AI 4 Mobility
Eine Einführung in *Artificial Intelligence*

Markus Ehrenmann
Bern, Februar 2018

Our Value Proposition

Compass

Is a co-creation service based on design thinking method

Diver

Is about data discovery and prototyping in a very early stage

Ocean

Is a modular, multipurpose enterprise data platform

Kapitelangabe

Agenda

1. Intro
2. **AI – ML – DL: Definition**
3. Applikationen
4. Wie funktioniert das?


The biggest worry I have about AI is that we will not have enough of it, and that we need to do more to make sure we can continue to make groundbreaking discoveries that will raise productivity growth, improving the lives of Americans and people throughout the world.
Jason Furman
Chairman of the US Council of Economic Advisers

Digital Natives
USA - China

Animashree Anandkumar, principal scientist at Amazon Web Services, and Jian Wang, president of Alibaba's technology committee, speaking at EmTech China 2018 in Beijing.

YAOPAI

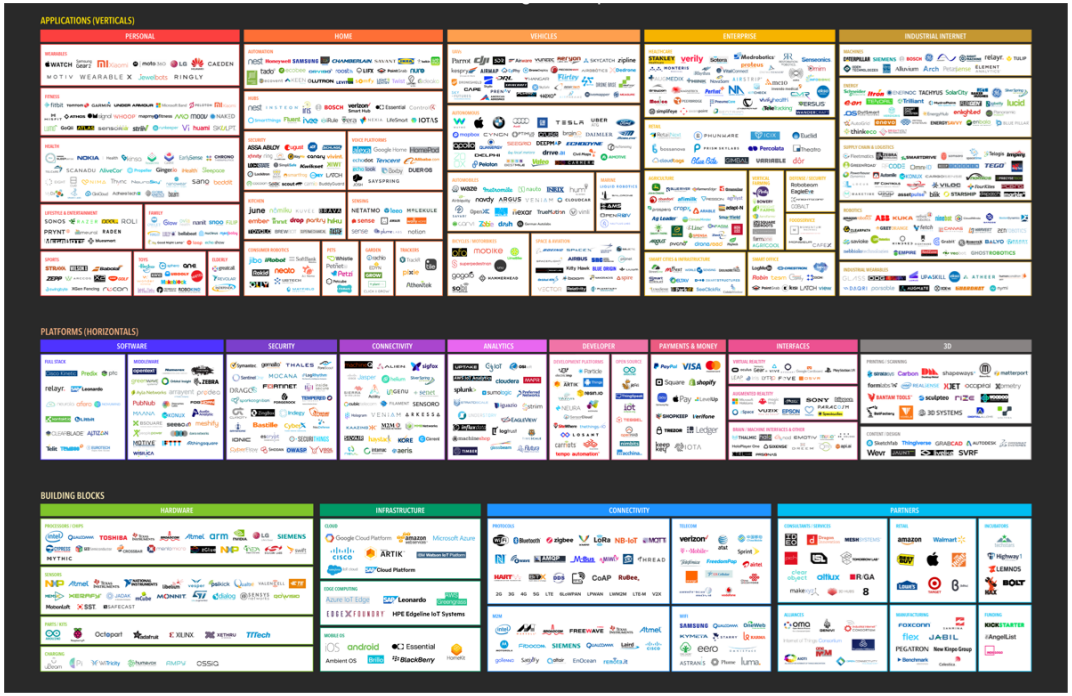
Intelligent Machines

China and the US are bracing for an AI showdown—in the cloud

Alibaba, Amazon, and others are adding ever more capable AI services to their cloud platforms.

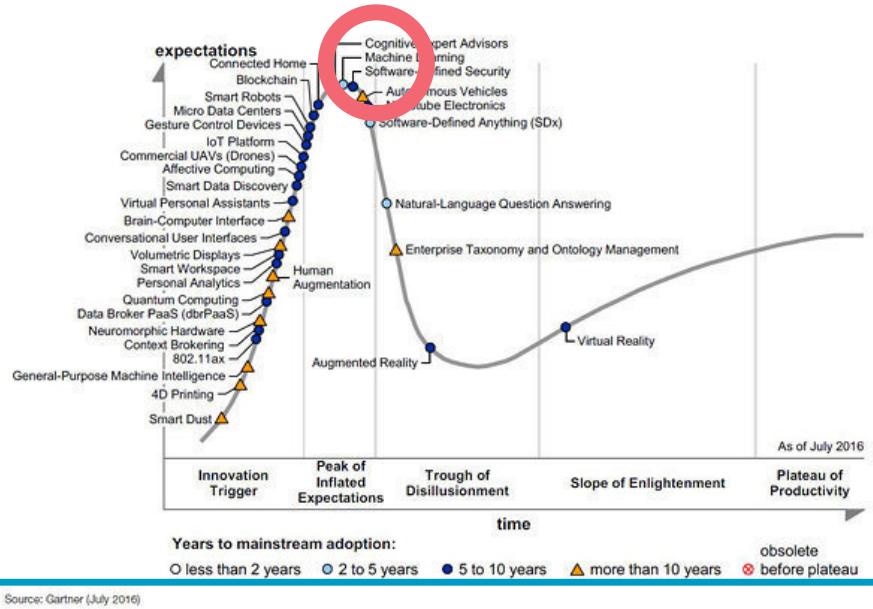
https://www.technologyreview.com/s/610140/china-and-the-us-are-bracing-for-an-ai-showdownin-the-cloud/

AI/ Big Data Landscape
Matt Turck, 2018



- Elements for Artificial Intelligence & Big Data Applications
- Sehr viel Innovation, sehr viel Bewegung, viele Anbieter

Digitalization and AI: Strong versus Narrow
Be careful with the Hype

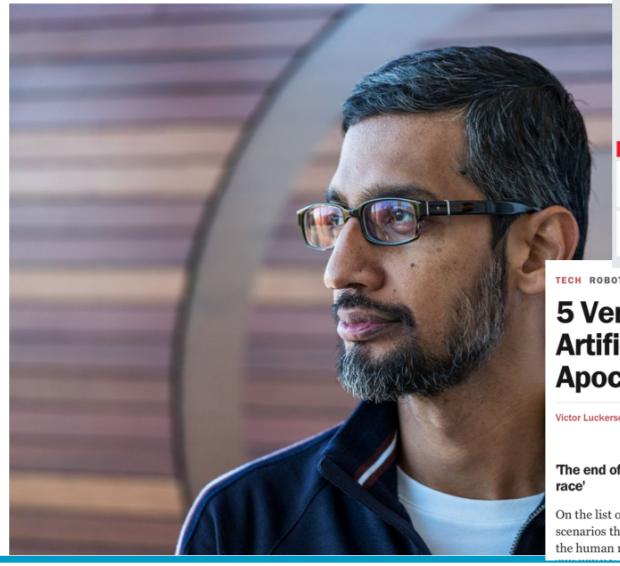


Source: Gartner (July 2016)

Google CEO Sundar Pichai compares impact of AI to electricity and fire

By Lauren Goode | @LaurenGoode | Jan 19, 2018, 4:50pm EST

SHARE



TECH ROBOTICS

5 Very Smart People Who Think Artificial Intelligence Could Bring the Apocalypse

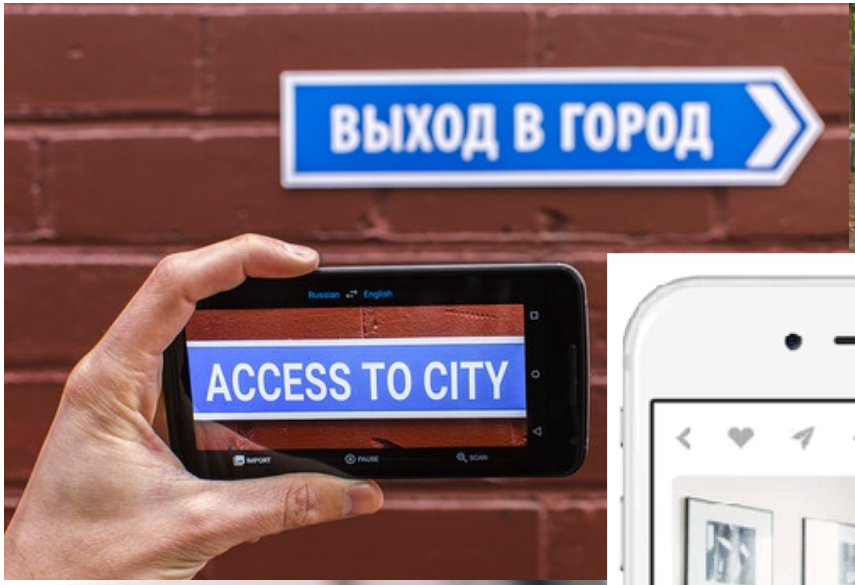
Victor Luckerson @VLuck | Dec. 2, 2014

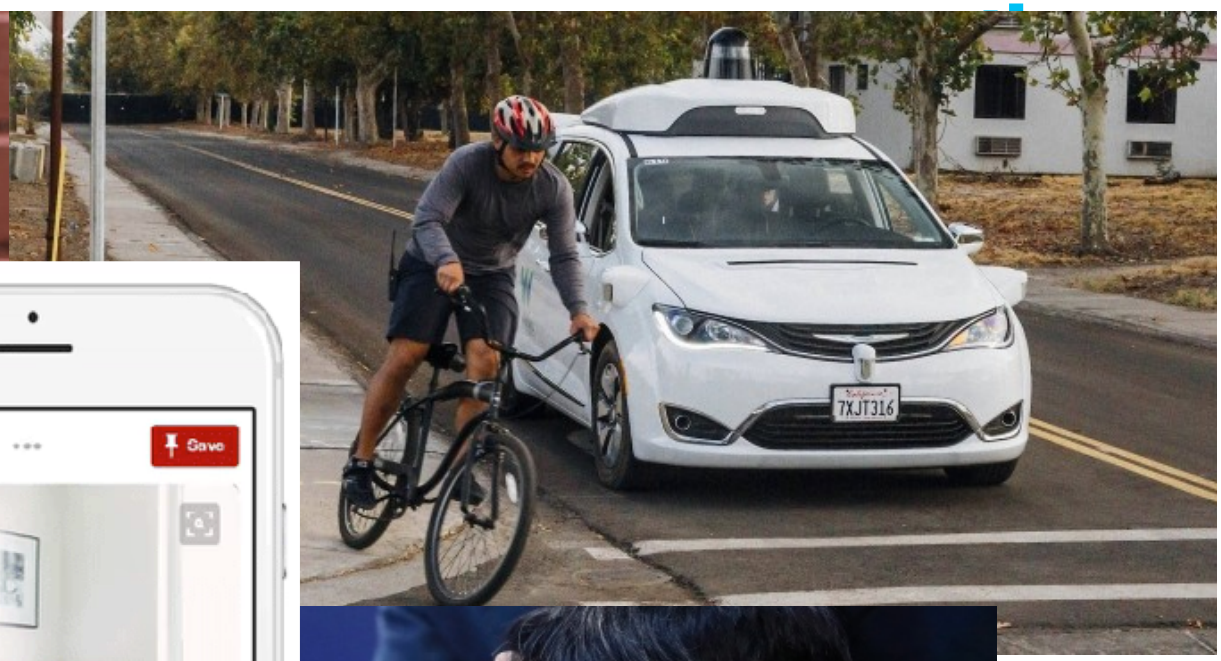
'The end of the human race'

On the list of doomsday scenarios that could wipe out the human race, super-smart

Gartner Hype Cycle report 2016:

- AI king of hype
- Strong AI applications 5-10 years away
- Perceptual smart machines „the most disruptive class of technologies over the next 10 years“


ВЫХОД В ГОРОД
ACCESS TO CITY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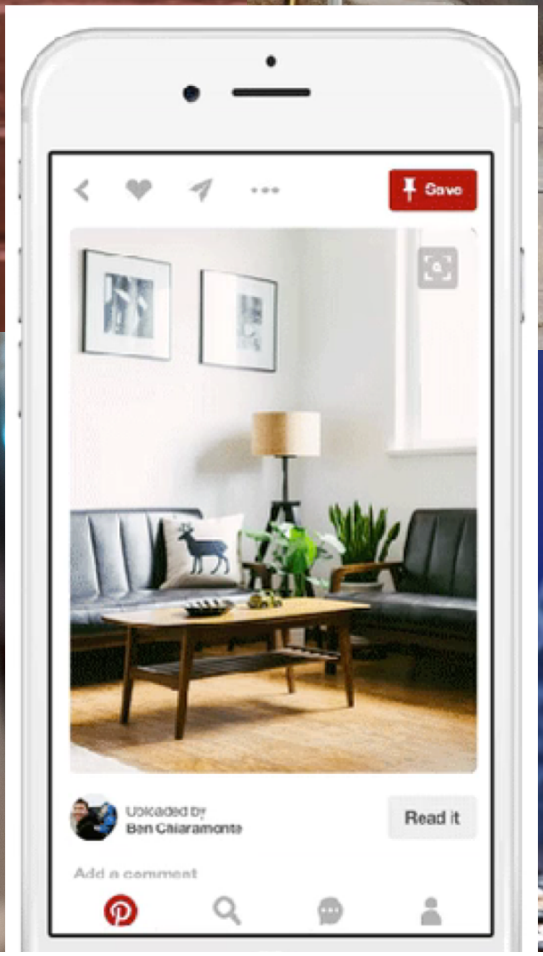
AT&T
2:51 PM
What can I help you with?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Ben Calaramonte
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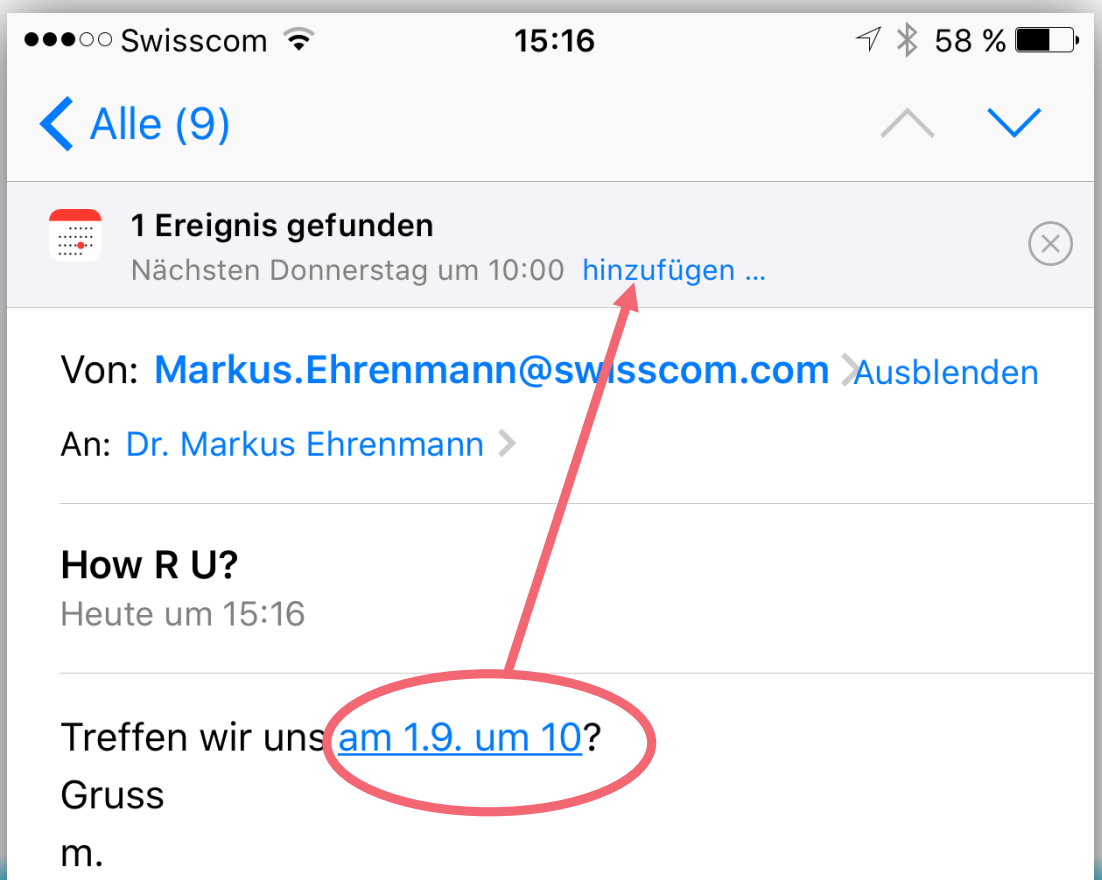
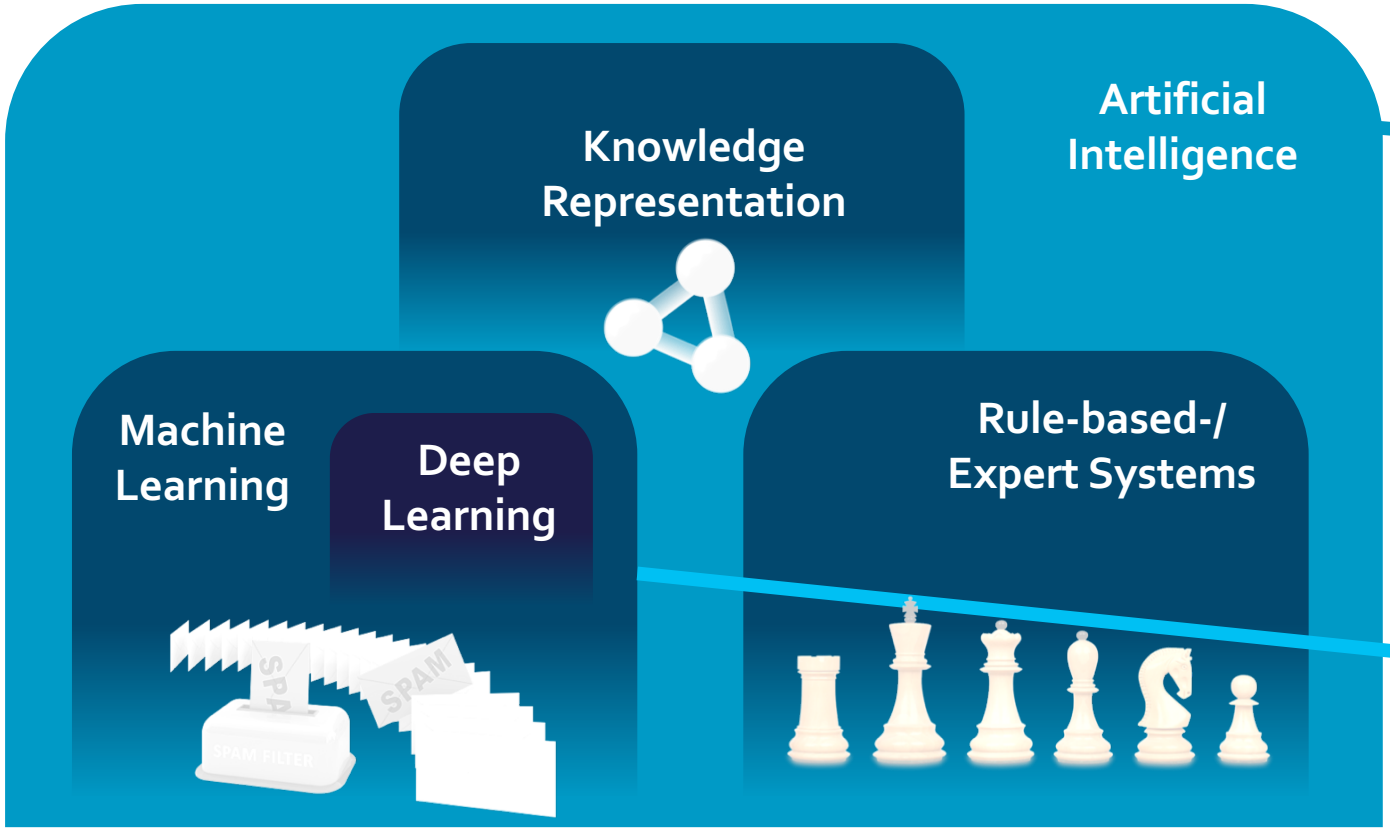
Narrow AI Anwendungsfall
Entity Recognition: Datum & Uhrzeit Erkennung



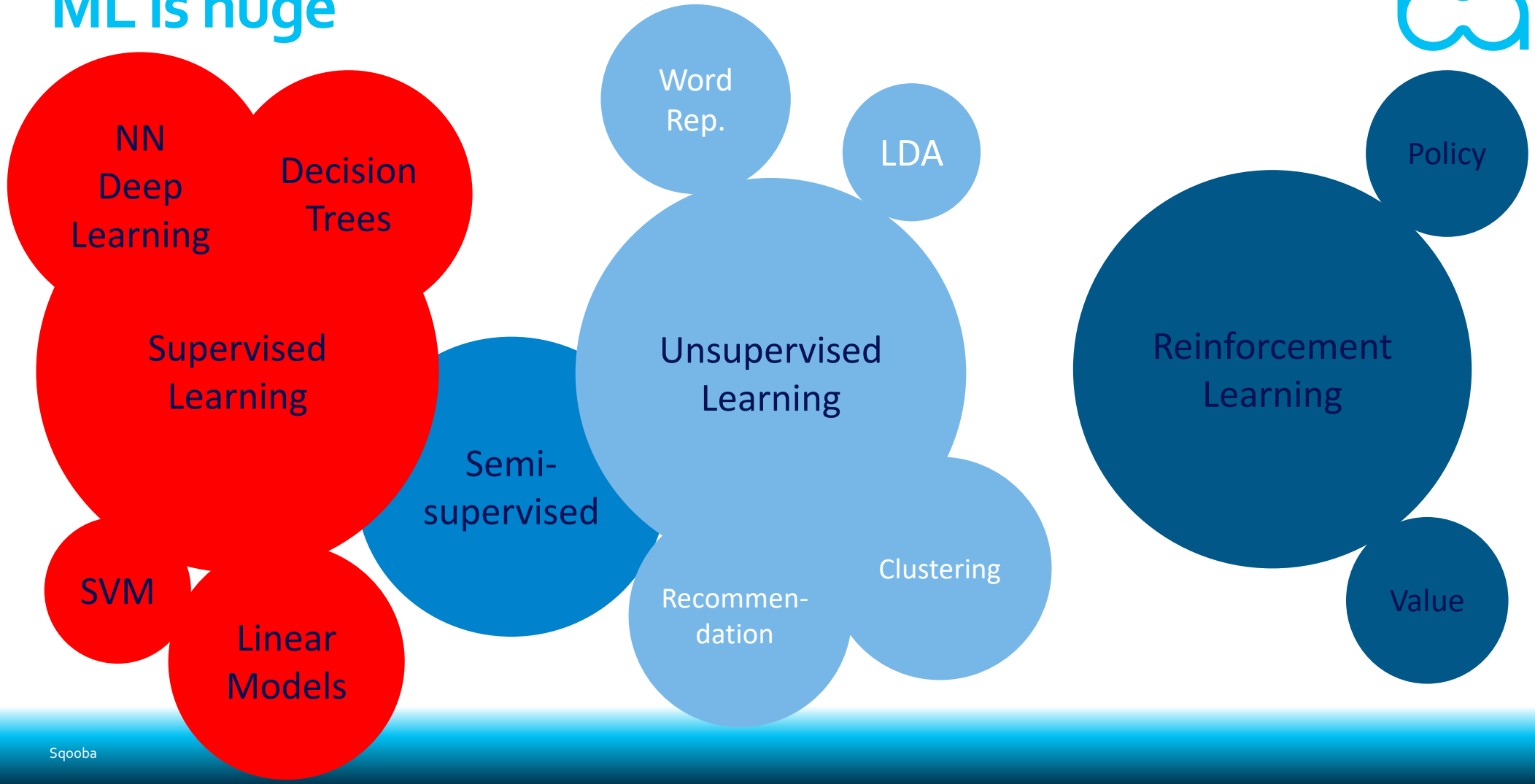
Artificial Intelligence is an umbrella term…



Wikipedia: «***[AI ist ein]*** *Teilgebiet der Informatik, welches sich* ***mit der Automatisierung intelligenten Verhaltens*** *befasst.»*

Valiant, «A theory of the Learnable» 1984: «*we shall say that a program for performing a task has been acquired by* ***learning*** *if it* ***has been acquired by any means other than explicit programming****.»*

ML is huge


NN
Deep
Learning
Decision
Trees
Supervised
Learning
SVM
Linear
Models
Semi-
supervised
Word
Rep.
LDA
Unsupervised
Learning
Recommen-
dation
Clustering
Reinforcement
Learning
Policy
Value

Deep Learning
Klassifikation/ Prädiktion

Aufgabe: Treffe die Aussage, ob eine durch **Merkmale** beschriebene Beobachtung zu einer **Klasse** gehört oder nicht

>> Ohne explizites Programmieren

Beispiel:
Getränkeklassen {Wein, Bier}

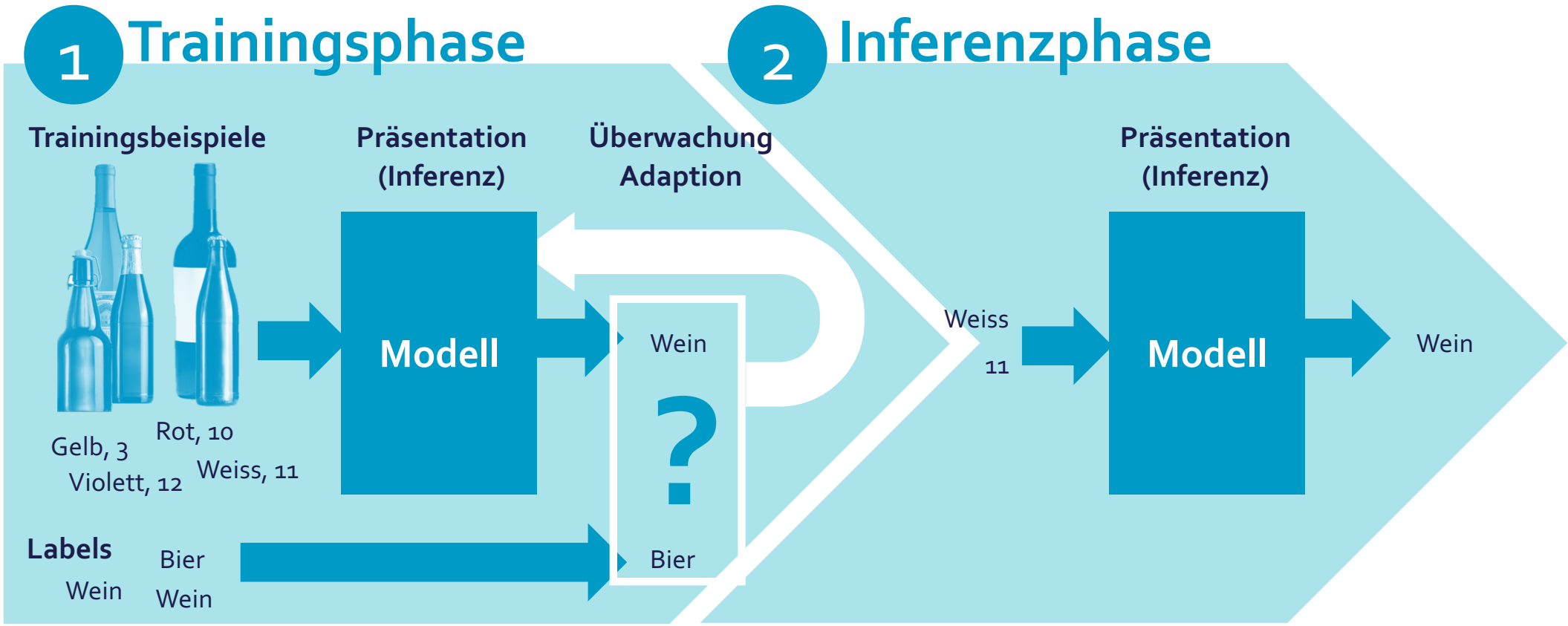
Merkmale:
Farbe {gelb, rot}
Alkoholgehalt {x: x ∈ ℝ, 0.0<x<60 Vol%}

Merkmalsvektoren:

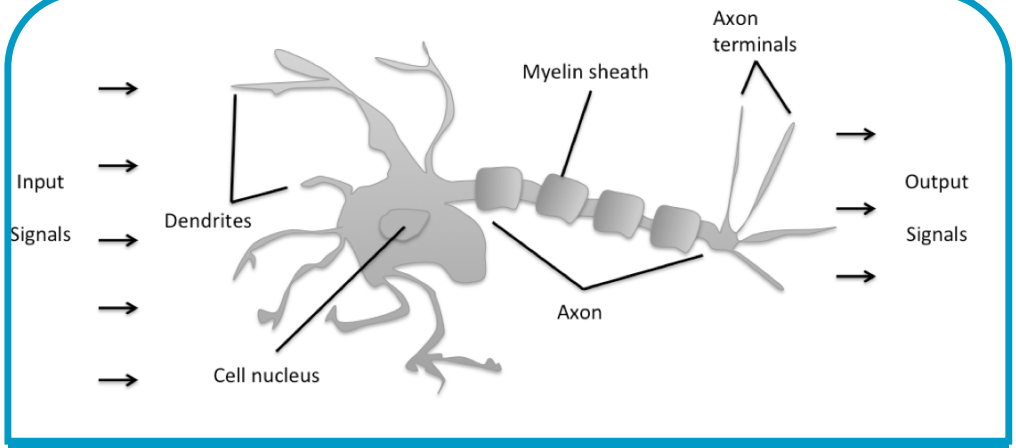
Gelb, 5% alc

Rot, 14% alc

Deep Learning Schritte

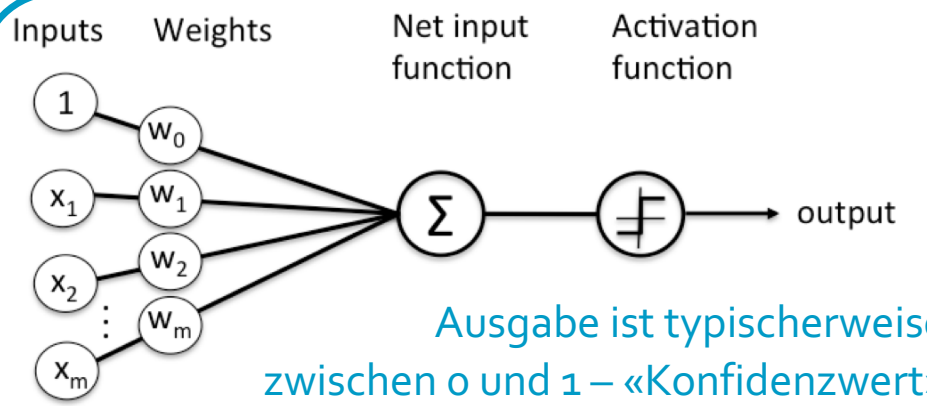


Perzeptron
Rosenblatt, McCulloch/ Pitts, 1943



Vorbild Nervenzelle

- Zelle ist über Dendriten/ Synapsen mit anderen Zellen verbunden
- Zellen zeigen Anpassung ihrer Erregungskurven



Ausgabe ist typischerweise zwischen 0 und 1 – «Konfidenzwert»

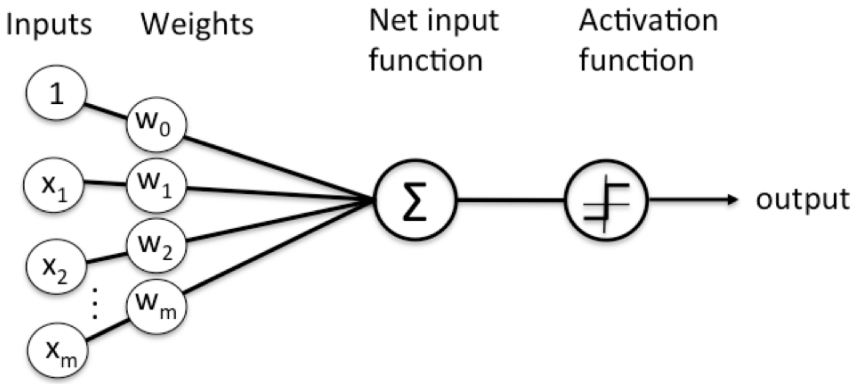
Perzeptron

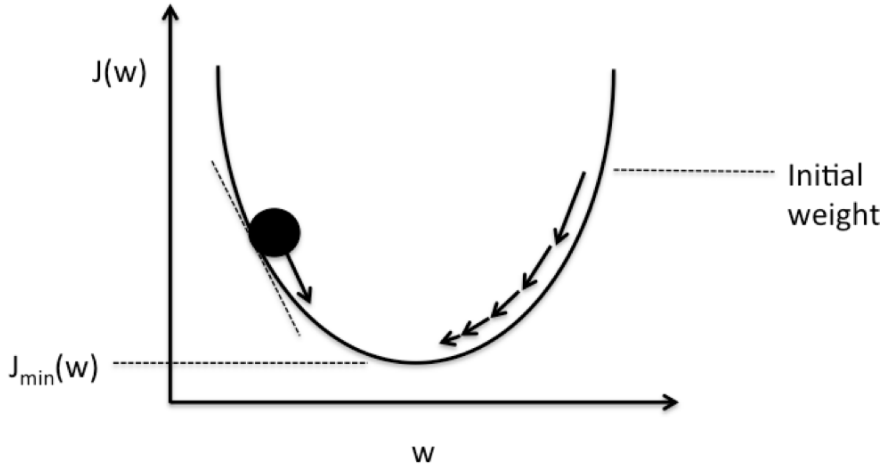
- Merkmalsvektoren als Eingang
- Gewichtete Summierung
- Glättung und Normierung der Erregung

Narrow AI
Backpropagation/ Gradientenabstieg für Zielfunktion

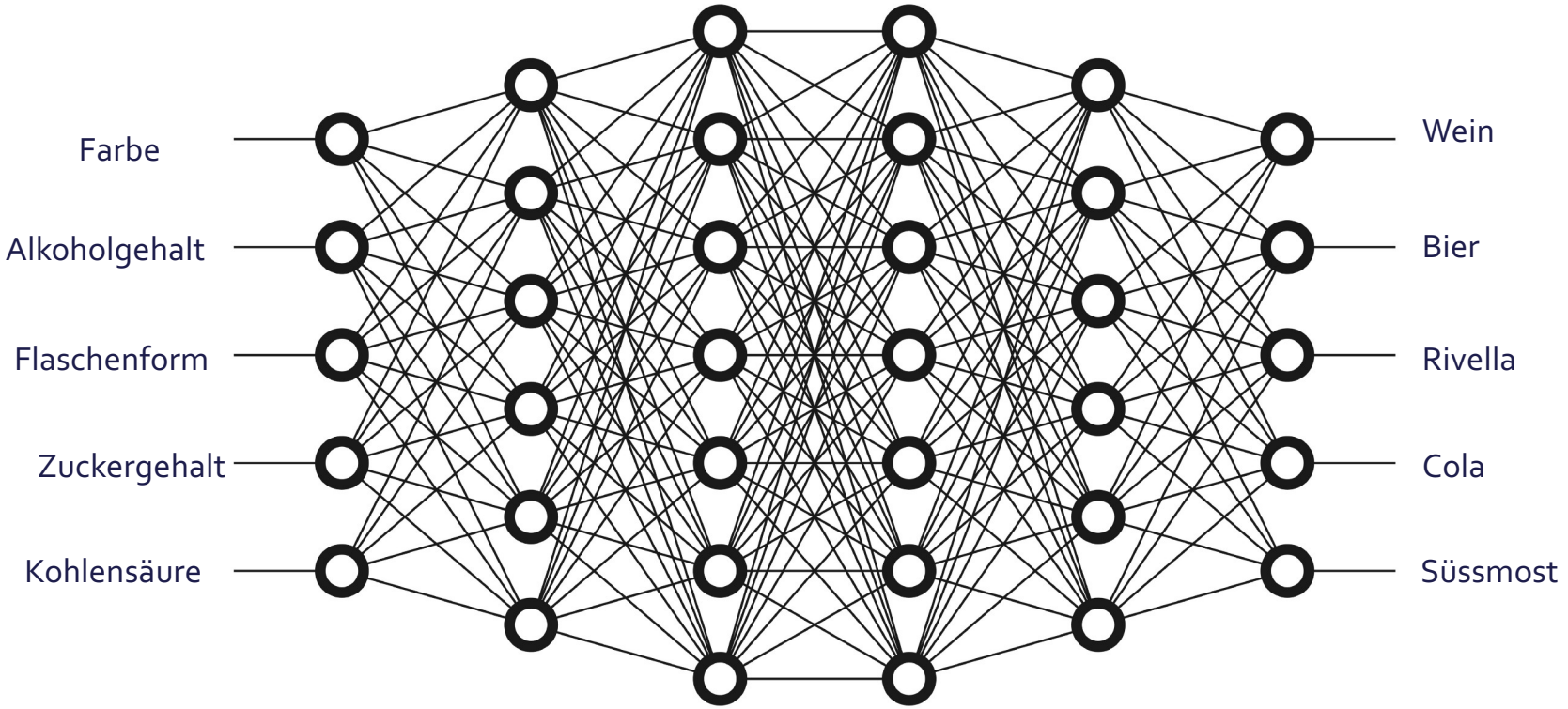
Zielfunktion: Minimiere den Fehler

$$J(\mathbf{w}) = \frac{1}{2}\sum_i (\text{target}^{(i)} - \text{output}^{(i)})^2$$





Hochdimensionale Probleme – Mehr Layer
Deep Neural Networks

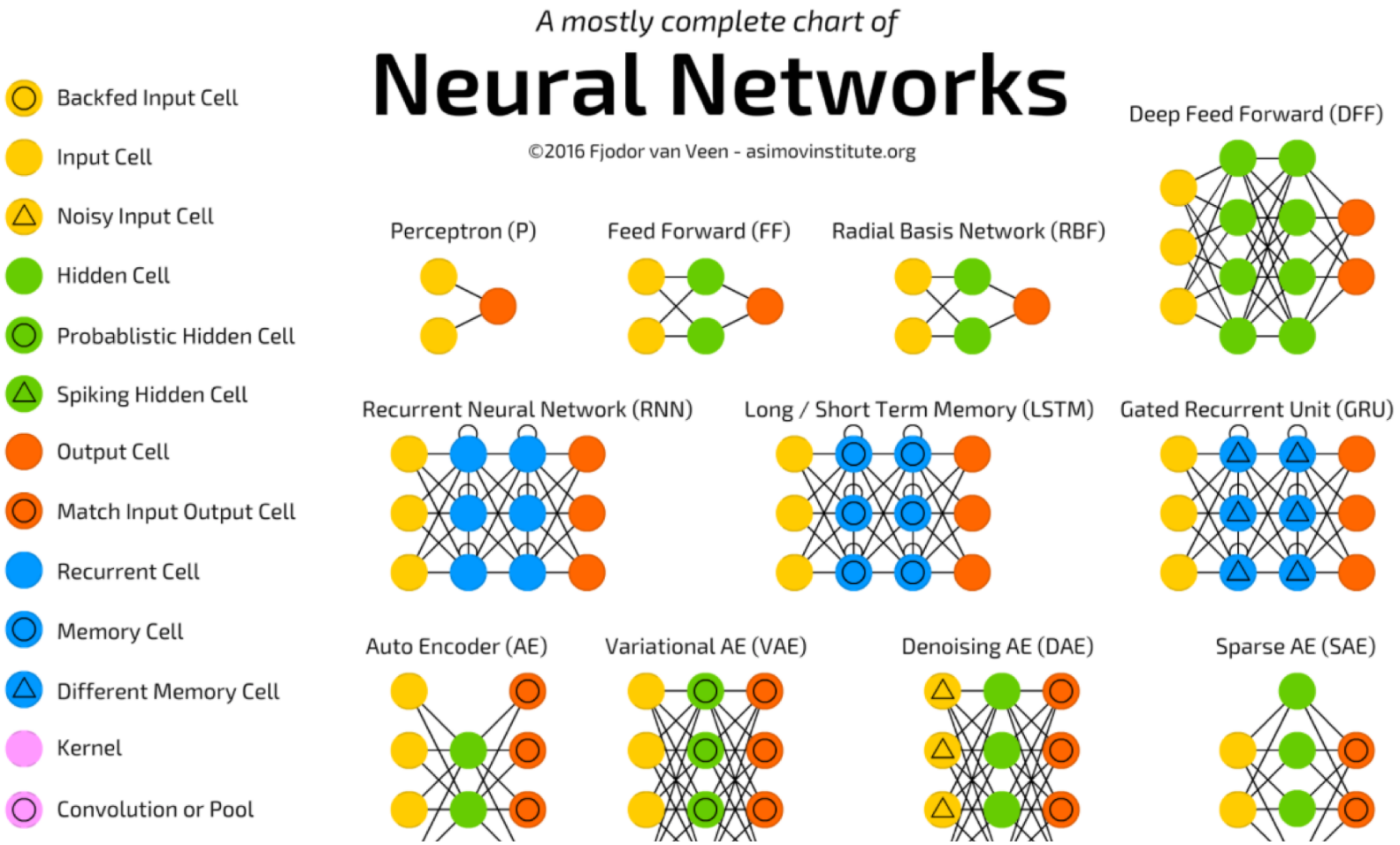


Gradientenabstieg möglich über Kettenregel für die Differenzierung

Viele Varianten von Gradientenabstiegsverfahren

Viele Netzarchitekturen (FF, LSTM, Convolutional, GAN, ...)

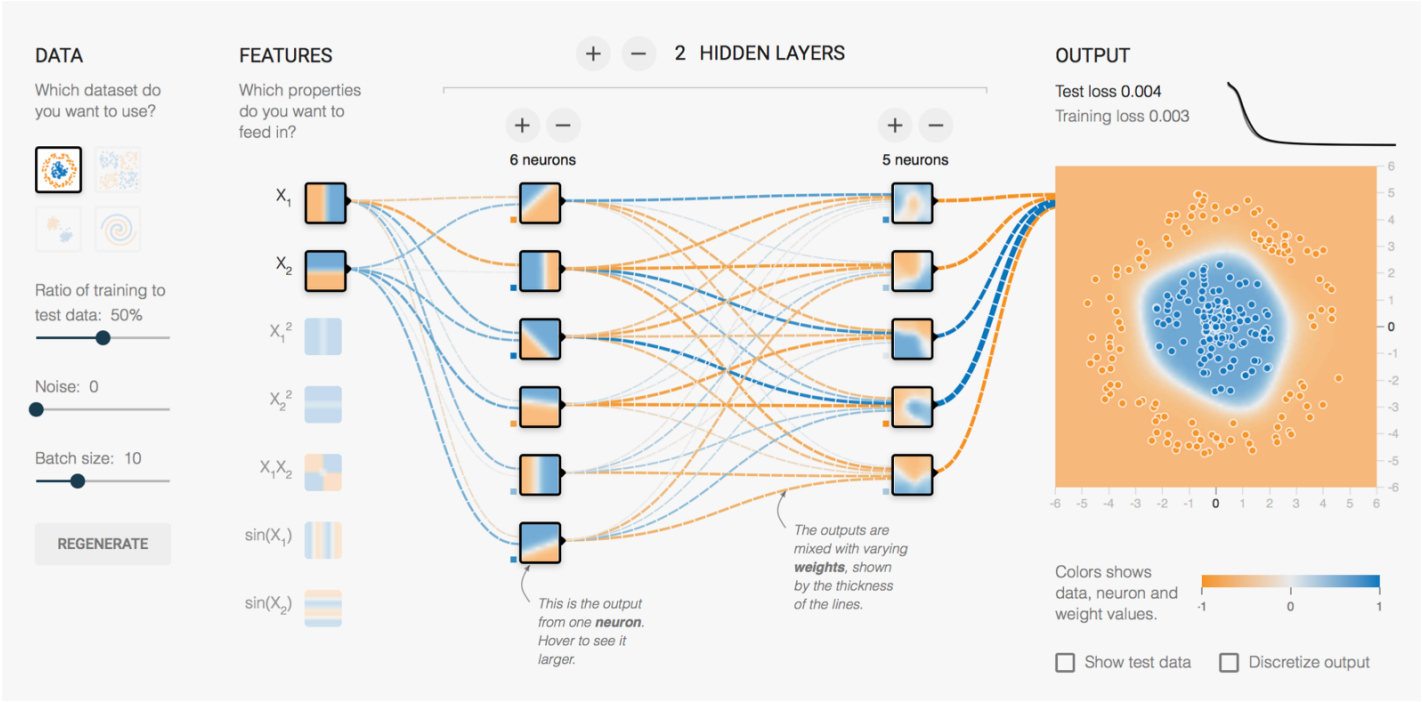
Hochdimensionale Probleme – Mehr Layer
Deep Neural Networks



http://www.asimovinstitute.org/neural-network-zoo/

Demo

http://playground.tensorflow.org



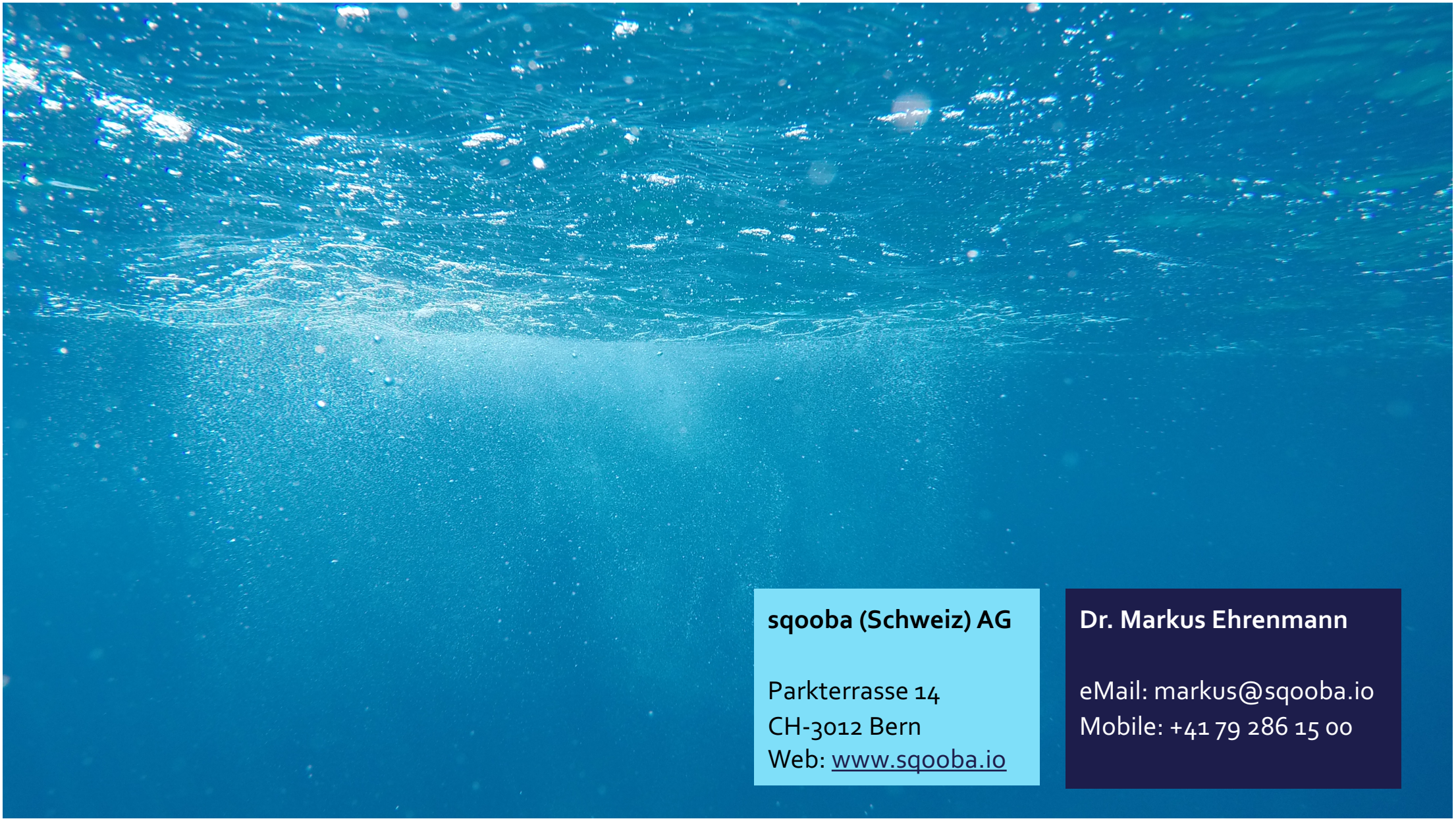
Beispielanwendungen
Objekterkennung, Wegführungs- und Hinderniserkennung

Google, Deep-Learning basierte Fotountertitelung
https://research.googleblog.com/2017/11/automl-for-large-scale-image.html

Nvidia, Deep-Learning basierte
Hindernis- und Wegführungserkennung

Merci

Fragen?



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