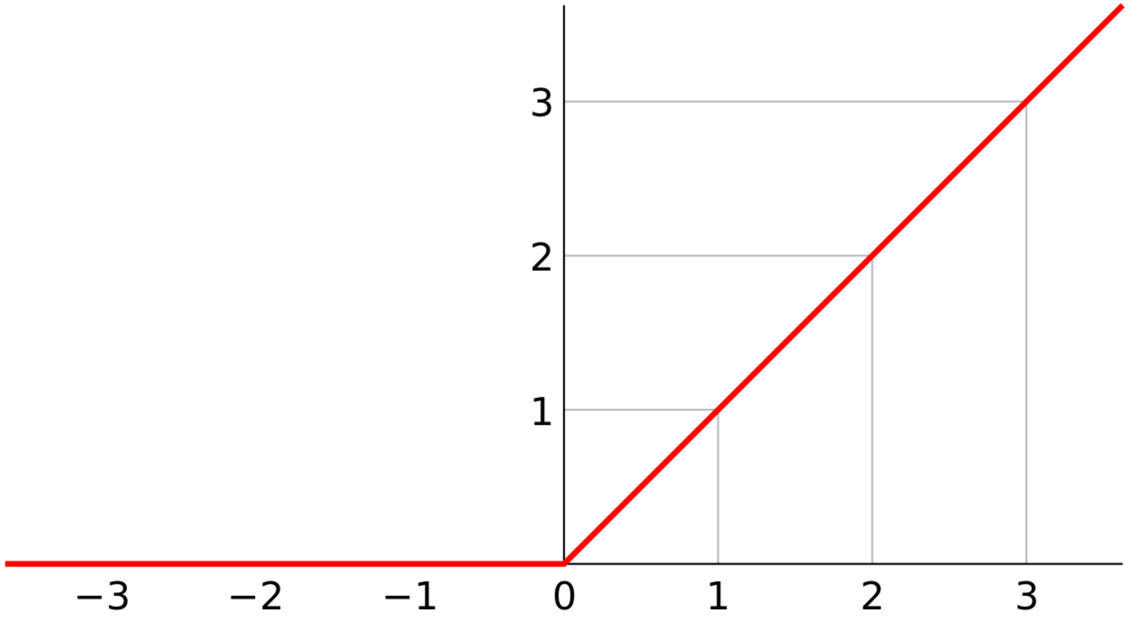
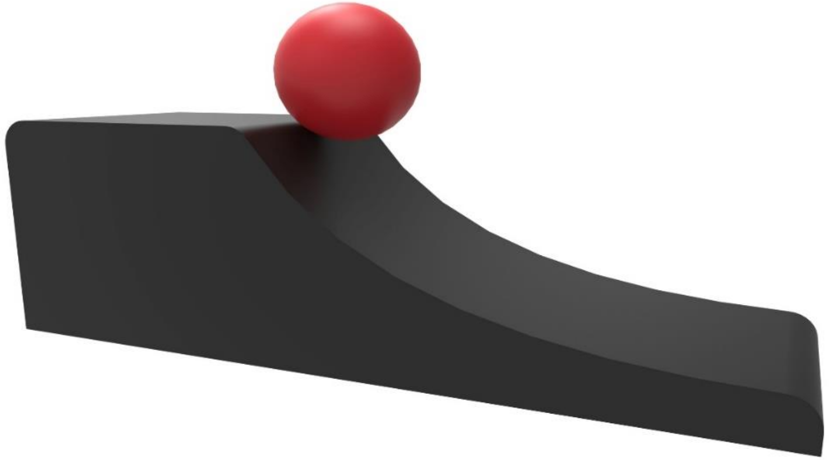
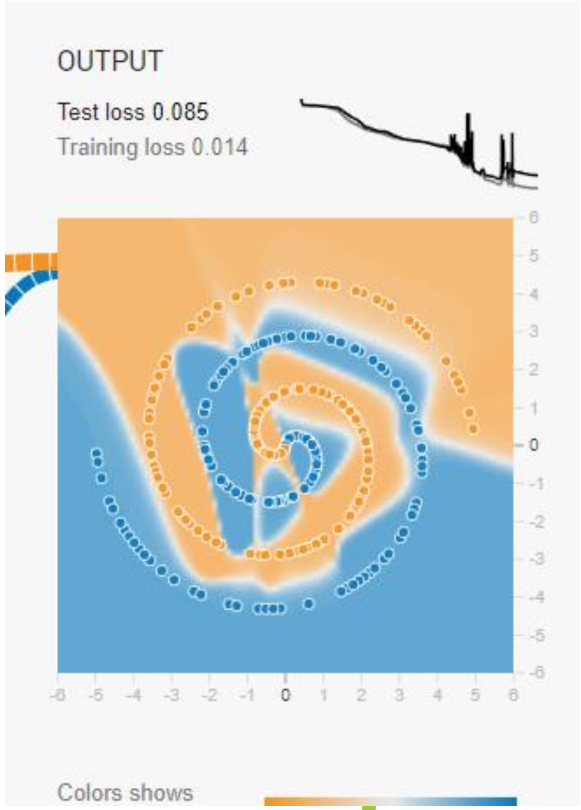


optimization functions



avoiding overfitting



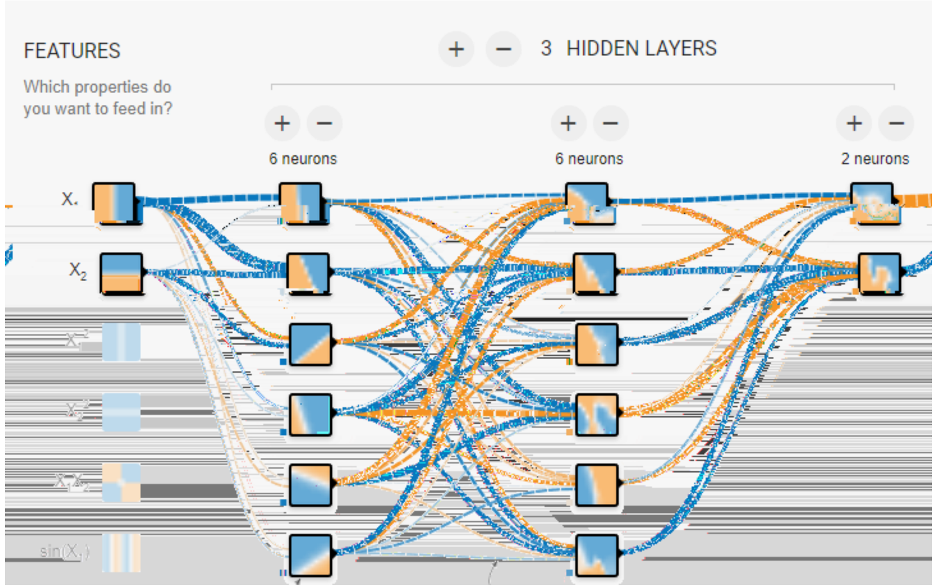
OUTPUT

Test loss 0.085

Training loss 0.014

Colors shows

tuning your **topology**



tensorflow

why tensorflow?

tensorflow basics

```
import tensorflow as tf

a = tf.Variable(1, name="a")
b = tf.Variable(2, name="b")
f = a + b

init = tf.global_variables_initializer()
with tf.Session() as s:
    init.run()
    print( f.eval() )
```

creating a neural network with tensorflow

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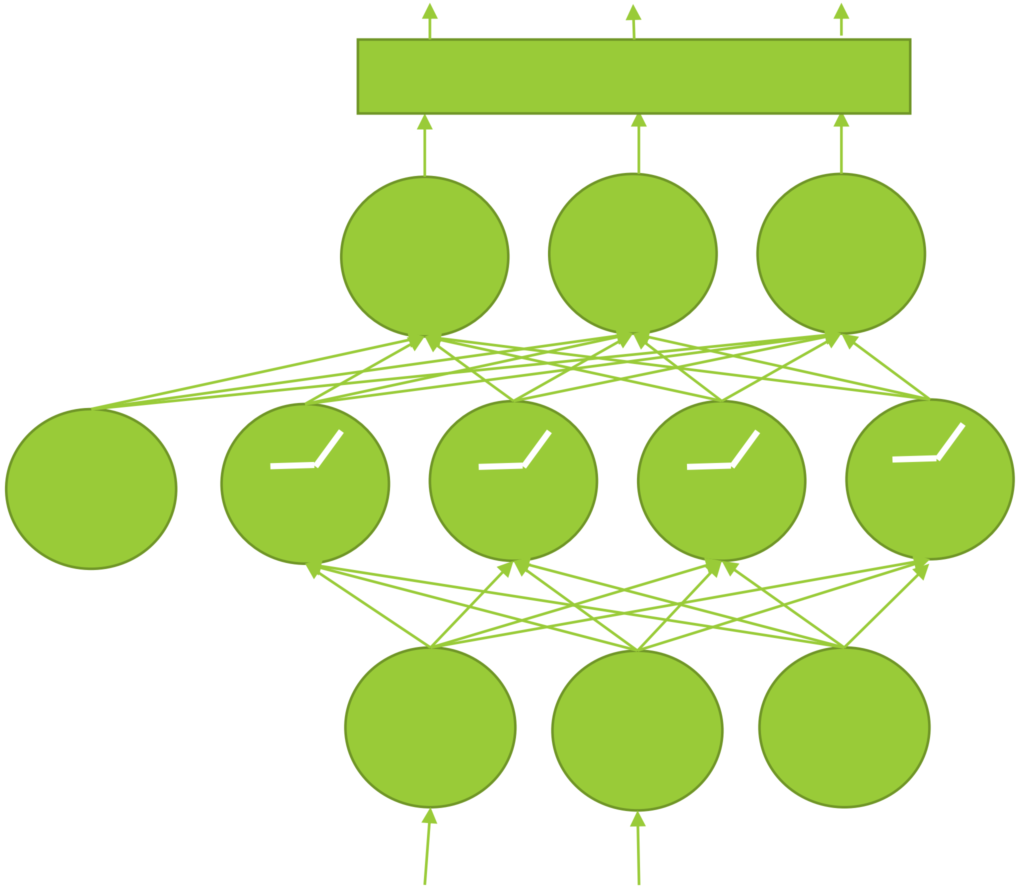
```
output =
tf.matmul(previous_layer,
layer_weights) + layer_biases
```

-

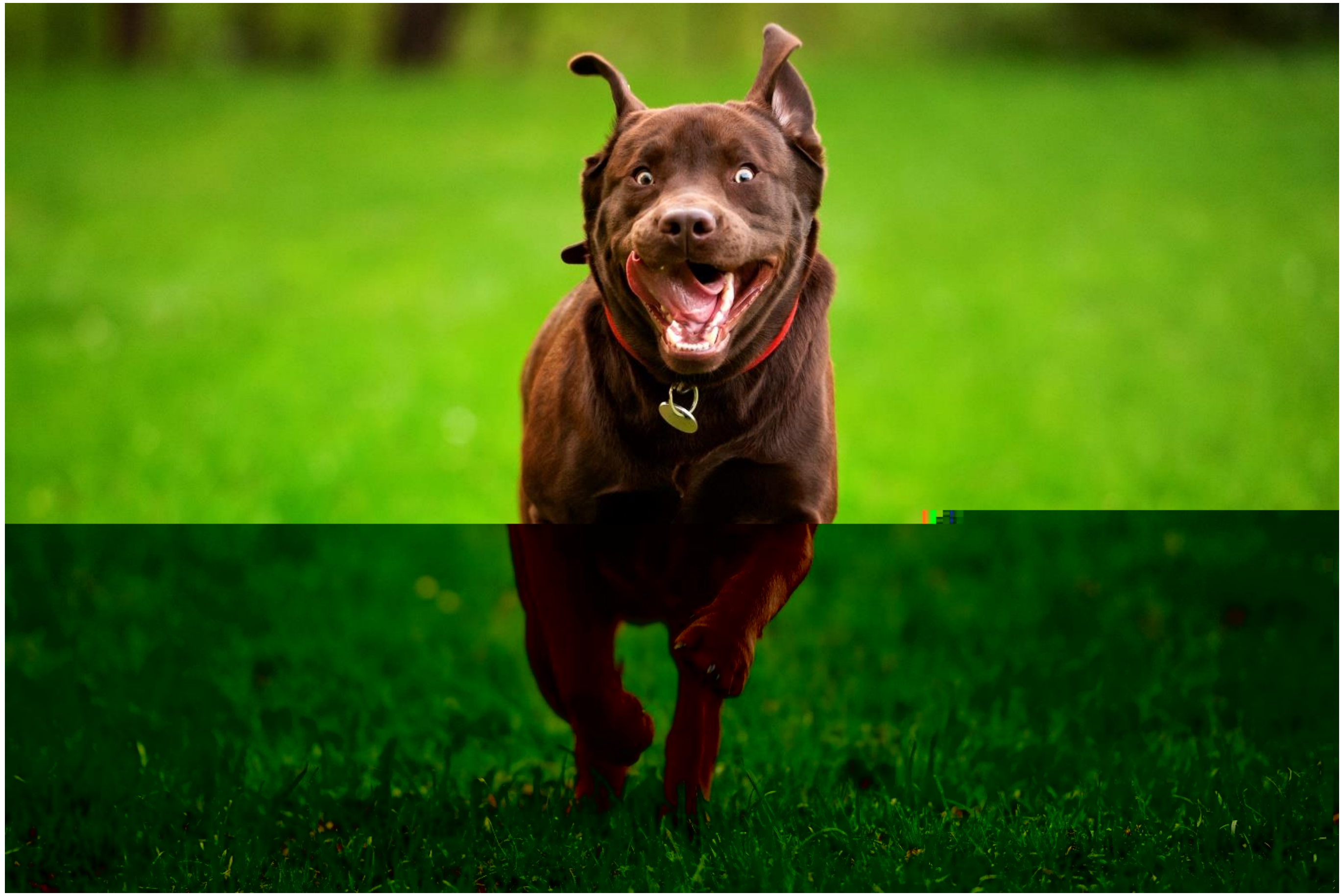


creating a neural network with tensorflow

- placeholders
- variables

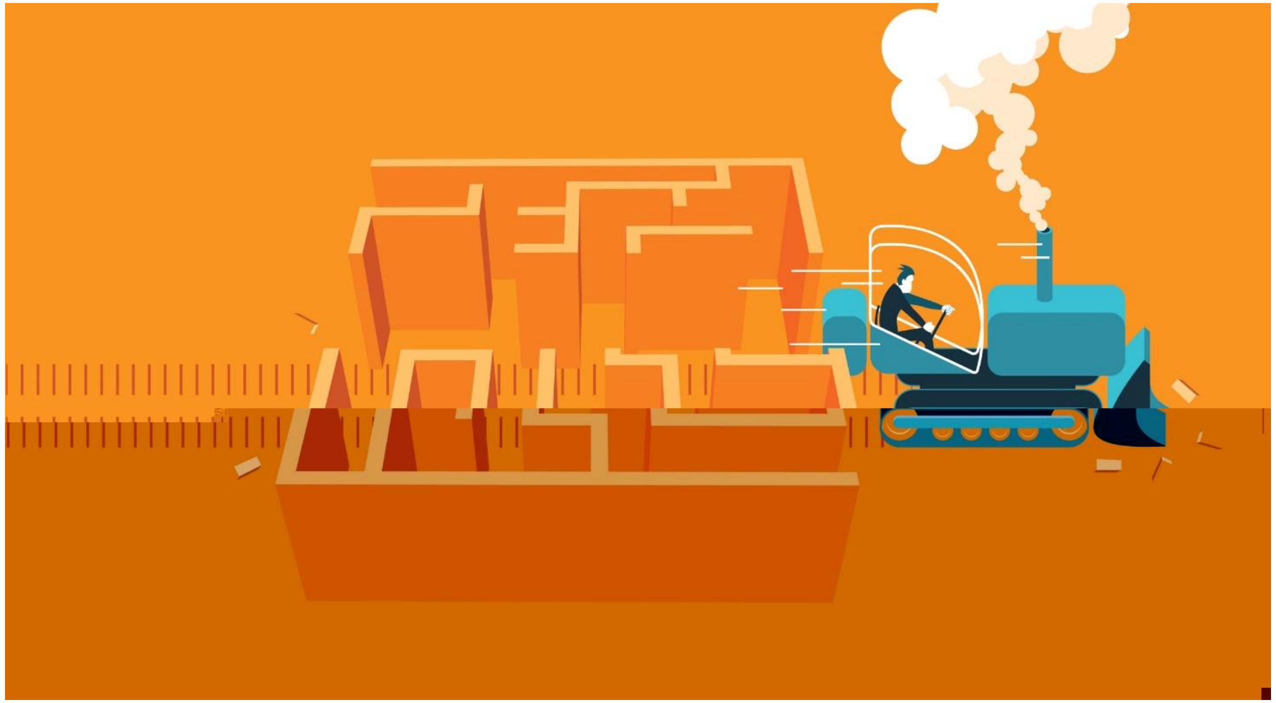
make sure your features are normalized

let’s try it out



keras

why keras?



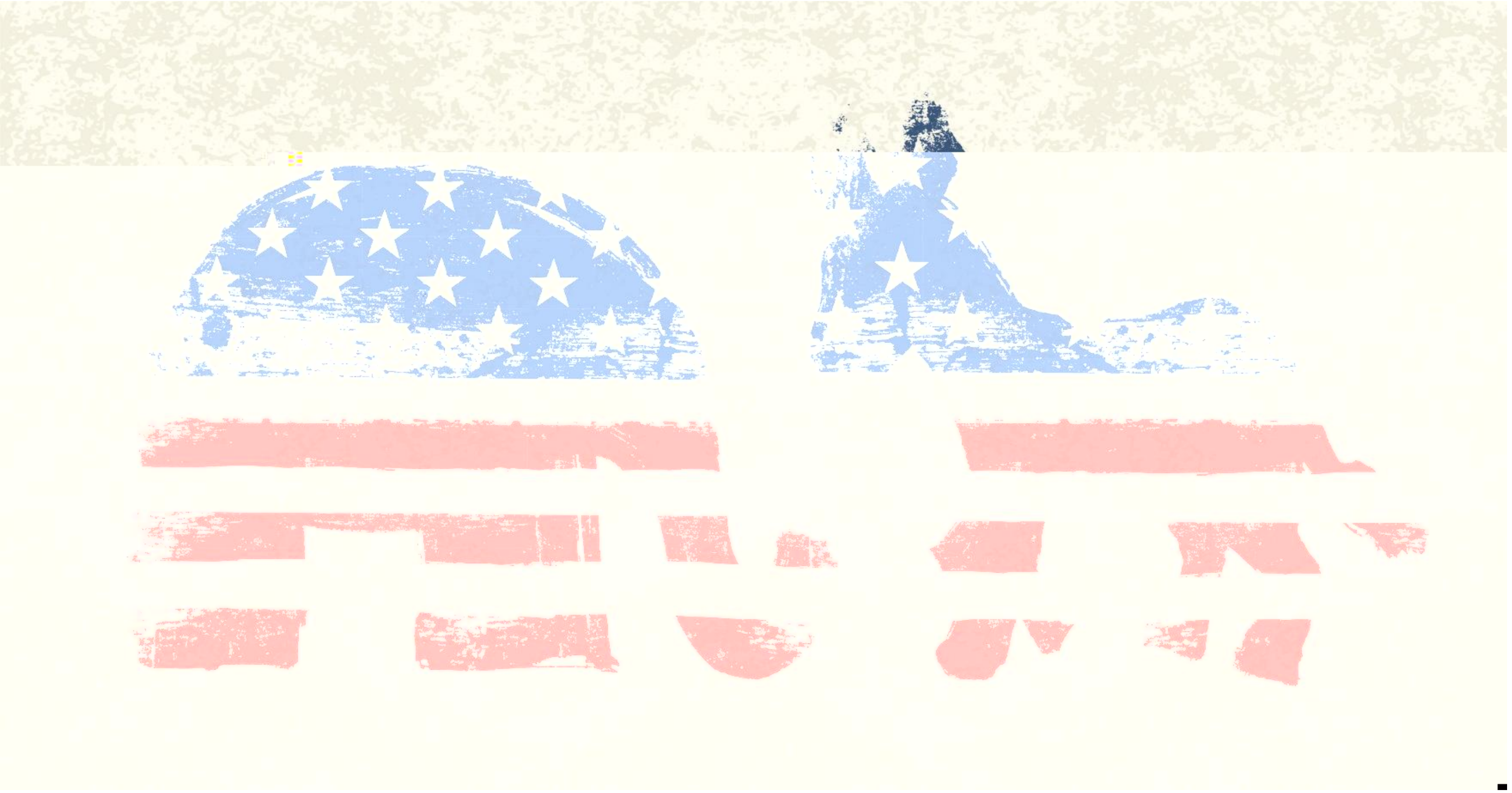
let’s dive in

```
True
```

example: binary classification

integrating keras with scikit-learn

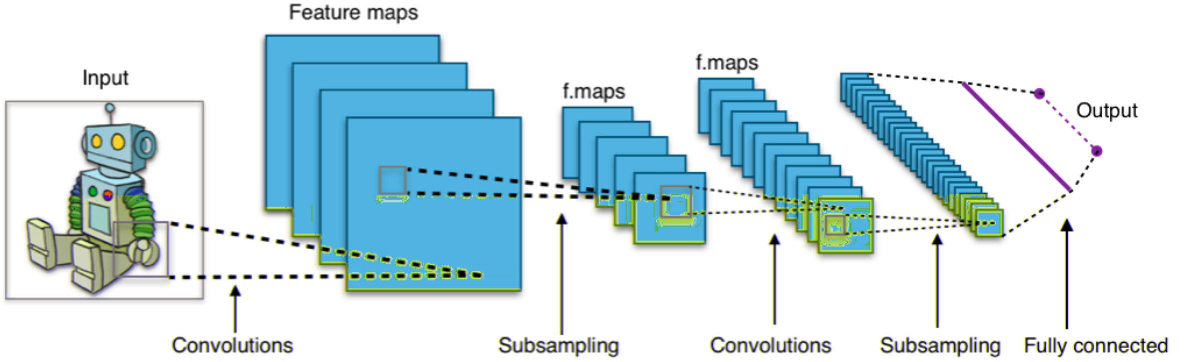
let’s try it out



convolutional neural networks

cnn's: what are they for?

cnn's: how do they work?



how do we “know” that’s a stop sign?

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cnn's with keras

cnn's are hard

specialized cnn architectures

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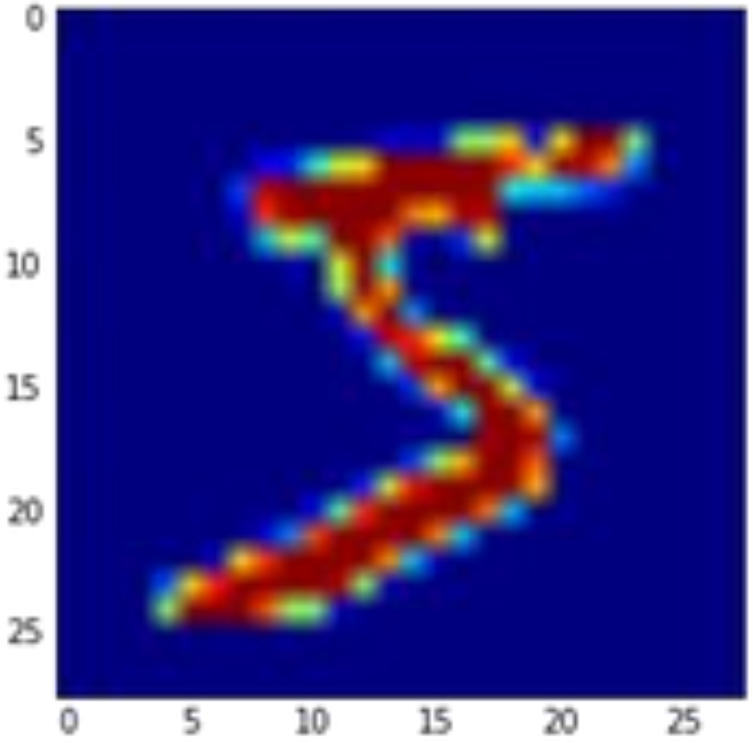
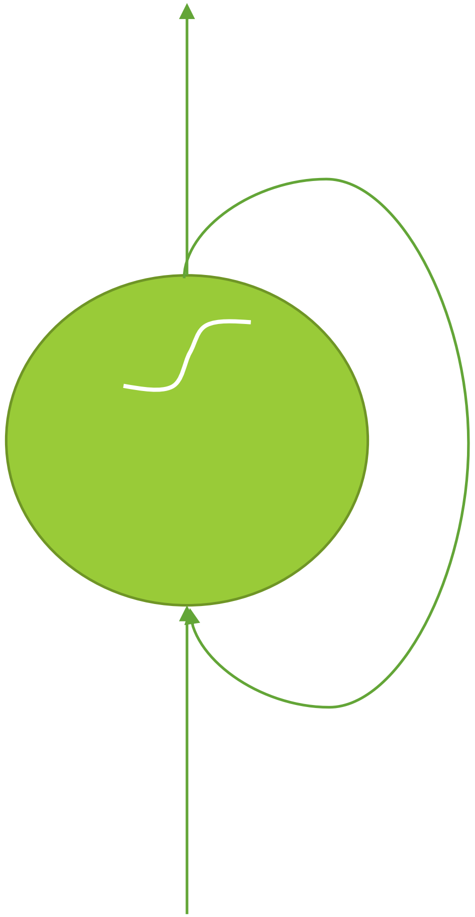
let's try it out



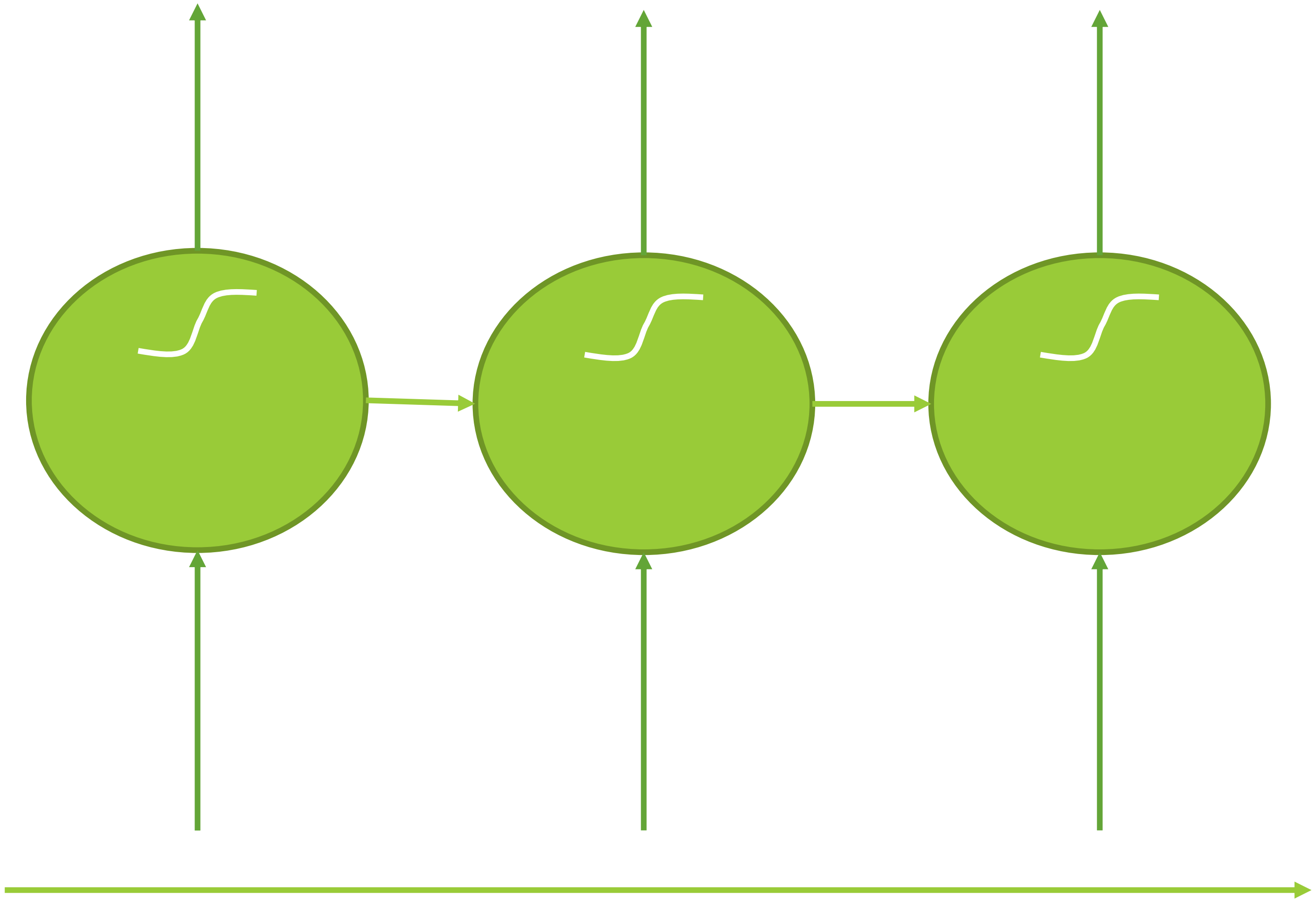
recurrent neural networks

rnn's: what are they for?

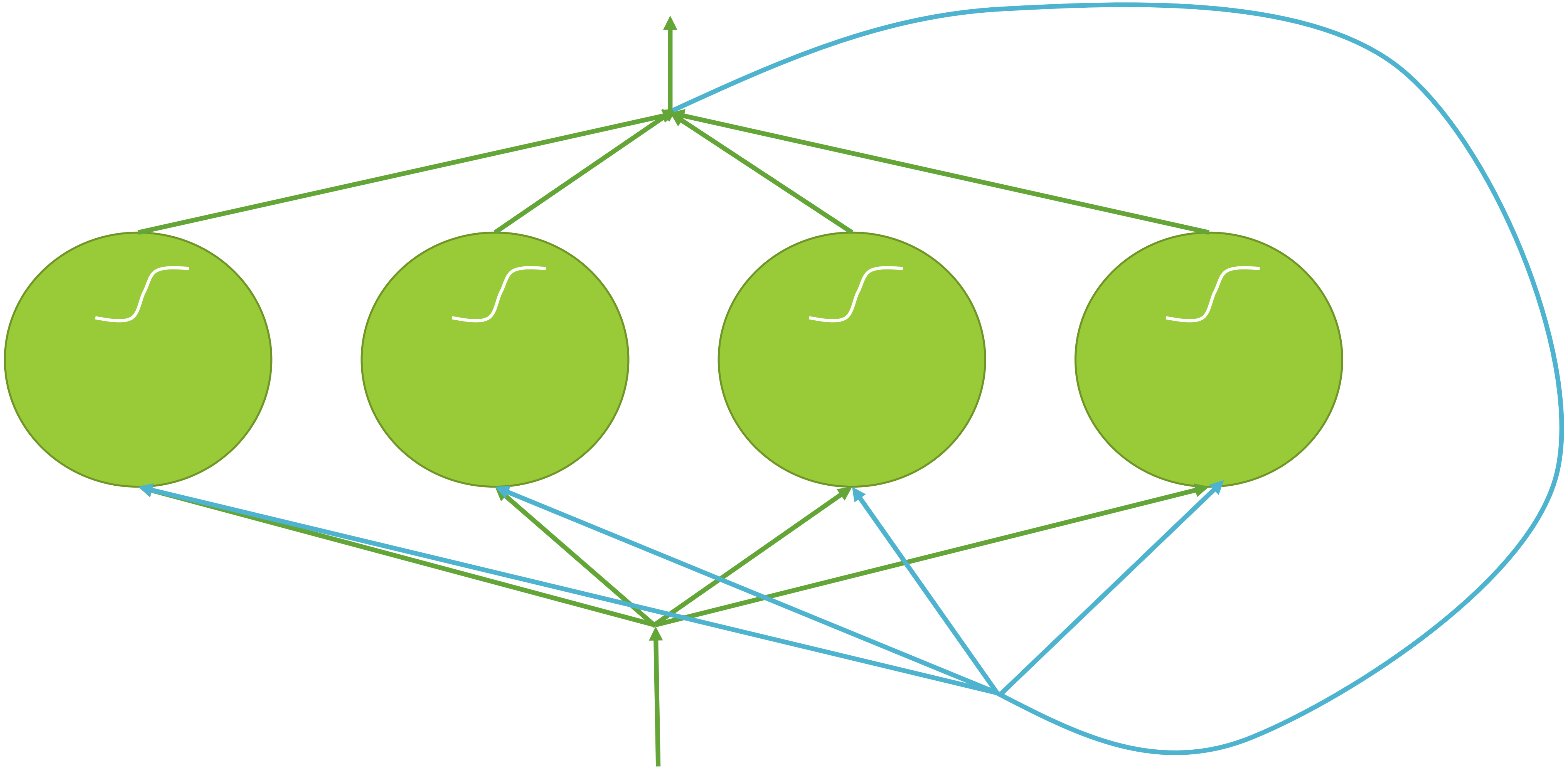
a recurrent neuron



another way to look at it



a layer of recurrent neurons



rnn topologies

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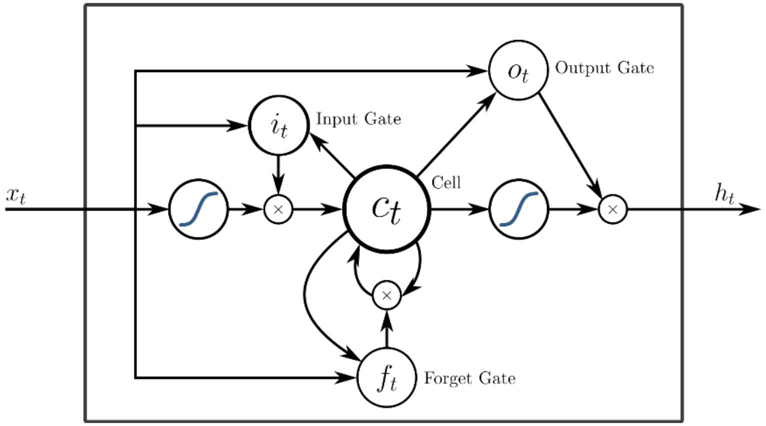
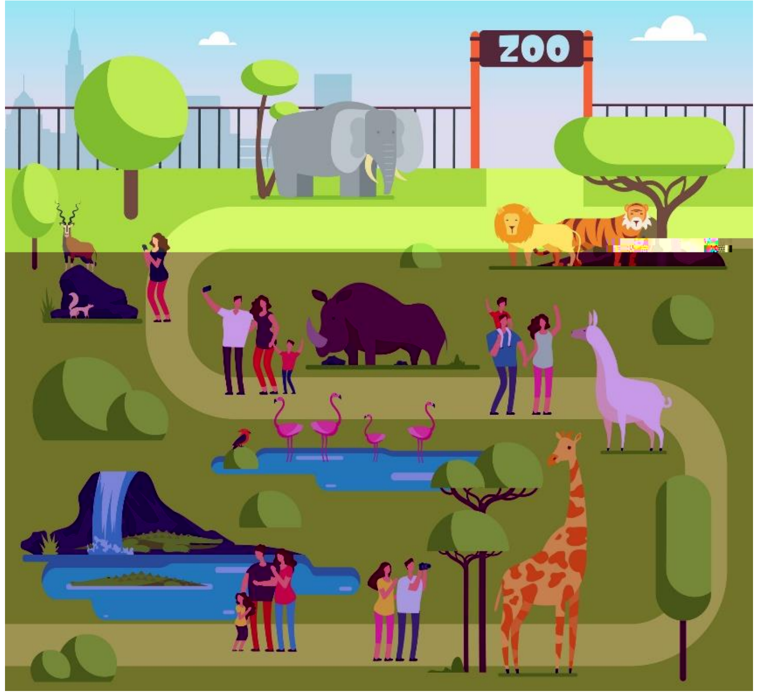
training rnn's

training rnn's



training rnn's

let’s run an example


ZOO