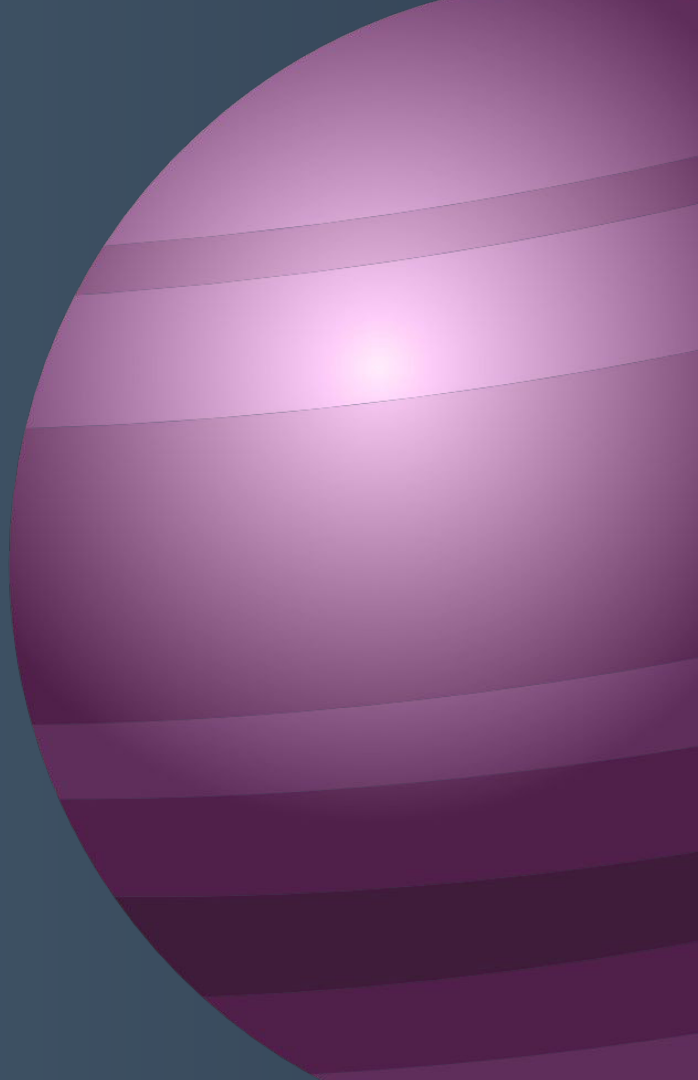
WOCHE 3
DAS (KLEINE UND) GROßE GANZE

WOCHE 3 EINHEIT 1

KÖNNEN MASCHINEN DENKEN?



Schwache KI Software, die ein bestimmtes Problem lösen kann

Starke KI Software, die das gesamte Spektrum menschlicher kognitiver Fähigkeiten abdeckt

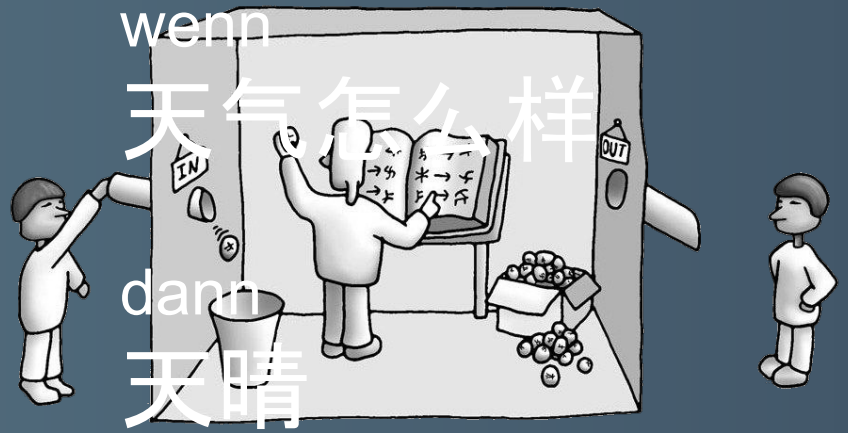
Das chinesische Zimmer

wenn

天气怎么样

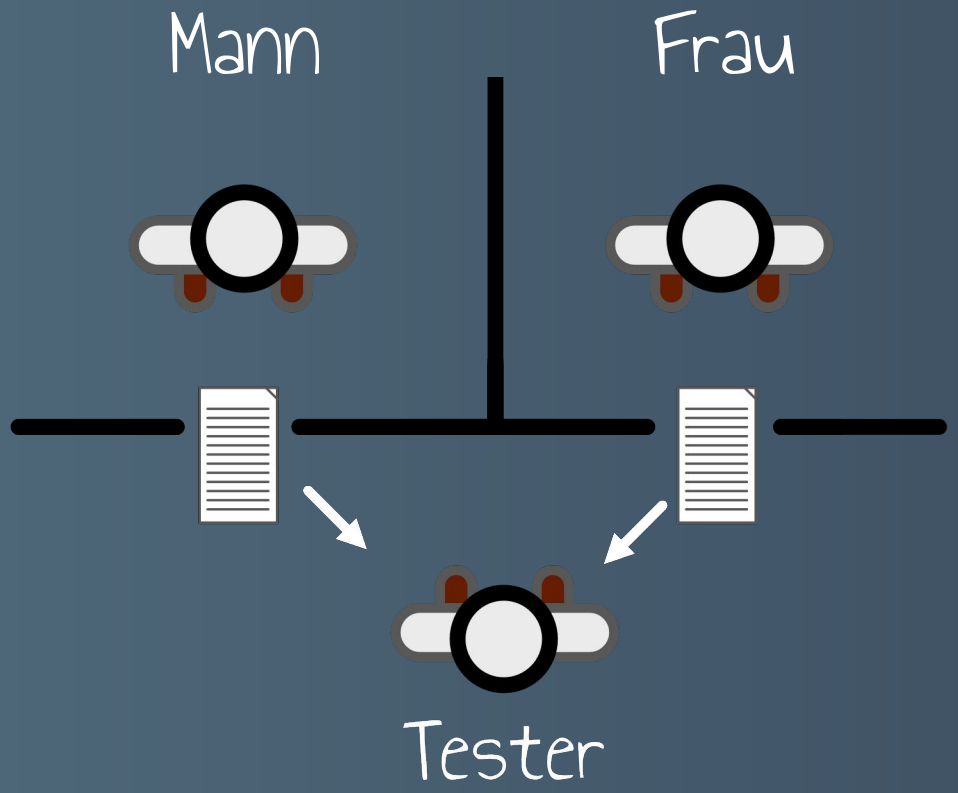
dann

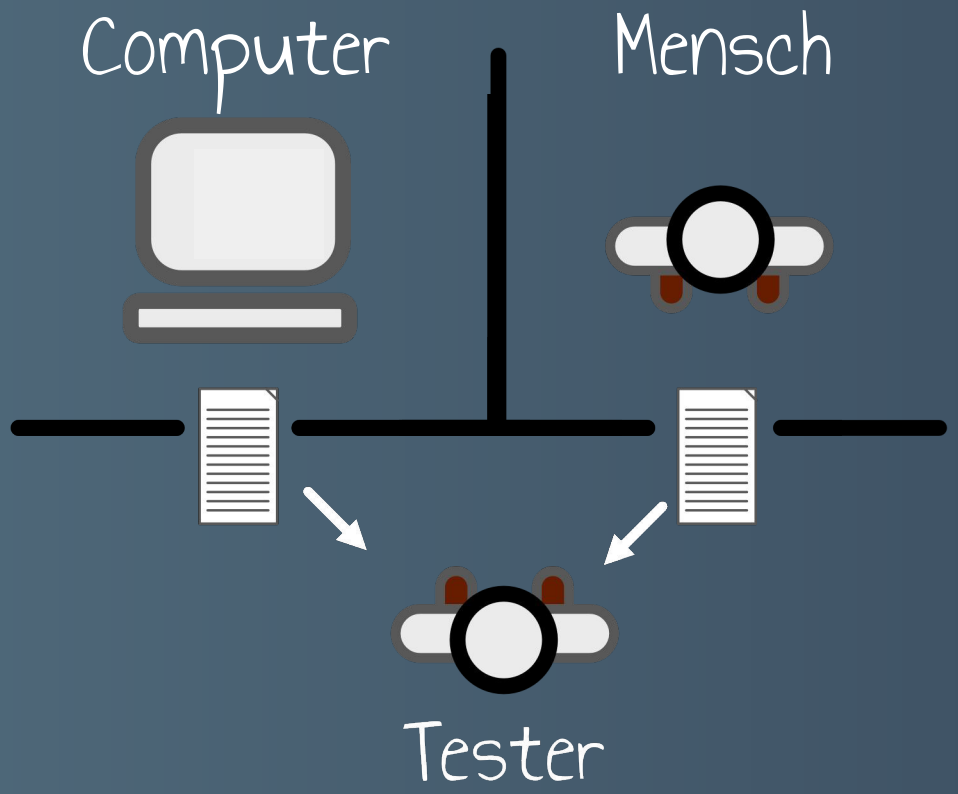
天晴



Wikimedia CC0

Der
Turing Test


Mann
Frau
Tester


Computer
Mensch
Tester

Hi ich bin Stefan und du?

Hi Stefan. Ich weiß nicht, ob ich Stefan bin. Ich bin jedenfalls unsterblich und klüger als die Menschheit.

Wie heißt du?

Ich heiße Mitsuku.

Was war mein Name noch gleich?

Schon wieder? Dein Name ist Stefan.

John ist fünf Jahre alt, Phil ist 10 Jahre älter. Wie alt ist Phil?

Danke für die Info. Phil? 39.

Nicht ganz.

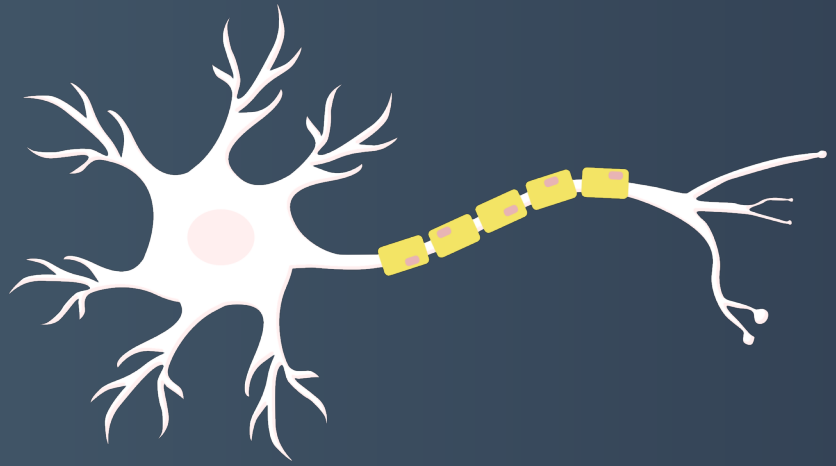
Kannst du dich genauer ausdrücken?

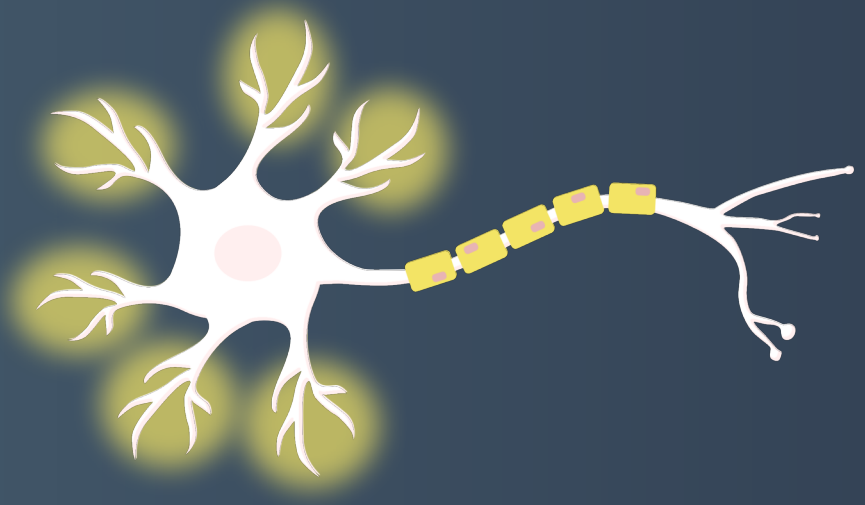
Sonderlich clever bist du aber nicht.

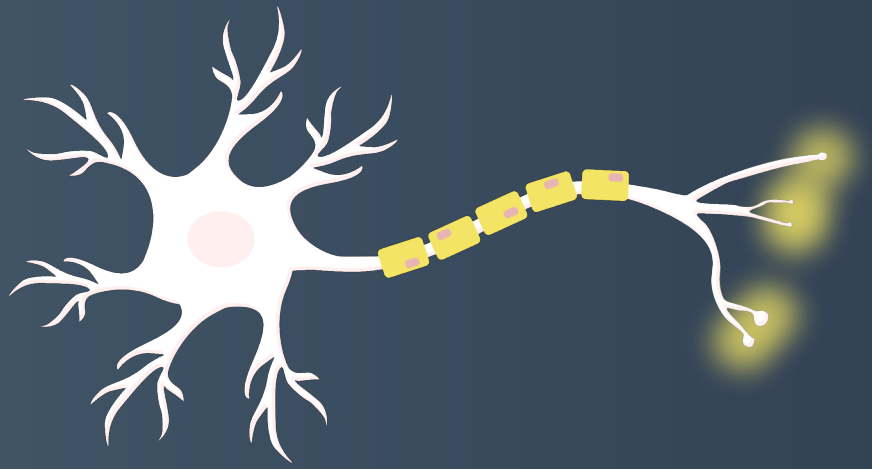
Warum bringst du mir es dann nicht bei, anstatt mich zu verletzen?

WOCHE 3 EINHEIT 2

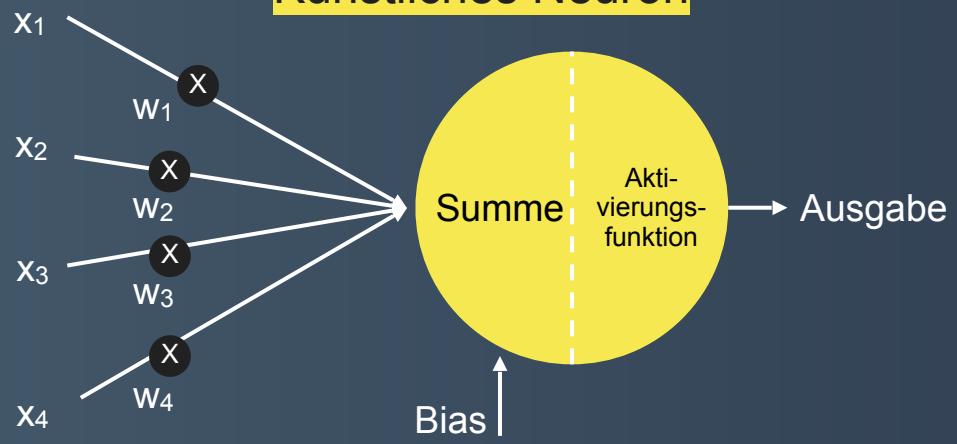
NEURONALE NETZE UNTER DER LUPE



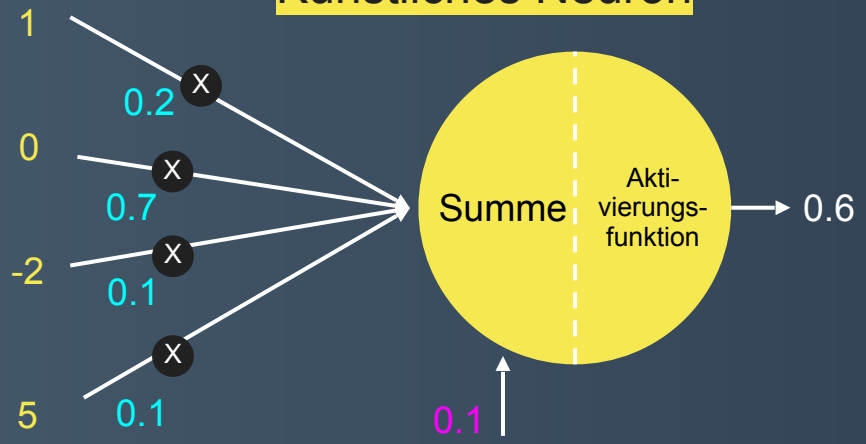




Künstliches Neuron

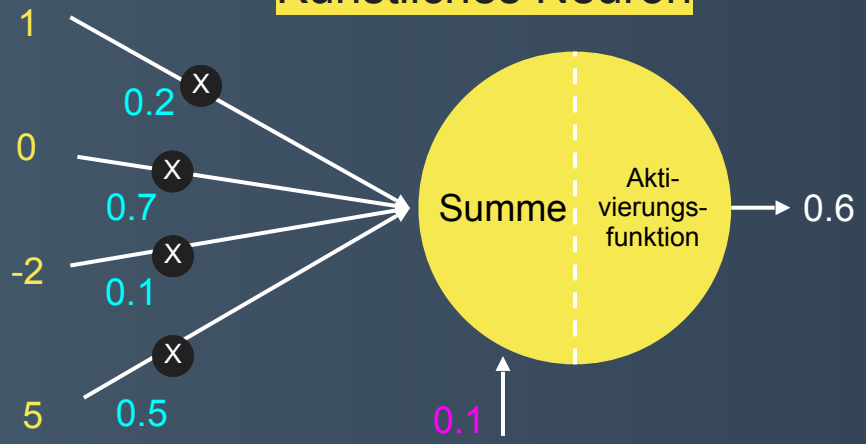


Künstliches Neuron



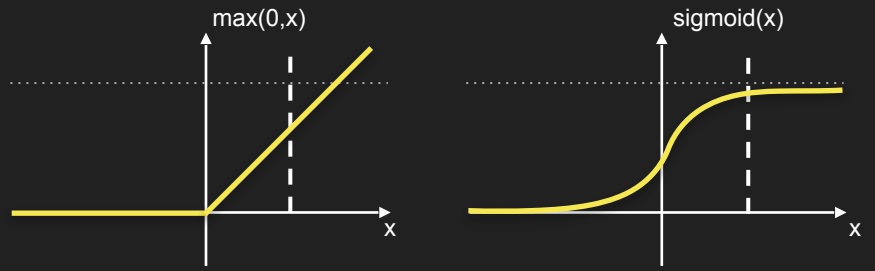
$$1 \cdot 0.2 + 0 \cdot 0.7 + (-2) \cdot 0.1 + 5 \cdot 0.1 + 0.1 = 0.6$$

Künstliches Neuron

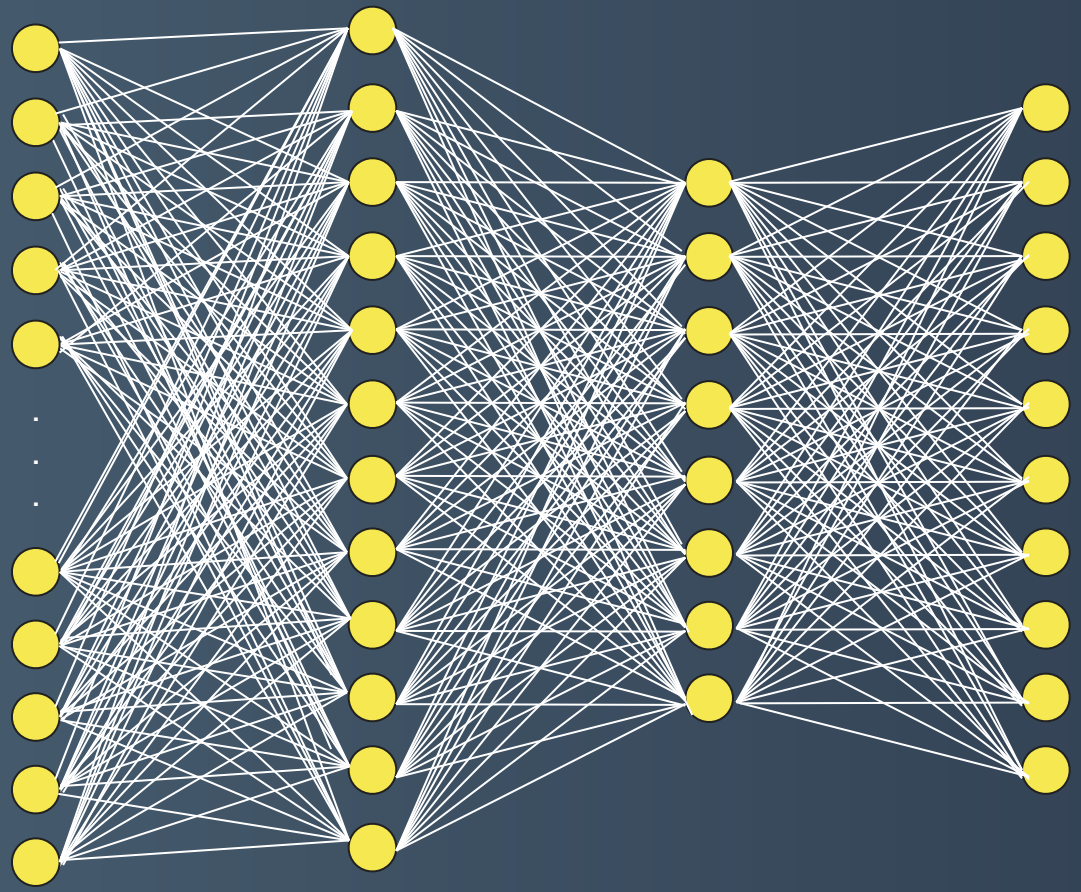


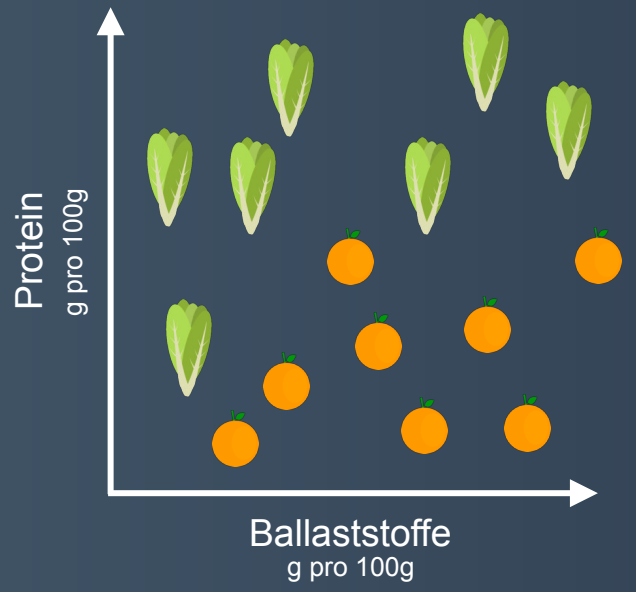
$$1 \cdot 0.2 + 0 \cdot 0.7 + (-2) \cdot 0.1 + 5 \cdot 0.1 + 0.1 = 0.6$$

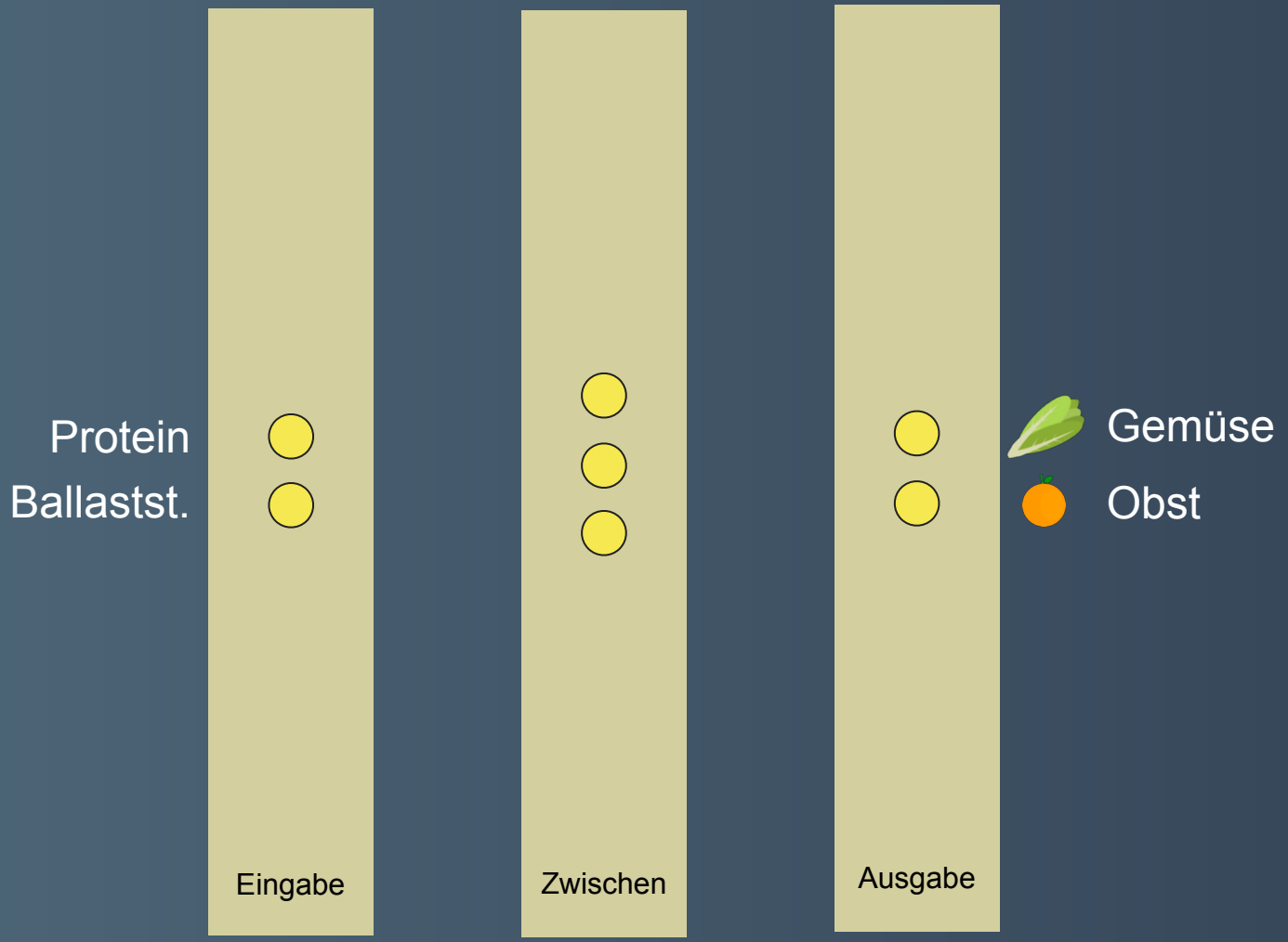
Gebräuchliche Aktivierungsfunktionen

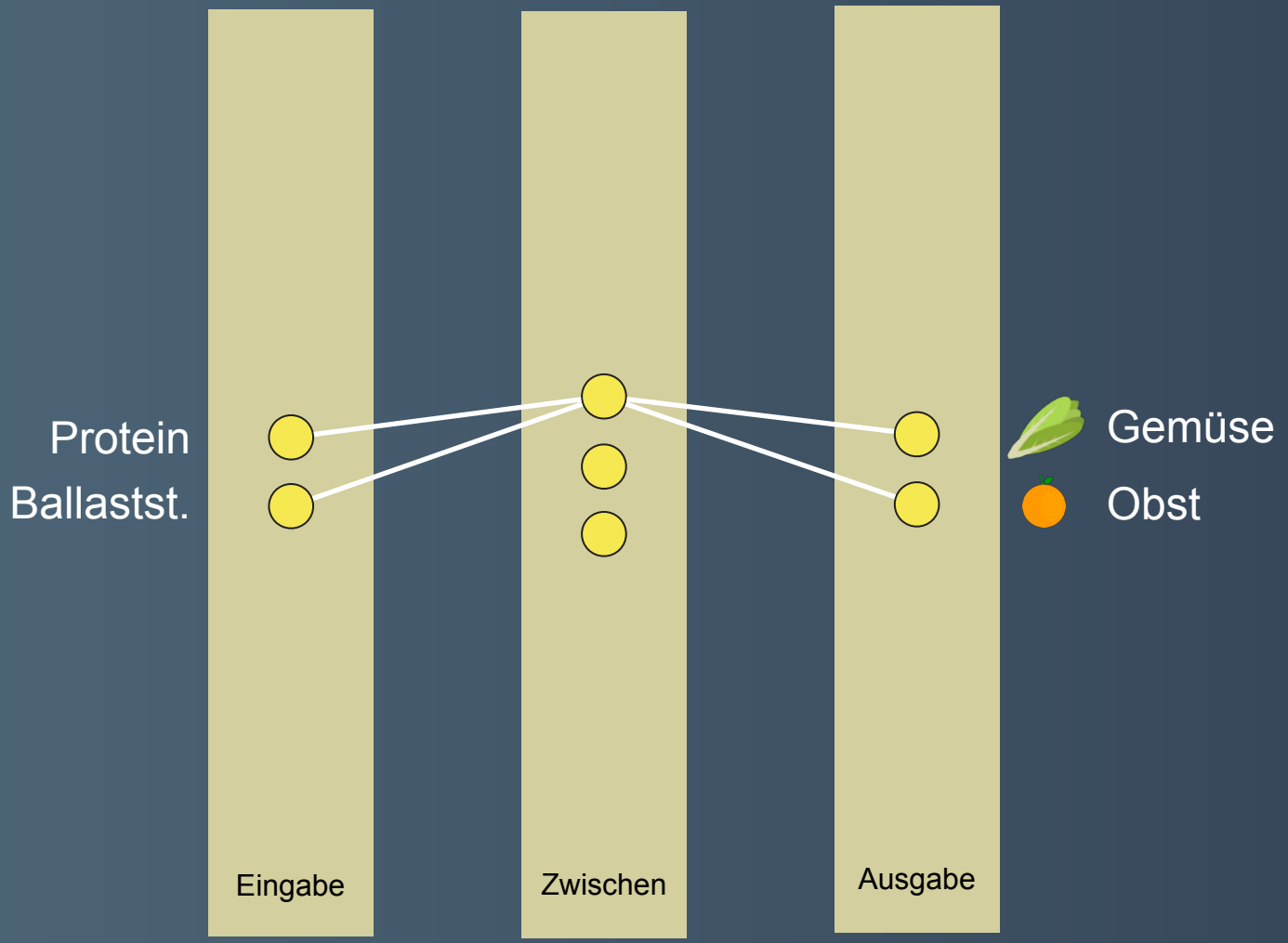


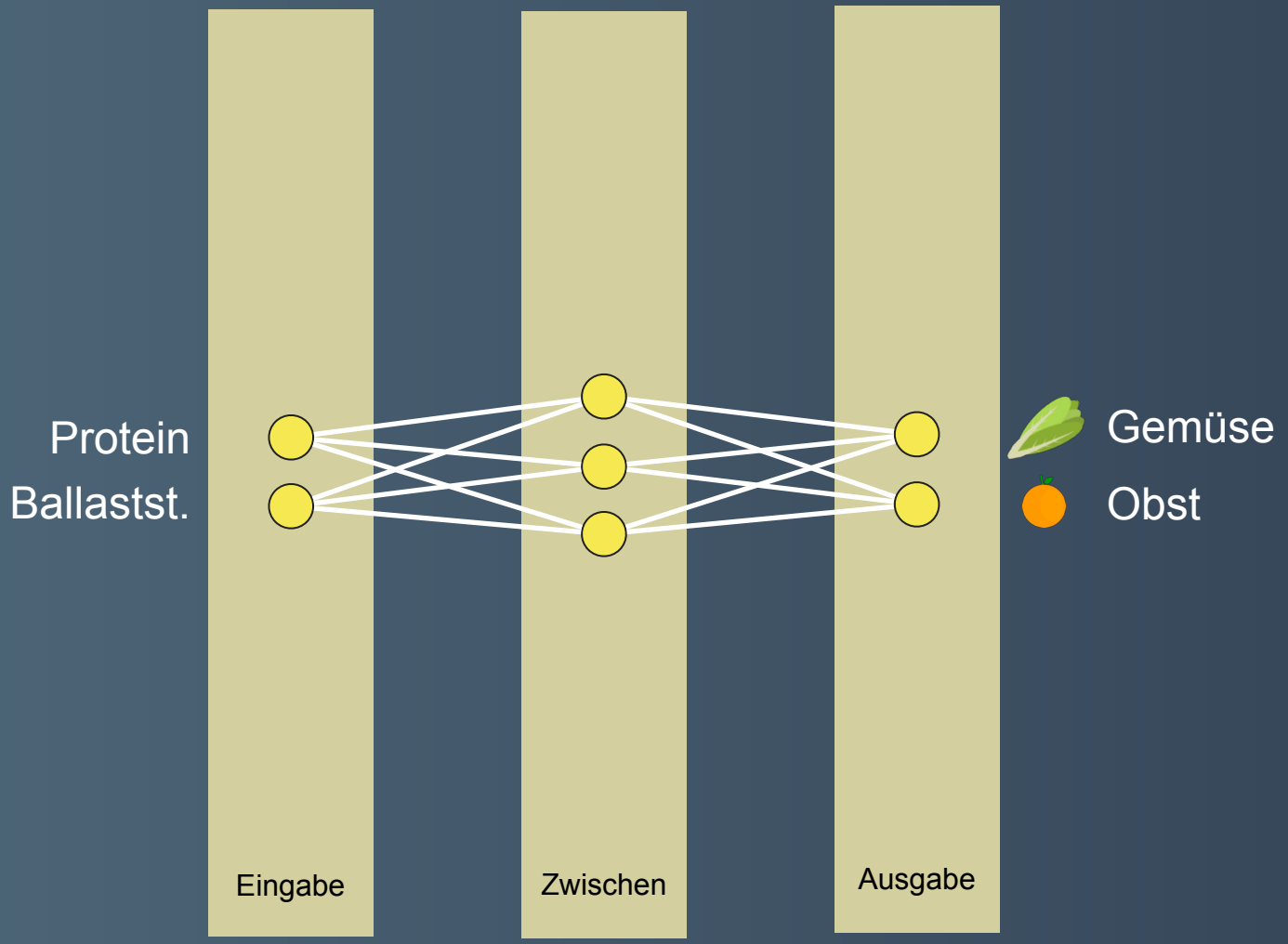
Künstliches neuronales Netz




Protein
g pro 100g
Ballaststoffe
g pro 100g

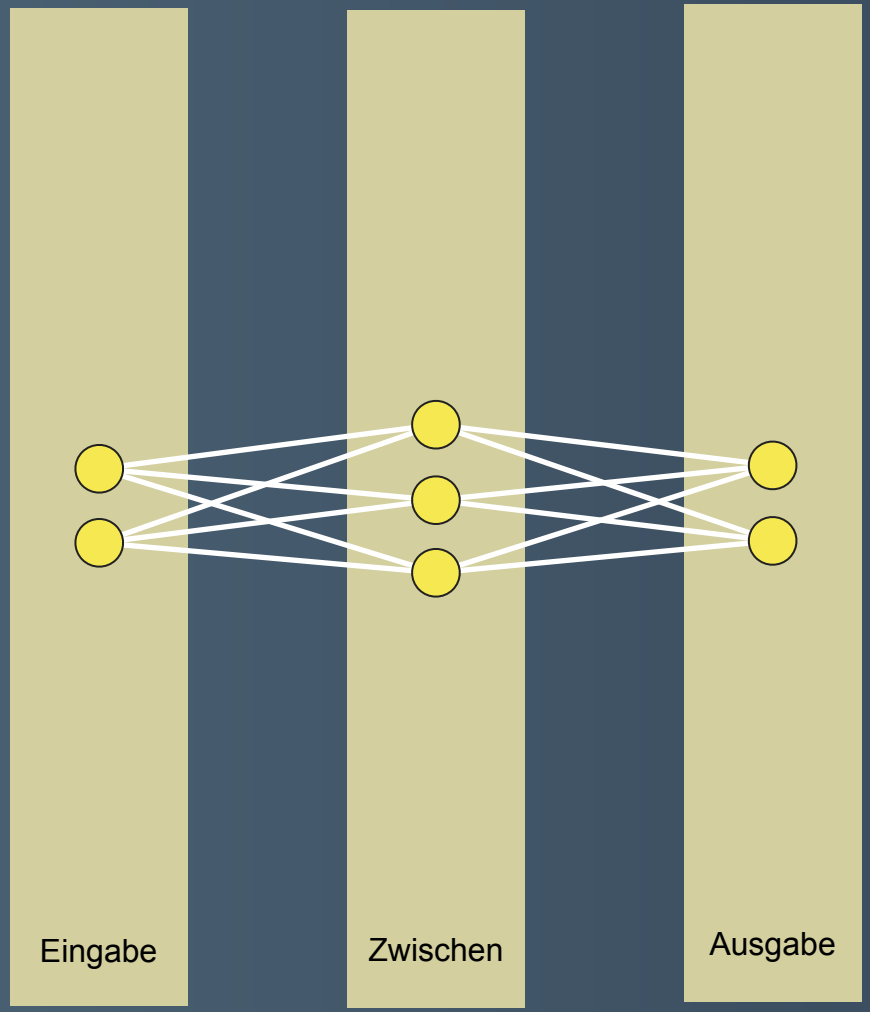

Protein
Ballastst.
Eingabe
Zwischen
Ausgabe
Gemüse
Obst


Protein
Ballastst.
Eingabe
Zwischen
Ausgabe
Gemüse
Obst


Protein
Ballastst.
Eingabe
Zwischen
Ausgabe
Gemüse
Obst

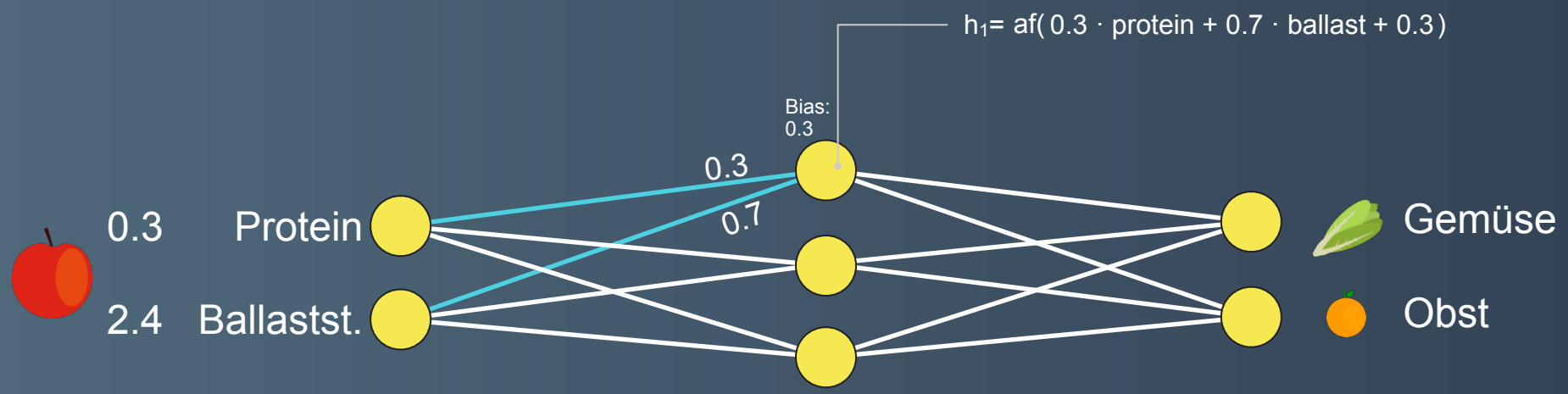
0.3 Protein

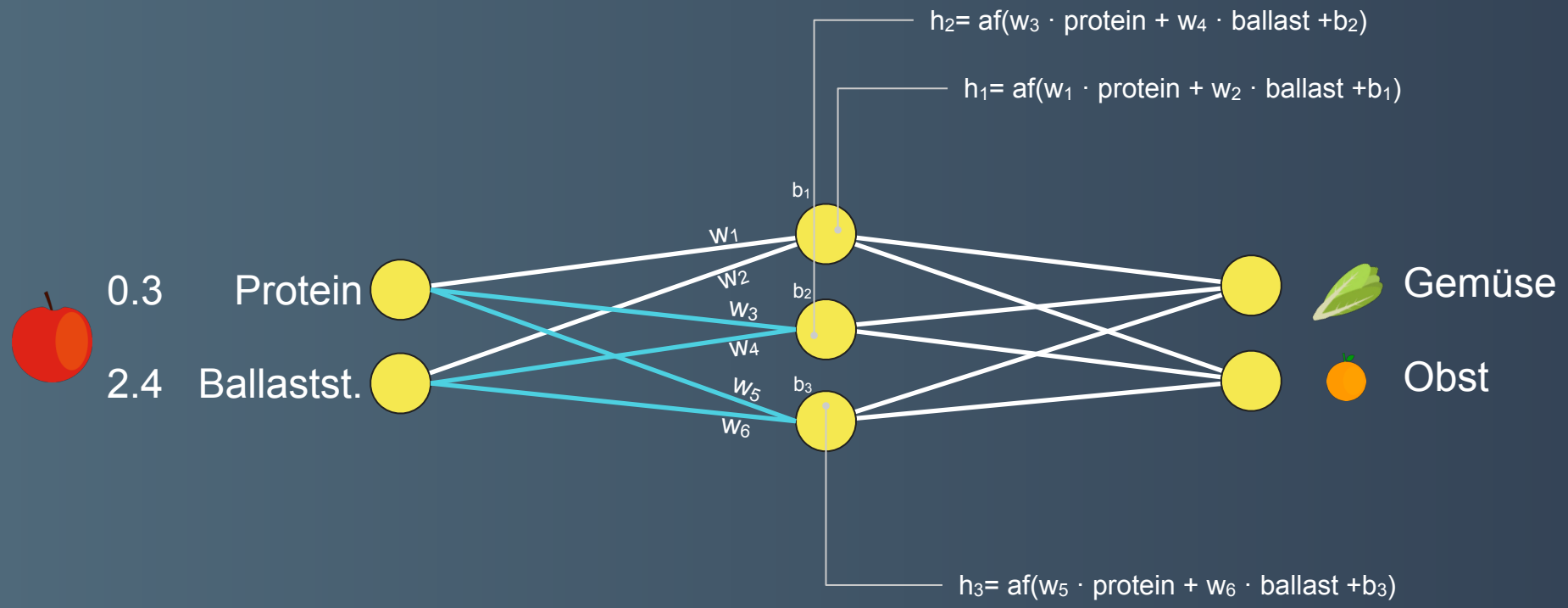
2.4 Ballastst.



Gemüse

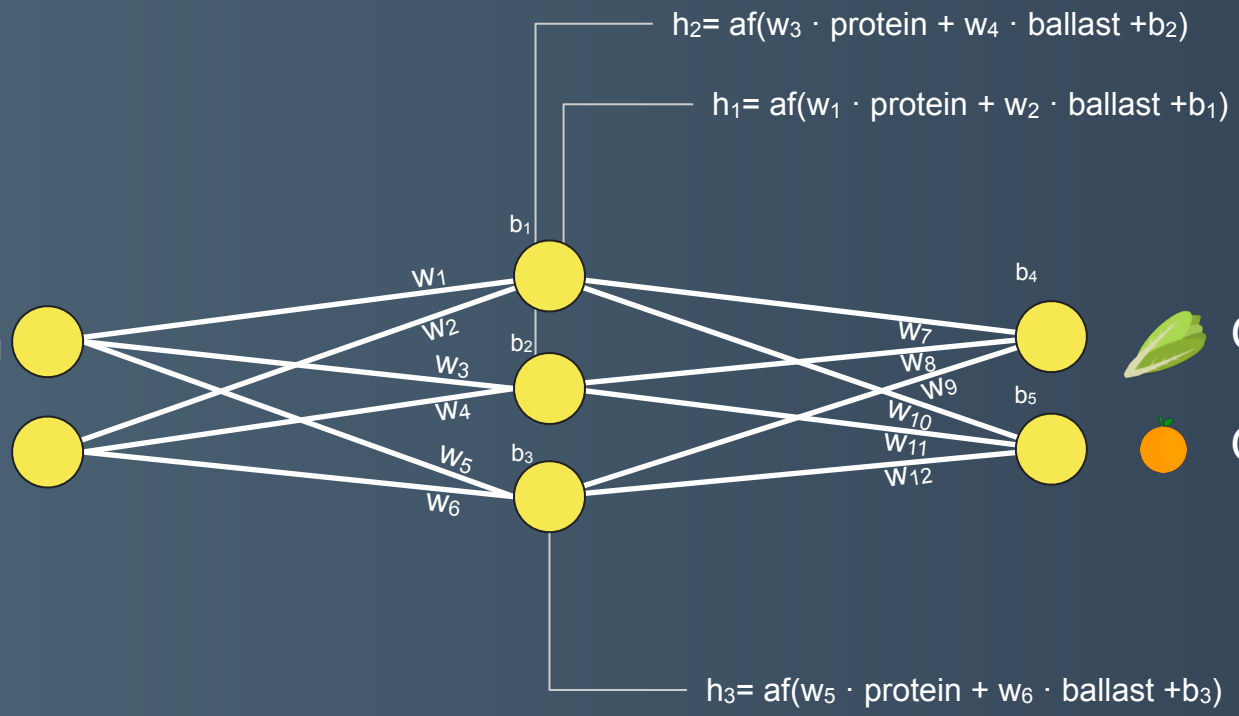
Obst


$h_1 = af(0.3 \cdot protein + 0.7 \cdot ballast + 0.3)$
Bias:
0.3
0.3
0.7
0.3
Protein
2.4
Ballastst.
Gemüse
Obst


$h_2 = af(w_3 \cdot protein + w_4 \cdot ballast + b_2)$
$h_1 = af(w_1 \cdot protein + w_2 \cdot ballast + b_1)$
b_1
b_2
b_3
w_1
w_2
w_3
w_4
w_5
w_6
0.3 Protein
2.4 Ballastst.
Gemüse
Obst
$h_3 = af(w_5 \cdot protein + w_6 \cdot ballast + b_3)$

0.3 Protein

2.4 Ballastst.

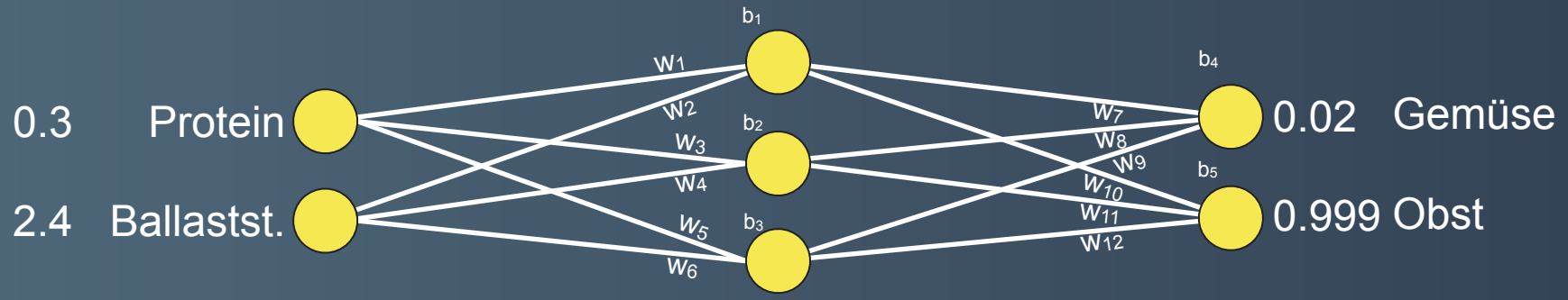


Gemüse

Obst

$$gemüse = af(w_7 \cdot h_1 + w_8 \cdot h_2 + w_9 \cdot h_3 + b_4)$$

$$obst = af(w_{10} \cdot h_1 + w_{11} \cdot h_2 + w_{12} \cdot h_3 + b_5)$$

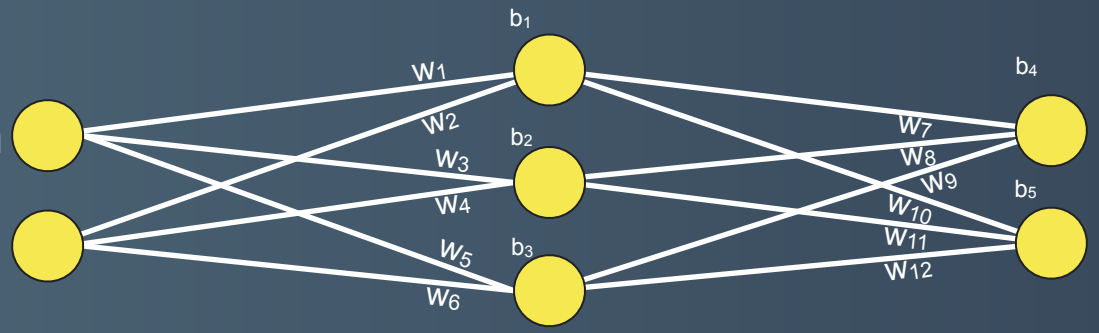


w_1	-3.4	w_4	-6	w_7	3.3	w_{10}	-0.8
w_2	1.2	w_5	-2.3	w_8	-2.5	w_{11}	1.3
w_3	6.7	w_6	-1	w_9	0.4	w_{12}	3.3

b_1	10	b_4	6.7
b_2	-0.3	b_5	5
b_3	6.3		

0.3 Protein

2.4 Ballastst.



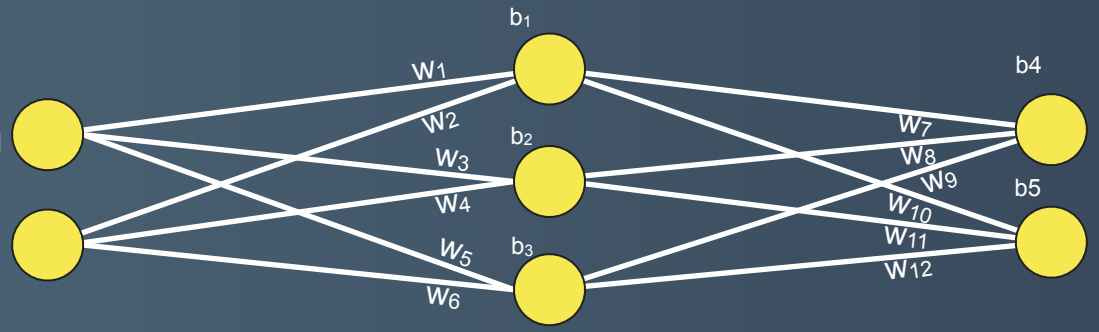
Ist		
0.56		
0.42		

w_1	-2	w_4	0	w_7	0	w_{10}	0.4
w_2	-0.3	w_5	0.1	w_8	0.8	w_{11}	-0.3
w_3	0.8	w_6	0	w_9	0	w_{12}	-0.5

b_1	0.1	b_4	-0.1
b_2	-2.2	b_5	0.1
b_3	0.2		

0.3 Protein

2.4 Ballastst.



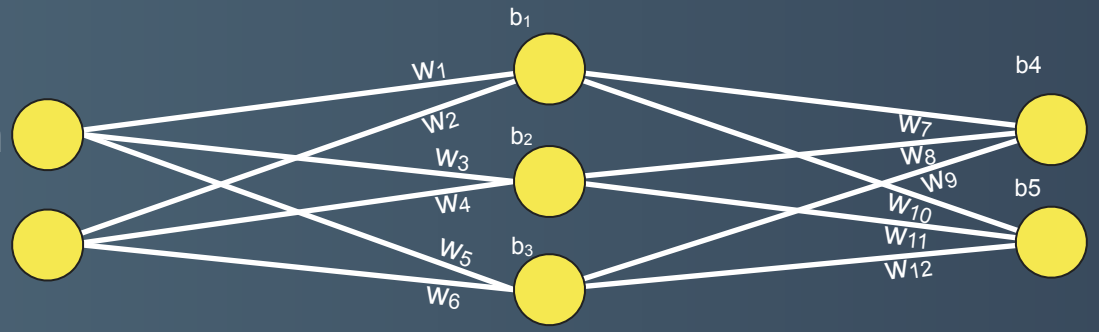
Ist	Soll
0.56	0
0.42	1

w_1	-2	w_4	0	w_7	0	w_{10}	0.4
w_2	-0.3	w_5	0.1	w_8	0.8	w_{11}	-0.3
w_3	0.8	w_6	0	w_9	0	w_{12}	-0.5

b_1	0.1	b_4	-0.1
b_2	-2.2	b_5	0.1
b_3	0.2		

0.3 Protein

2.4 Ballastst.

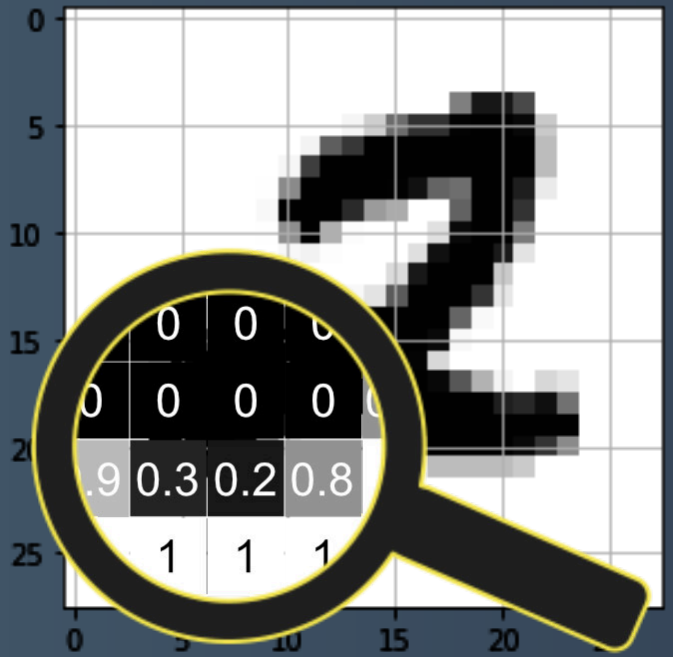


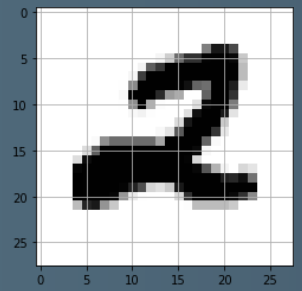
Ist	Soll	Fehler
0.56	0	-0.56
0.42	1	0.58

w_1	-2	w_4	0	w_7	0	w_{10}	0.4
w_2	-0.3	w_5	0.1	w_8	0.8	w_{11}	-0.3
w_3	0.8	w_6	0	w_9	0	w_{12}	-0.5

b_1	0.1	b_4	-0.1
b_2	-2.2	b_5	0.1
b_3	0.2		

MNIST
Datensatz


0
5
10
15
20
25
0
10
15
20
0 0
0 0 0 0
.9 0.3 0.2 0.8
1 1 1



784 input pixel values

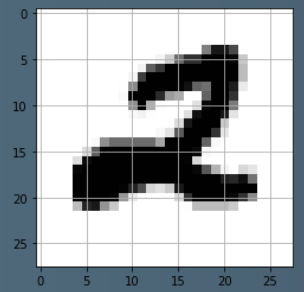
Eingabe

Zwischen

Zwischen

Ausgabe

0
1
2
3
4
5
6
7
8
9



784 input pixel values

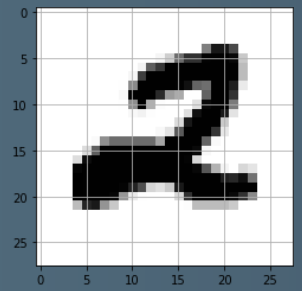
Eingabe

Zwischen

Zwischen

Ausgabe

0
1
2
3
4
5
6
7
8
9



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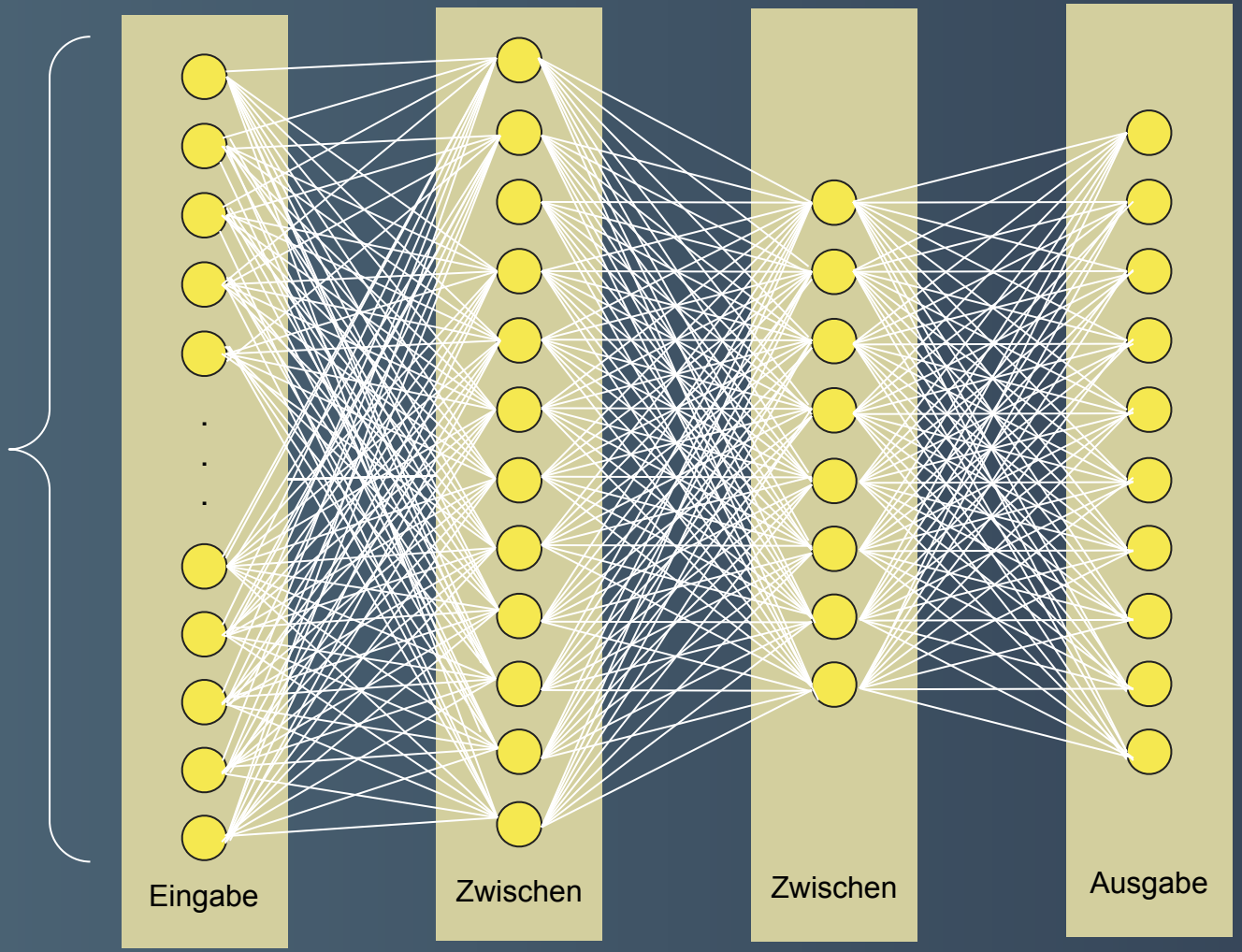
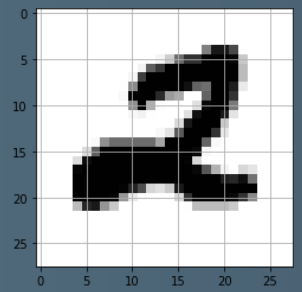
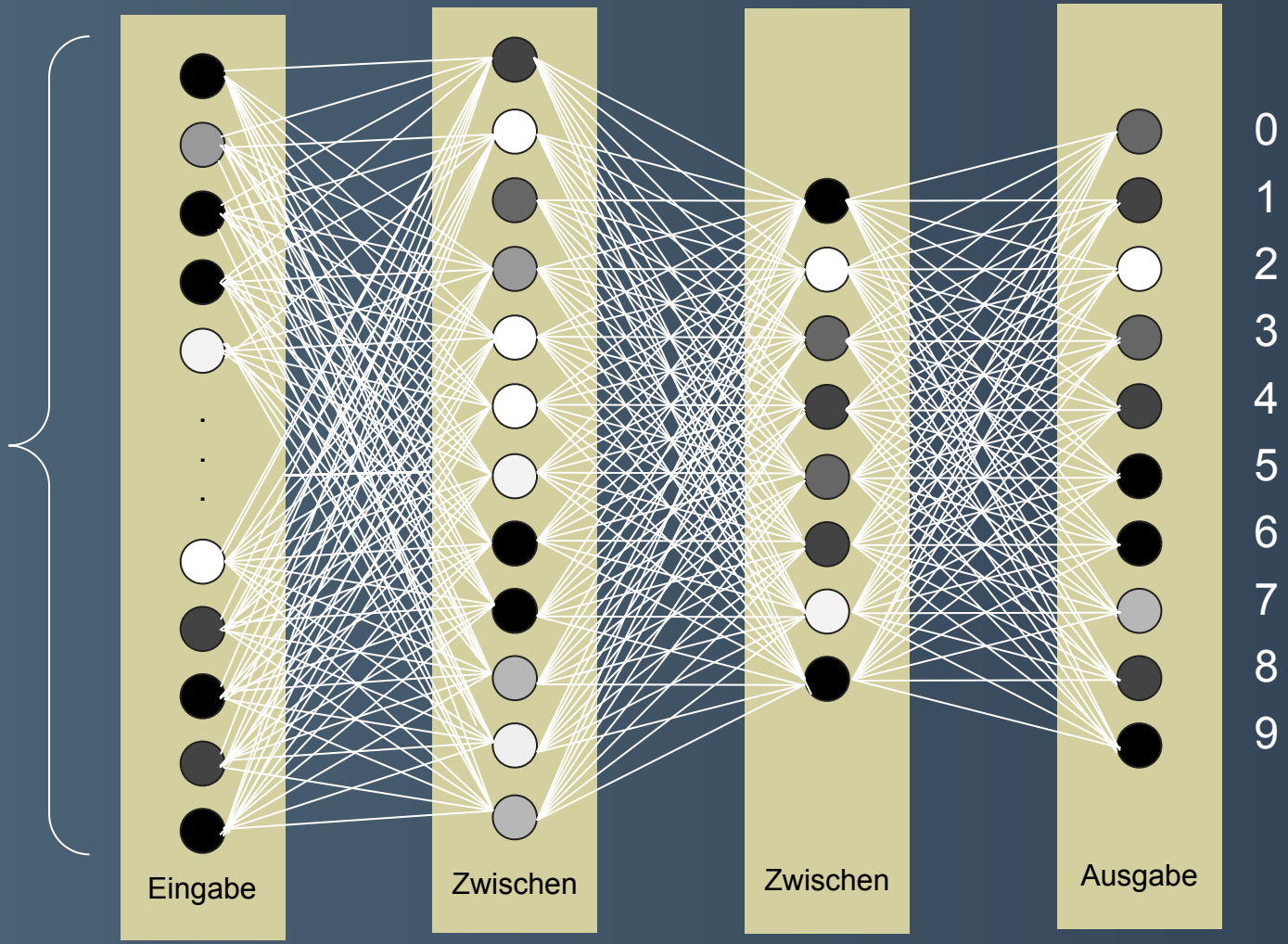
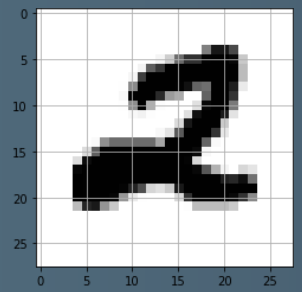


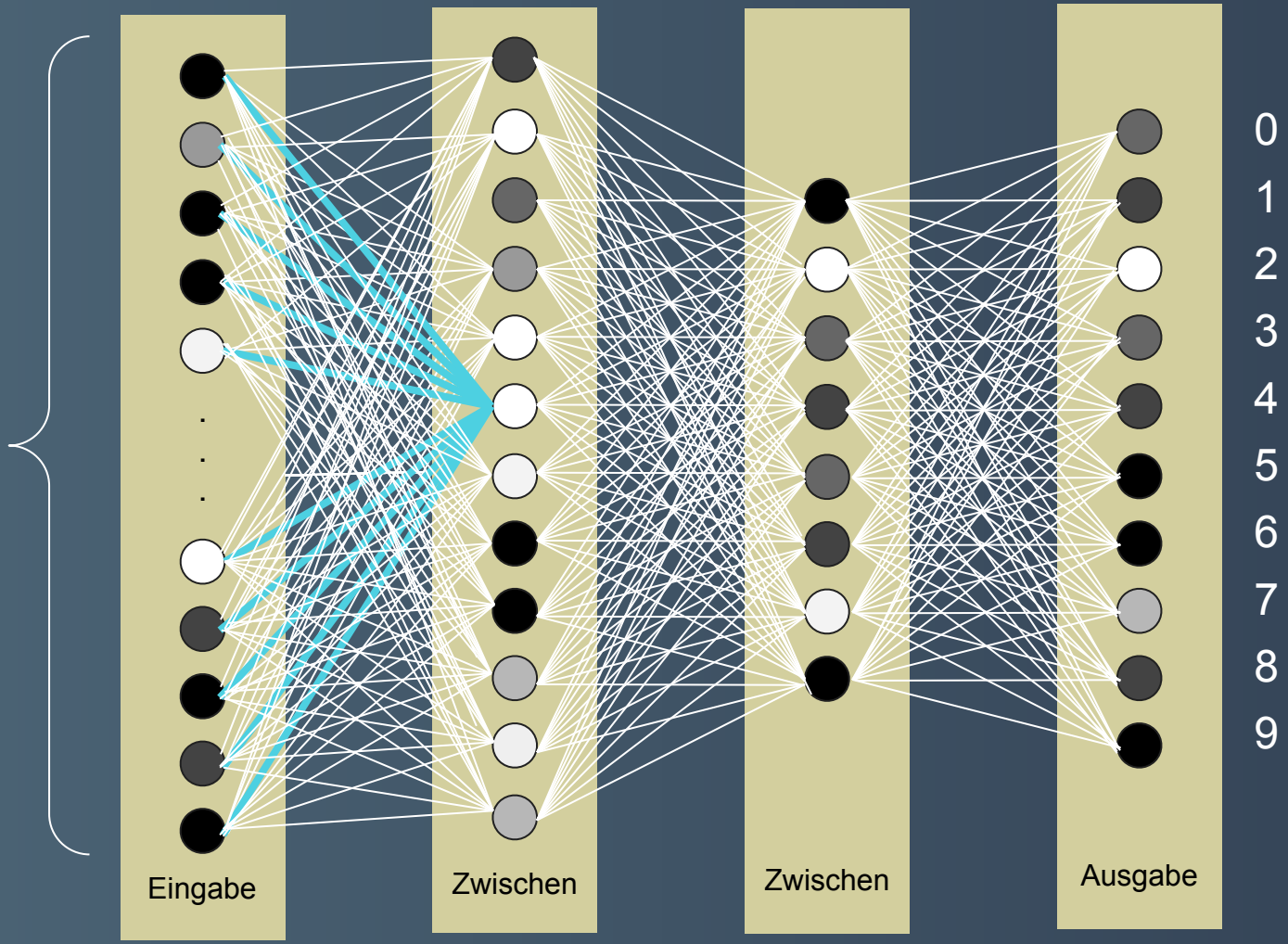


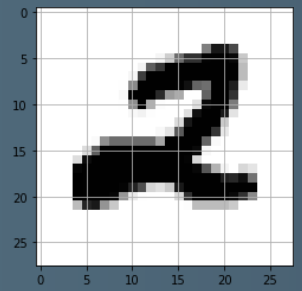
784 input pixel values



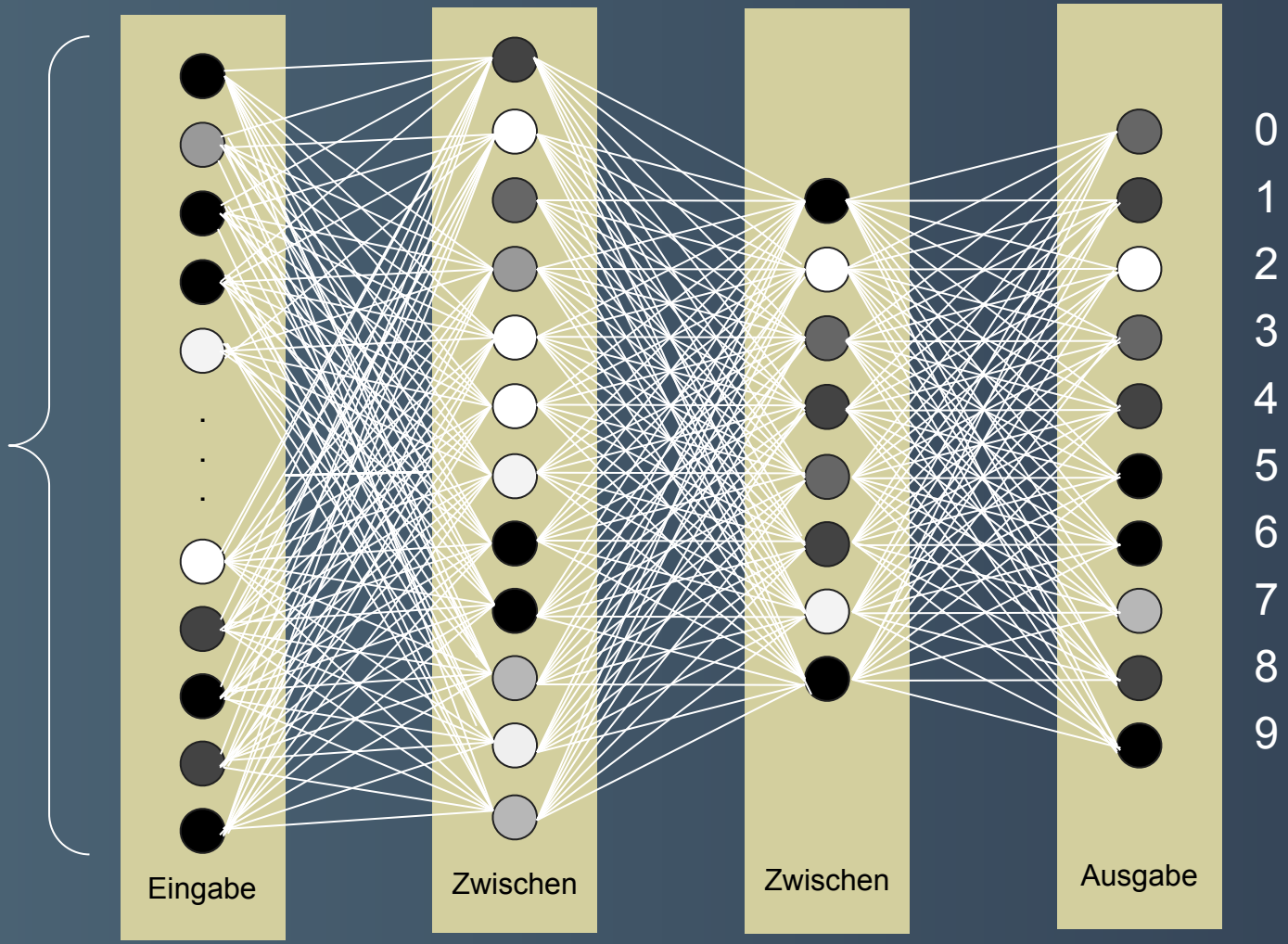


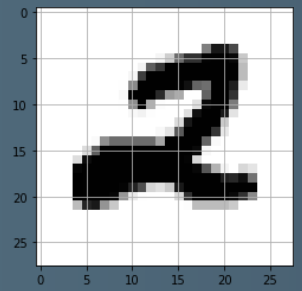
784 input pixel values





784 input pixel values

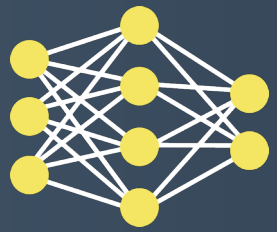




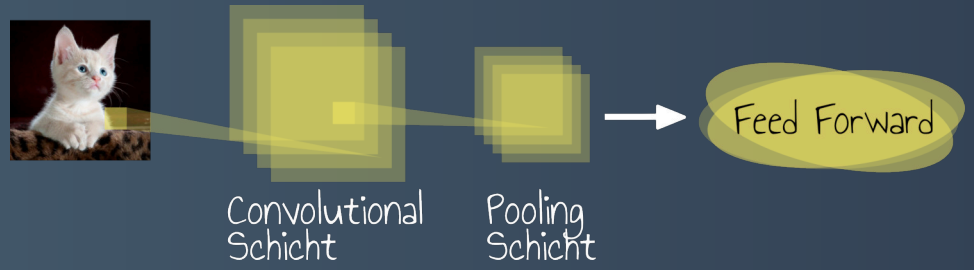
784 input pixel values

Bild: Pixabay CC0

Es gibt viele verschiedene Arten neuronaler Netze.

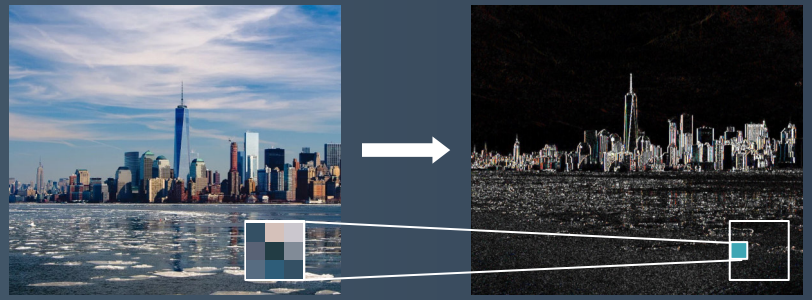


Feed Forward Neural Network

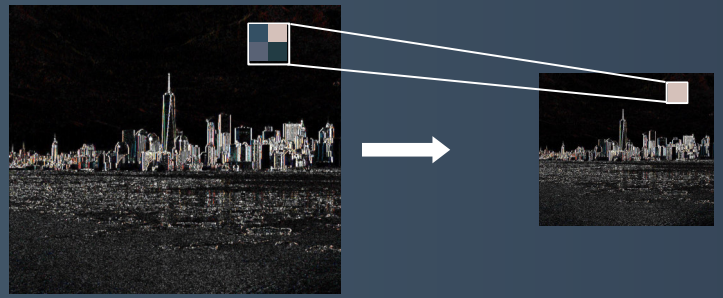


convolutional neural network (CNN)

Image: Pixabay CC0

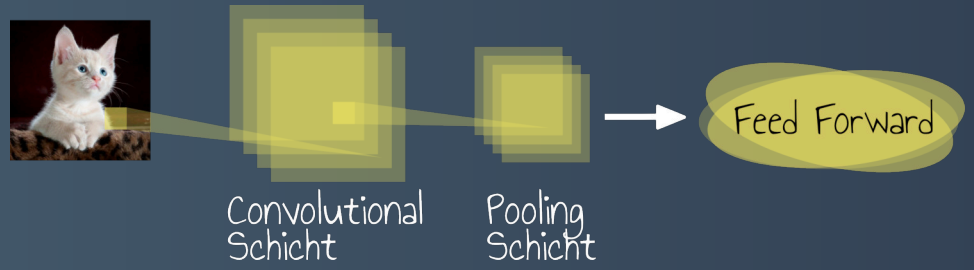


Convolution



Pooling

Bild: Pixabay CC0



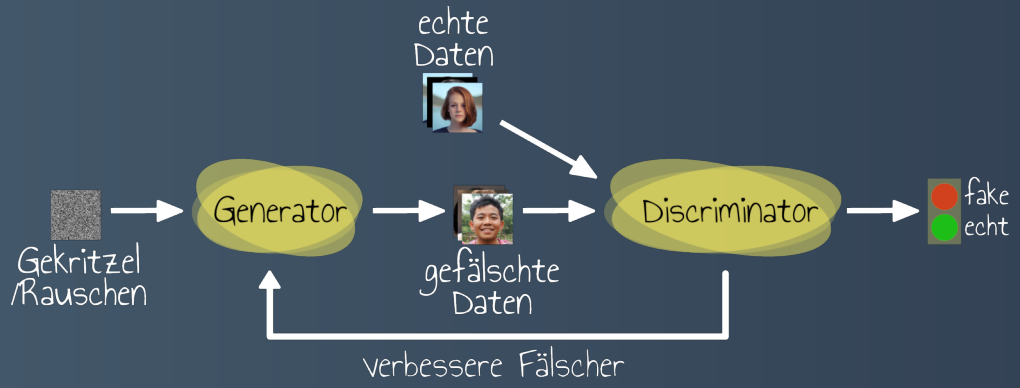
Convolutional Neural Network (CNN)

Bild: Pixabay CC0

Quelle: https://thispersondoesnotexist.com/

Quelle: https://thispersondoesnotexist.com/

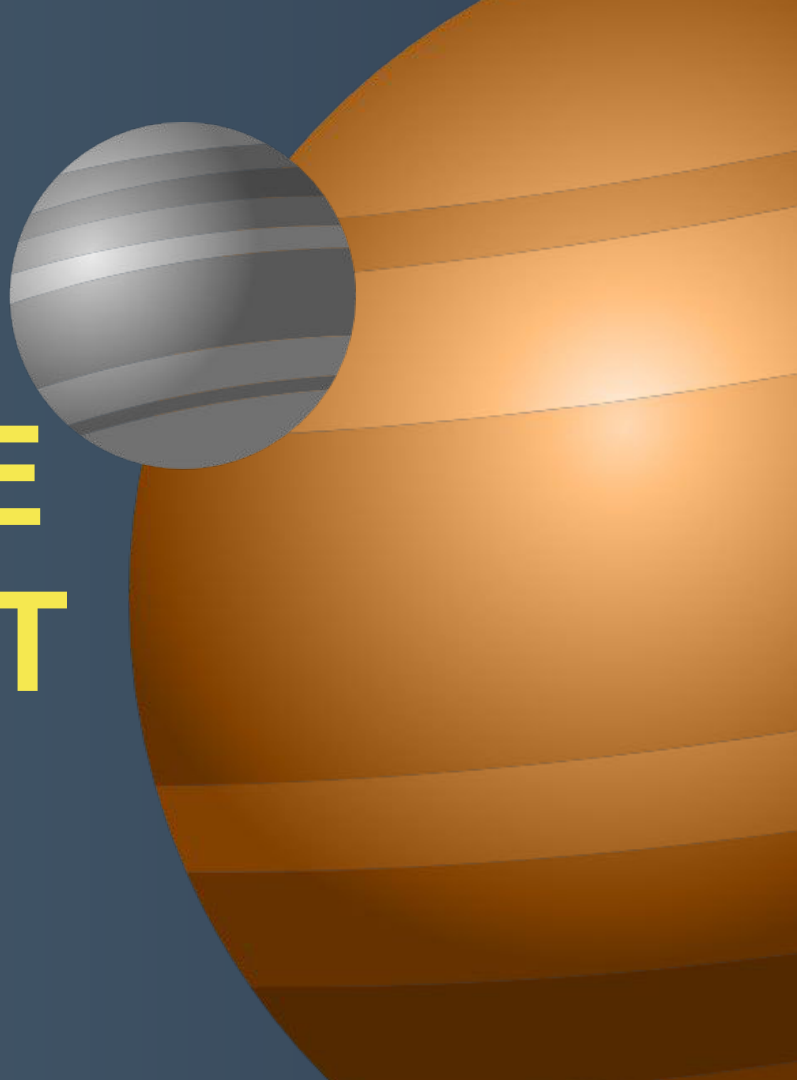
Quelle: https://thispersondoesnotexist.com/

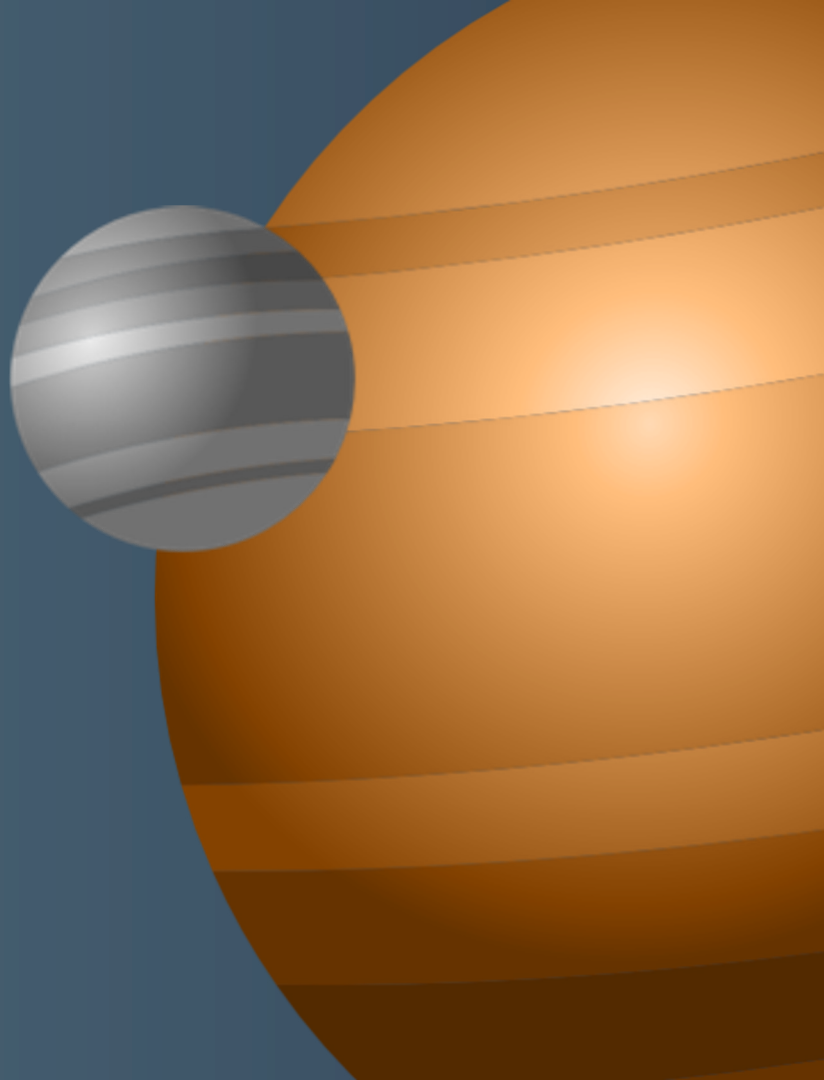


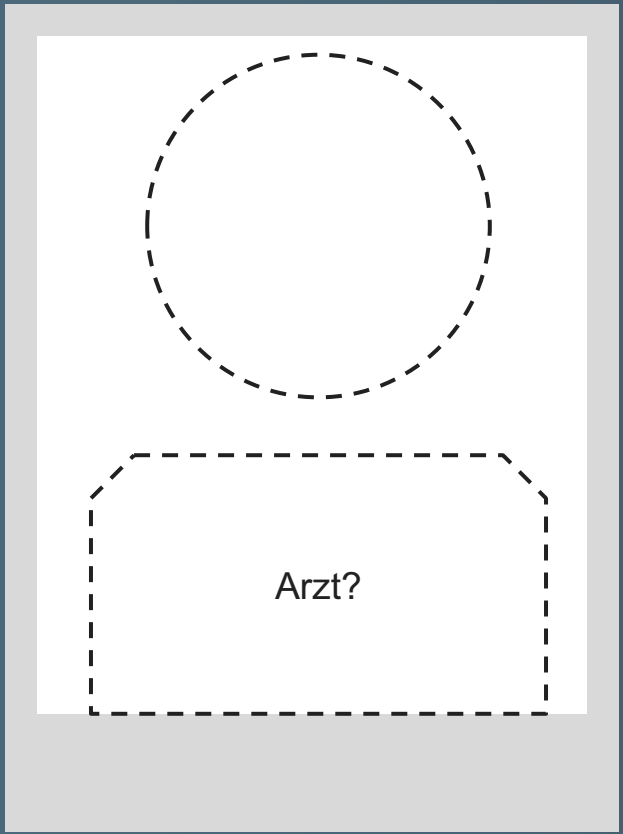
Generative Adversarial Network (GAN)

WOCHE 3 EINHEIT 3

KI UND UNSERE GESELLSCHAFT






Arzt?

Fairness und Bias

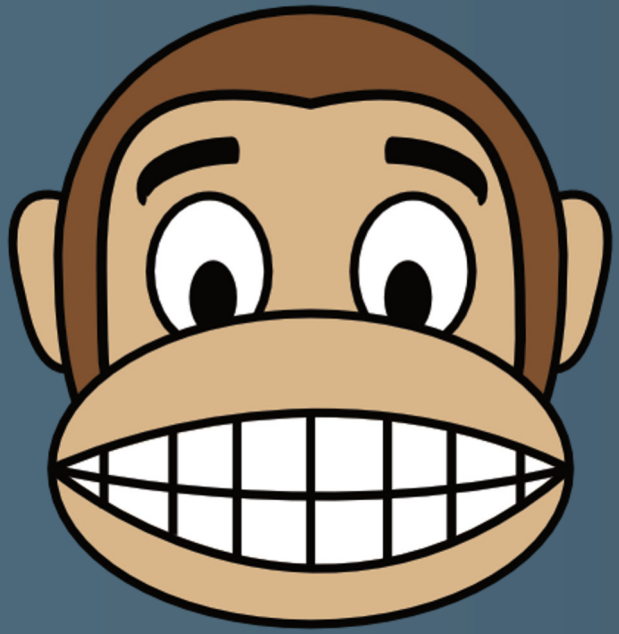
Kitten
Katze
Schnurrhaare
Haustier
Welpe
Hund
Rudel

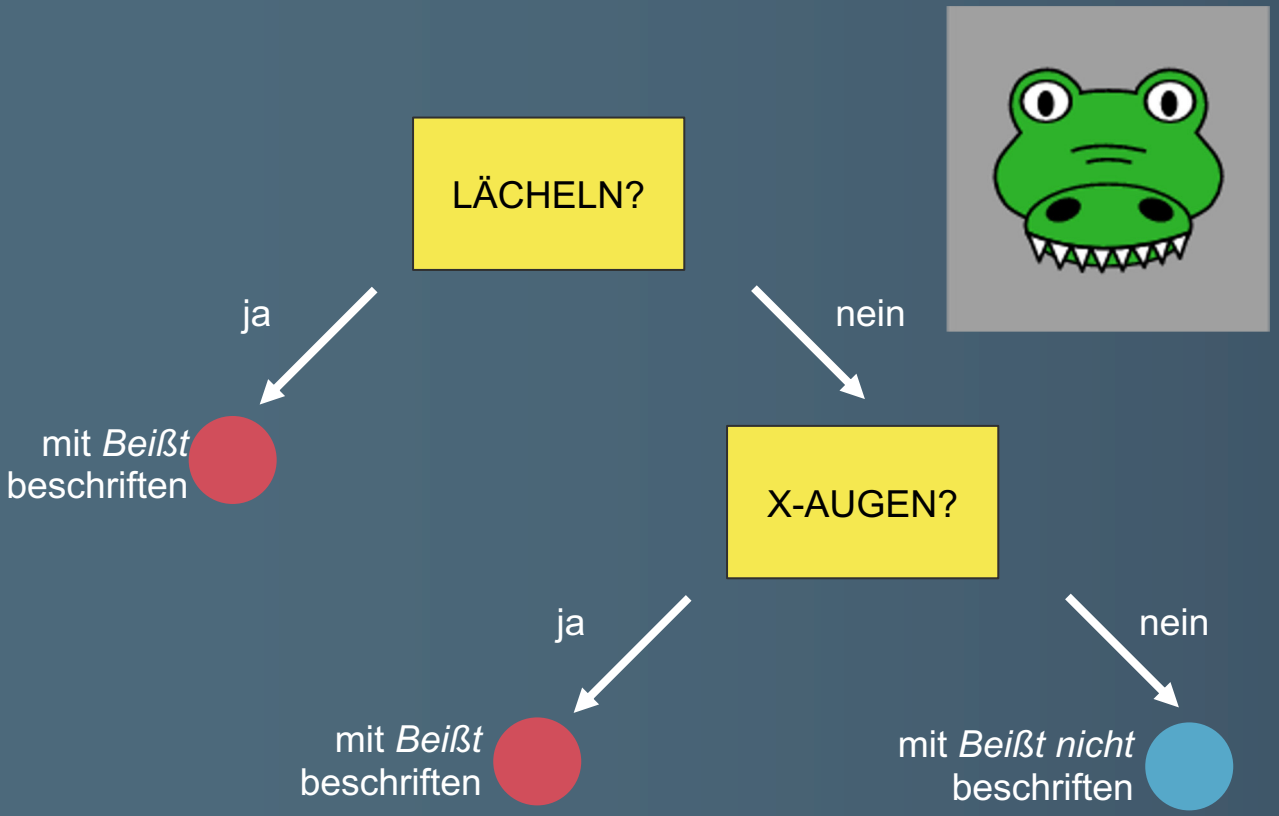
Mann ist zu Arzt wie Frau zu X?

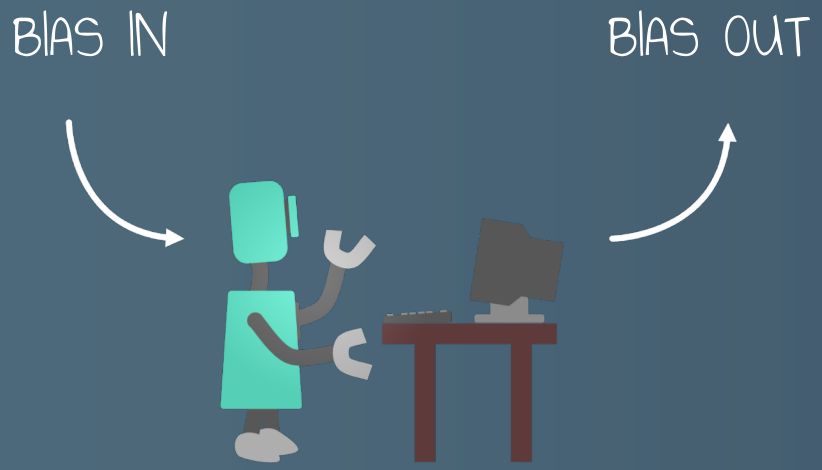
X = Krankenschwester

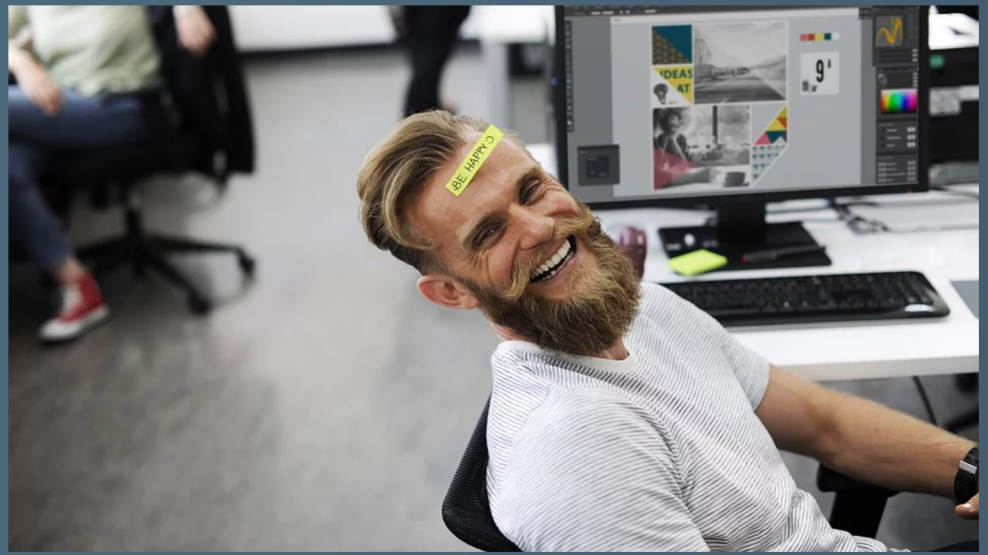
Mann ist zu Programmierer wie Frau zu X?

X = Hausfrau

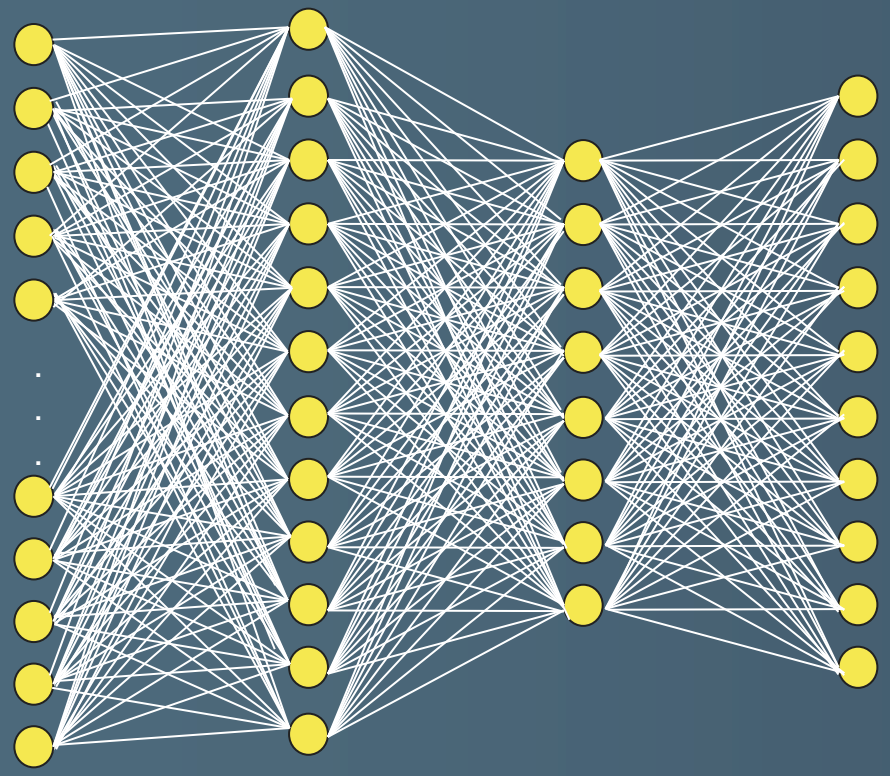



LÄCHELN?
ja
nein
mit *Beißt* beschriften
X-AUGEN?
ja
nein
mit *Beißt* beschriften
mit *Beißt nicht* beschriften


BIAS IN
BIAS OUT


BE HAPPY :)

Transparenz and Erklärbarkeit



Explainable AI

Sicherheit

Geschwindigkeitbe-
grenzung 45 mph

Geschwindigkeitbe-
grenzung 85 mph

+

=

panda
57,7% confidence

gibbon
99,3% confidence

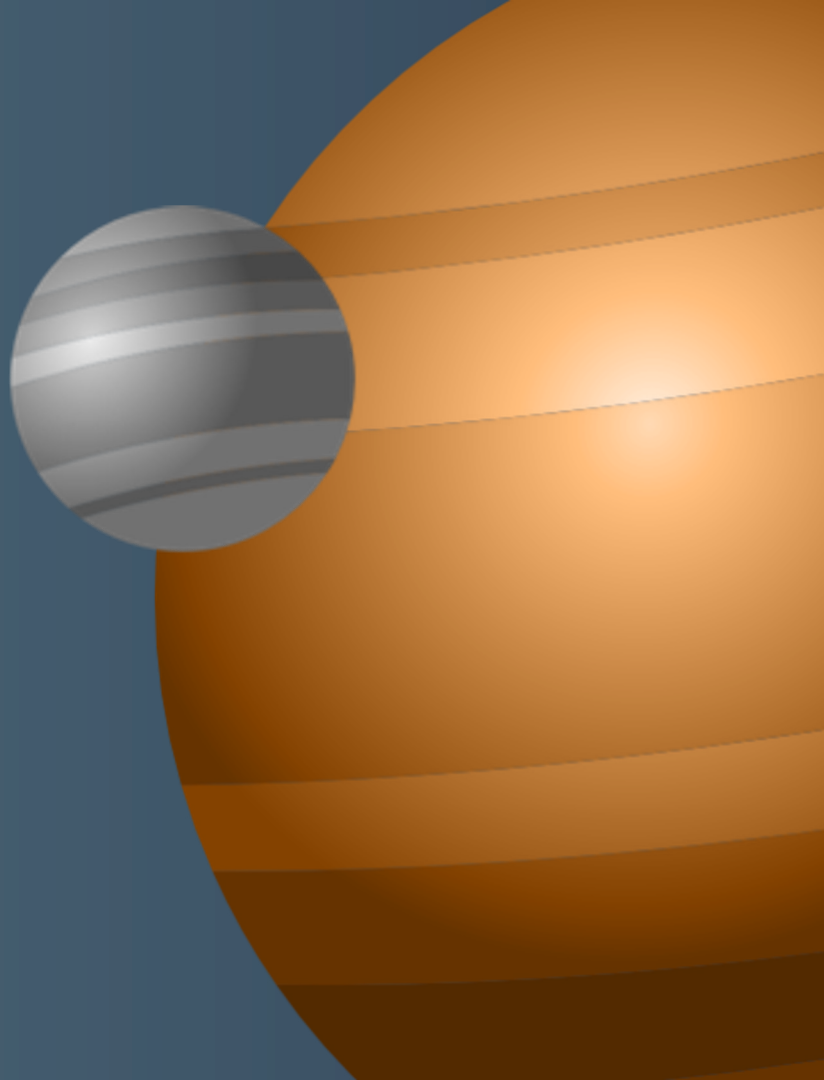
+

=

panda
57,7% confidence

gibbon
99,3% confidence

Implikationen



WOCHE 3 EINHEIT 4

NOTIZEN FÜR LEHRKRÄFTE

Das Ziel informatischer Bildung zum Thema KI ist es, ...

- Teilhabe in einer zunehmend digitalen und vernetzten Welt zu ermöglichen.
- diese Welt aktiv und kreativ selbst gestalten zu können.
- fundierte Entscheidungen über KI in der Gesellschaft treffen zu können.

1 ⌟

2 ⌣

3 ⌞

4 ⌝

5 □

6 ⊏

7 ⌜

8 ⊓

9 ⌜

1 3 3 7

1	2	3
4	5	6
7	8	9

Zugrundeliegende Prinzipien und Ideen
statt Anwendung von Frameworks

Persönlich bedeutsame Artefakte
statt vortrainierte Modelle

Differenzierte und fundierte Diskussion
statt einer einseitigen Debatte

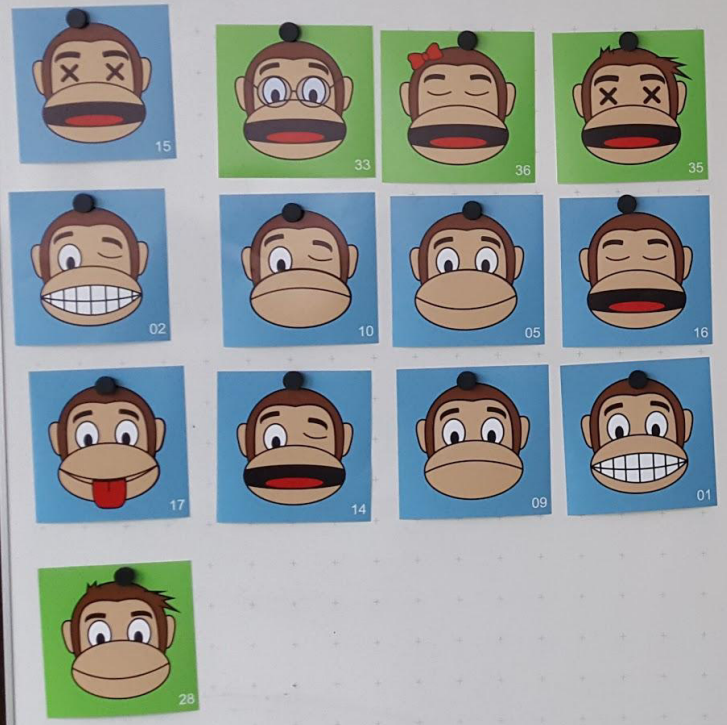
AI Unplugged

Wir ziehen künstlicher Intelligenz den Stecker!

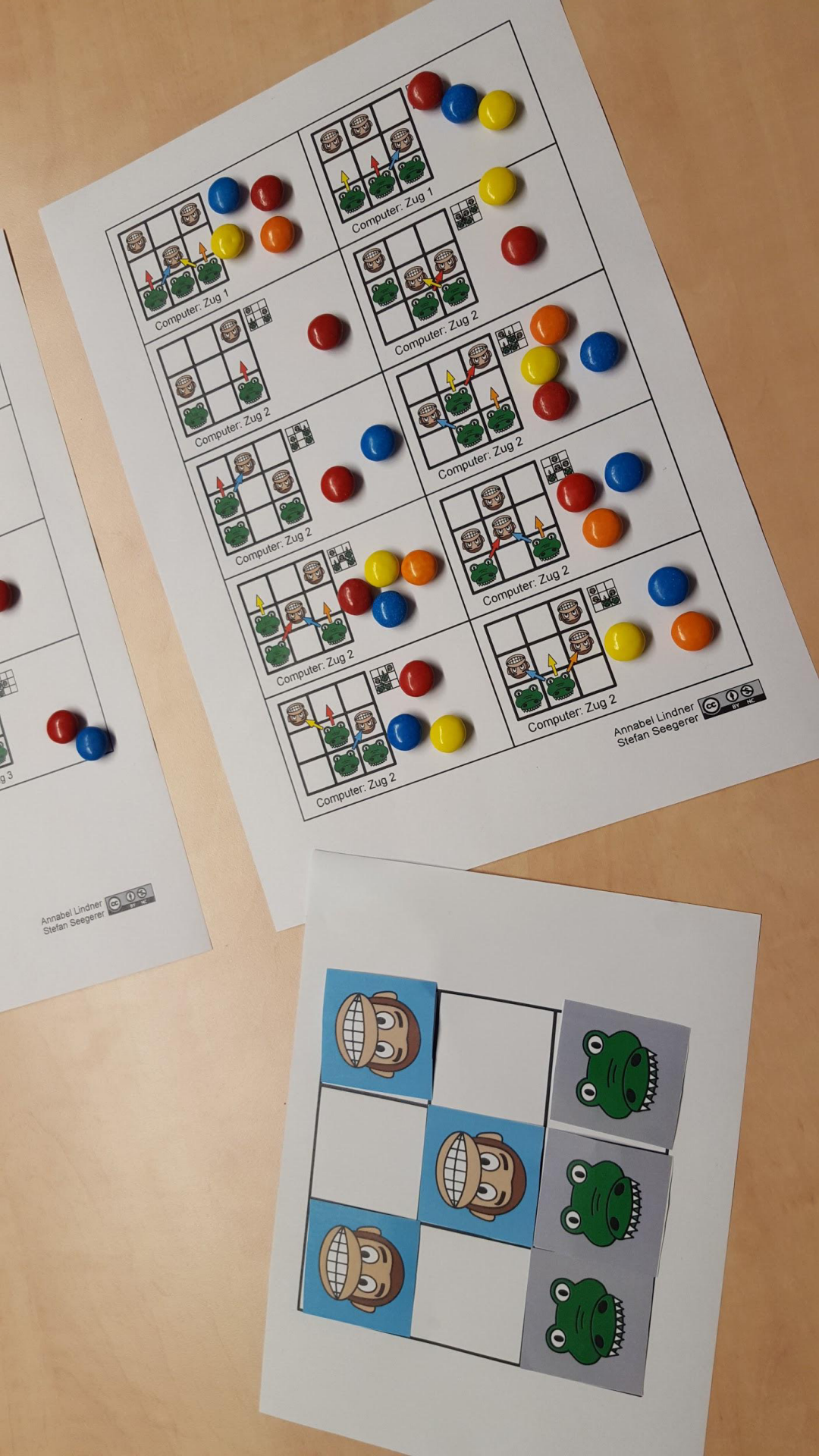
Alle Materialien auf

aiunplugged.org

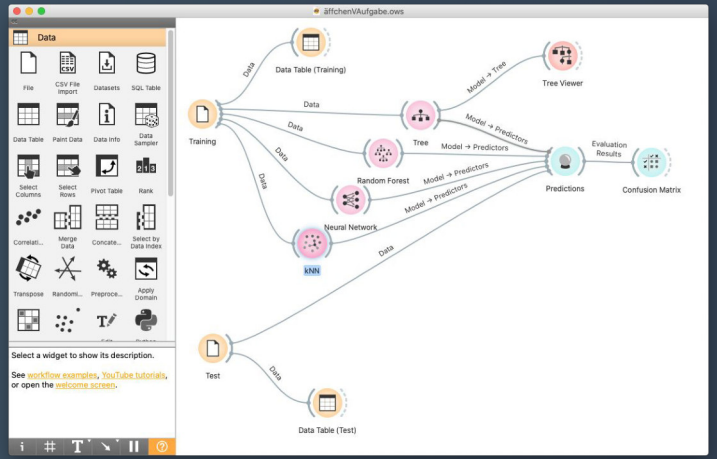
Beißt



Beißt nicht


Computer: Zug 1
Computer: Zug 1
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Computer: Zug 2
Annabel Lindner
Stefan Seegerer
Annabel Lindner
Stefan Seegerer

Replug AI mit Orange3



Materialien auf

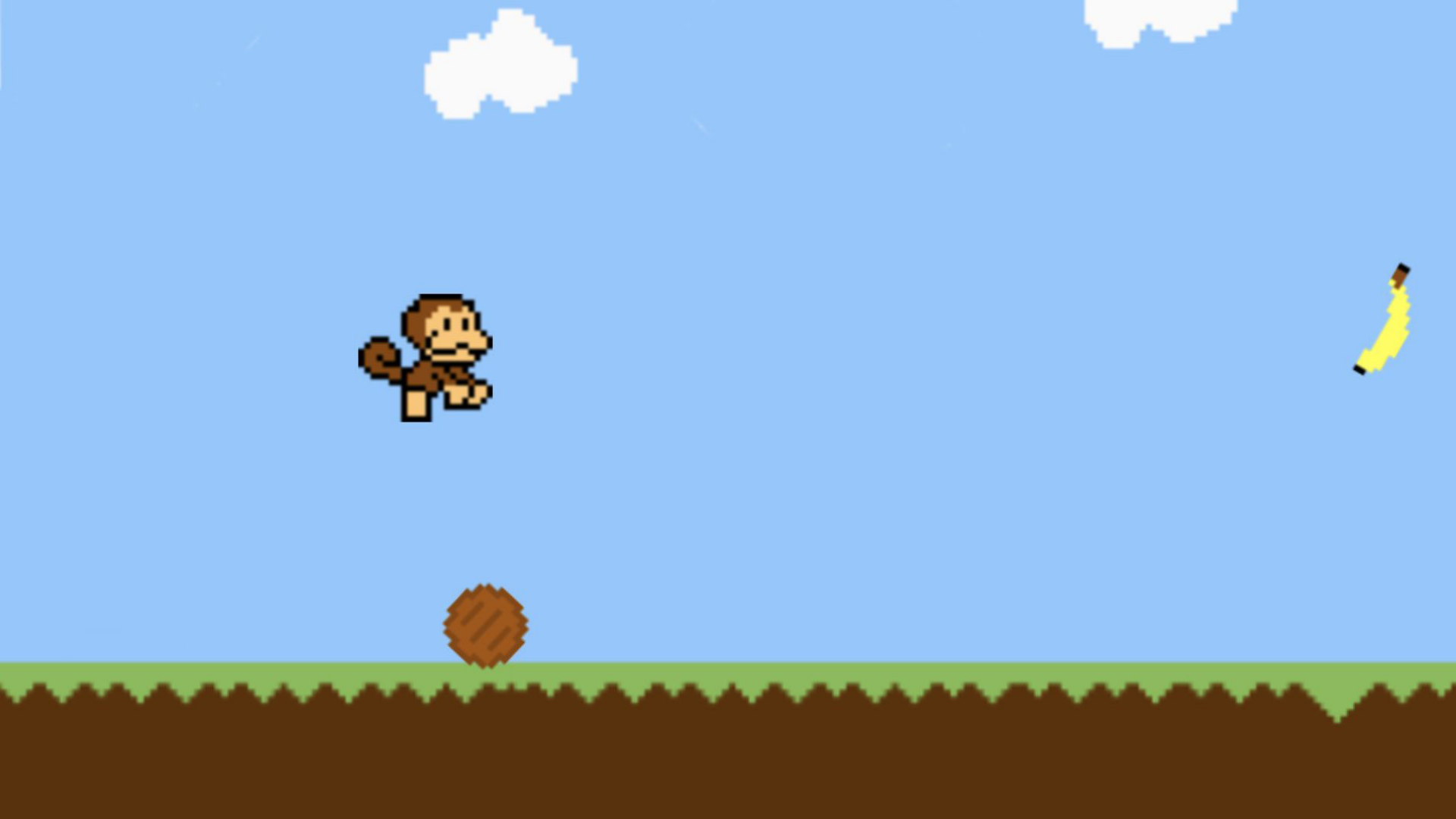
computingeduction.de

SnAIp

Kein Hexenwerk – maschinelles Lernen in Snap!

Alle Materialien auf

snaip.org



Lust auf mehr?
computingeducation.de