Was ist Machine Learning

Eine Mini Behind-The-Scenes Einführung

Agenda

Was ist Machine Learning

Was ist Deep Learning

Wie kann man es anwenden?

The New York Times

Tech Giants Are Paying Huge Salaries for Scarce AI Talent

Bloomberg

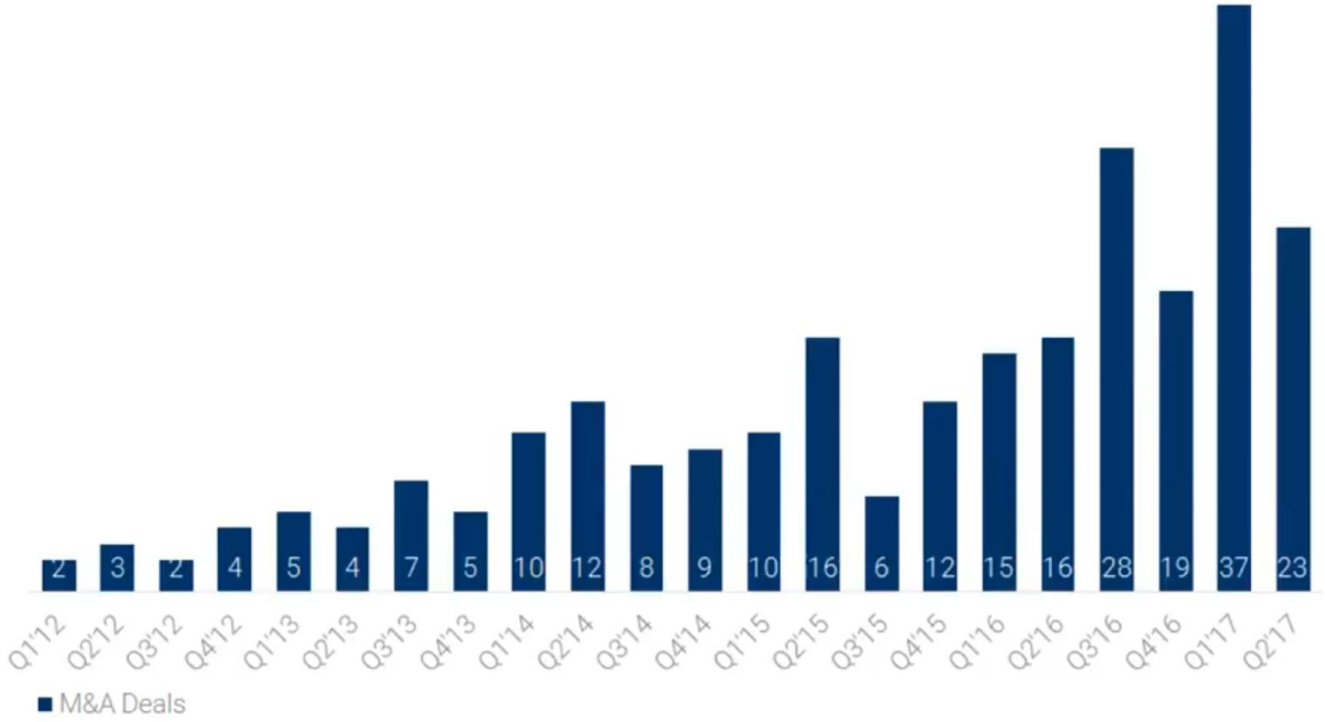
Sky-High Salaries Are the Weapons in the AI Talent War

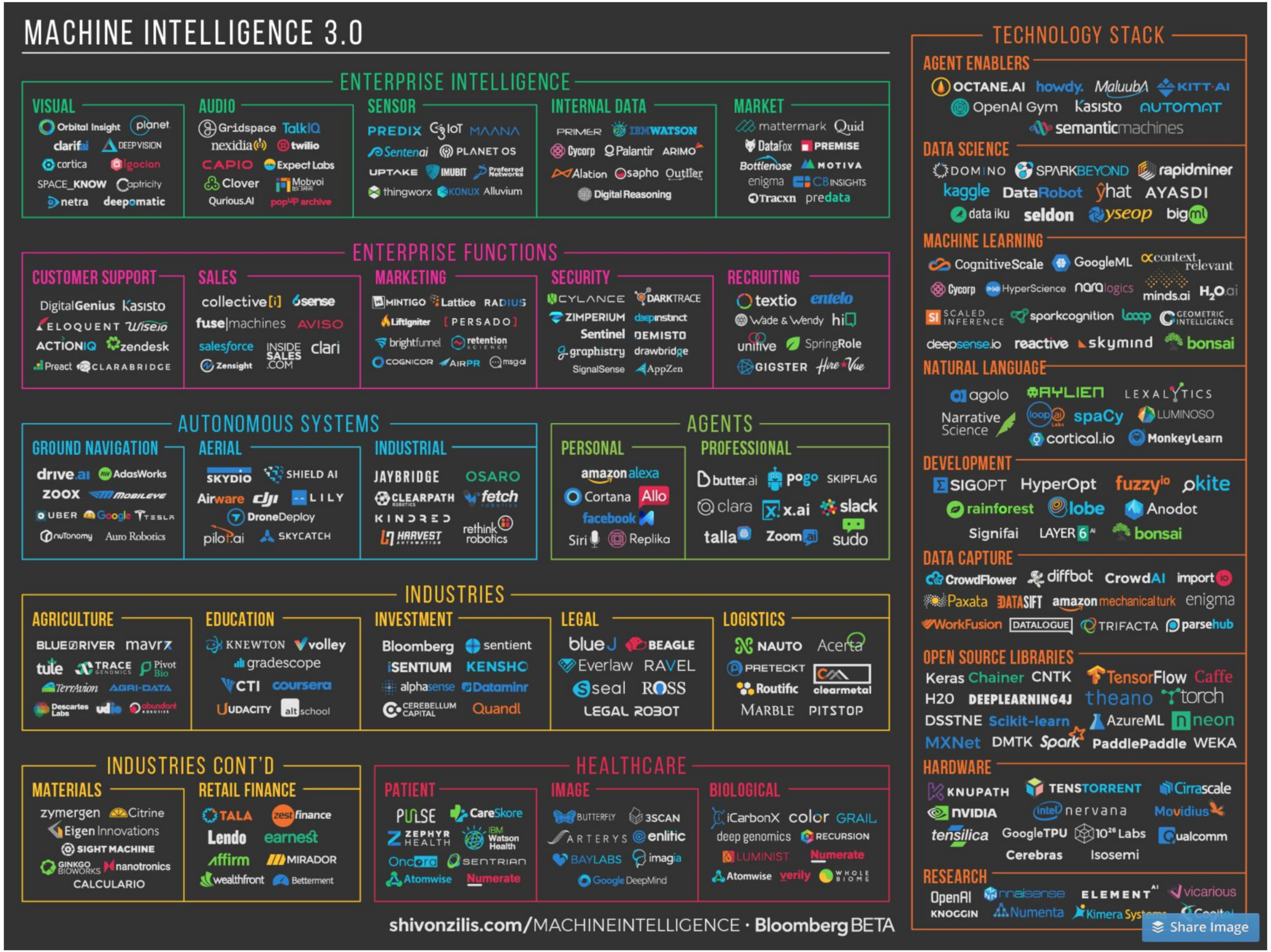
Forbes

Artificial Intelligence Will Relieve Skills Shortages, If We Could Find Enough People to Build It

ARTIFICIAL INGELLIGENCE M&A ACTIVITY

Q'12-Q2'17




MACHINE INTELLIGENCE 3.0
ENTERPRISE INTELLIGENCE
VISUAL
Orbital Insight planet clarifai DEEPVISION cortica algocian SPACE_KNOW Captricity netra deepomatic
AUDIO
Gridspace TalkIQ nexidia twilio CAPIO Expect Labs Clover Mobvoi Qurious.AI popUP archive
SENSOR
PREDIX C3 IoT MAANA Sentenai PLANET OS UPTAKE IMUBIT Preferred Networks thingworx KONUX Alluvium
INTERNAL DATA
PRIMER IBM WATSON Cycorp Palantir ARIMO Alation sapho Outlier Digital Reasoning
MARKET
mattermark Quid DataFox PREMISE Bottlenose MOTIVA enigma CB INSIGHTS Tracxn predata
ENTERPRISE FUNCTIONS
CUSTOMER SUPPORT
DigitalGenius Kasisto ELOQUENT Wiseio ACTIONIQ zendesk Preact CLARABRIDGE
SALES
collective[i] 6sense fuse|machines AVISO salesforce INSIDE SALES .COM clari Zensight
MARKETING
MINTIGO Lattice RADIUS Liftigniter PERSADO brightfunnel retention science COGNICOR AIRPR msg.ai
SECURITY
CYLANCE DARKTRACE ZIMPERIUM deepinstinct Sentinel DEMISTO graphistry drawbridge SignalSense AppZen
RECRUITING
textio entelo Wade & Wendy hiQ unitive SpringRole GIGSTER Hire Vue
AUTONOMOUS SYSTEMS
GROUND NAVIGATION
drive.ai AdasWorks ZOOX MOBILEYE UBER Google TESLA nuTonomy Auro Robotics
AERIAL
SKYDIO SHIELD AI Airware dji LILY DroneDeploy pilot.ai SKYCATCH
INDUSTRIAL
JAYBRIDGE OSARO CLEARPATH fetch KINDRED rethink robotics HARVEST
AGENTS
PERSONAL
amazon alexa Cortana Allo facebook Siri Replika
PROFESSIONAL
butter.ai pogo SKIPFLAG clara x.ai slack talla Zoom.ai sudo
INDUSTRIES
AGRICULTURE
BLUE RIVER mavrx tule TRACE GENOMICS Pivot Bio TerrAvion AGRI-DATA Descartes Labs udio abundant robotics
EDUCATION
KNEWTON volley gradescope CTI coursera UDACITY altschool
INVESTMENT
Bloomberg sentient iSENTIUM KENSHO alphasense Dataminr CEREBELLUM CAPITAL Quandl
LEGAL
blue J BEAGLE Everlaw RAVEL seal ROSS LEGAL ROBOT
LOGISTICS
NAUTO Acerta PRETECKT Routific clearmetal MARBLE PITSTOP
INDUSTRIES CONT'D
MATERIALS
zymergen Citrine Eigen Innovations SIGHT MACHINE GINKGO BIOWORKS nanotronics CALCULARIO
RETAIL FINANCE
TALA zest finance Lendo earnest affirm MIRADOR wealthfront Betterment
HEALTHCARE
PATIENT
PULSE CareSkore ZEPHYR HEALTH IBM Watson Health Oncora SENTRIAN Atomwise Numerate
IMAGE
BUTTERFLY 3SCAN ARTERYS enlitic BAYLABS imagia Google DeepMind
BIOLOGICAL
iCarbonX color GRAIL deep genomics RECURSION LUMINIST Numerate Atomwise verily WHOLE BIOME
shivonzilis.com/MACHINEINTELLIGENCE · Bloomberg BETA
TECHNOLOGY STACK
AGENT ENABLERS
OCTANE.AI howdy. Maluuba KITT.AI OpenAI Gym Kasisto AUTOMAT semanticmachines
DATA SCIENCE
DOMINO SPARKBEYOND rapidminer kaggle DataRobot yhat AYASDI data iku seldon yseop bigml
MACHINE LEARNING
CognitiveScale GoogleML context relevant Cycorp HyperScience naralogics minds.ai H2O.ai SCALED INFERENCE sparkcognition loop GEOMETRIC INTELLIGENCE deepsense.io reactive skymind bonsai
NATURAL LANGUAGE
agolo AYLIEN LEXALYTICS Narrative Science loop ai labs spaCy LUMINOSO cortical.io MonkeyLearn
DEVELOPMENT
SIGOPT HyperOpt fuzzy.io kite rainforest lobe Anodot Signifai LAYER 6 bonsai
DATA CAPTURE
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RESEARCH
OpenAI maisense ELEMENT AI vicarious KNOGGIN Numenta Kimera Systems
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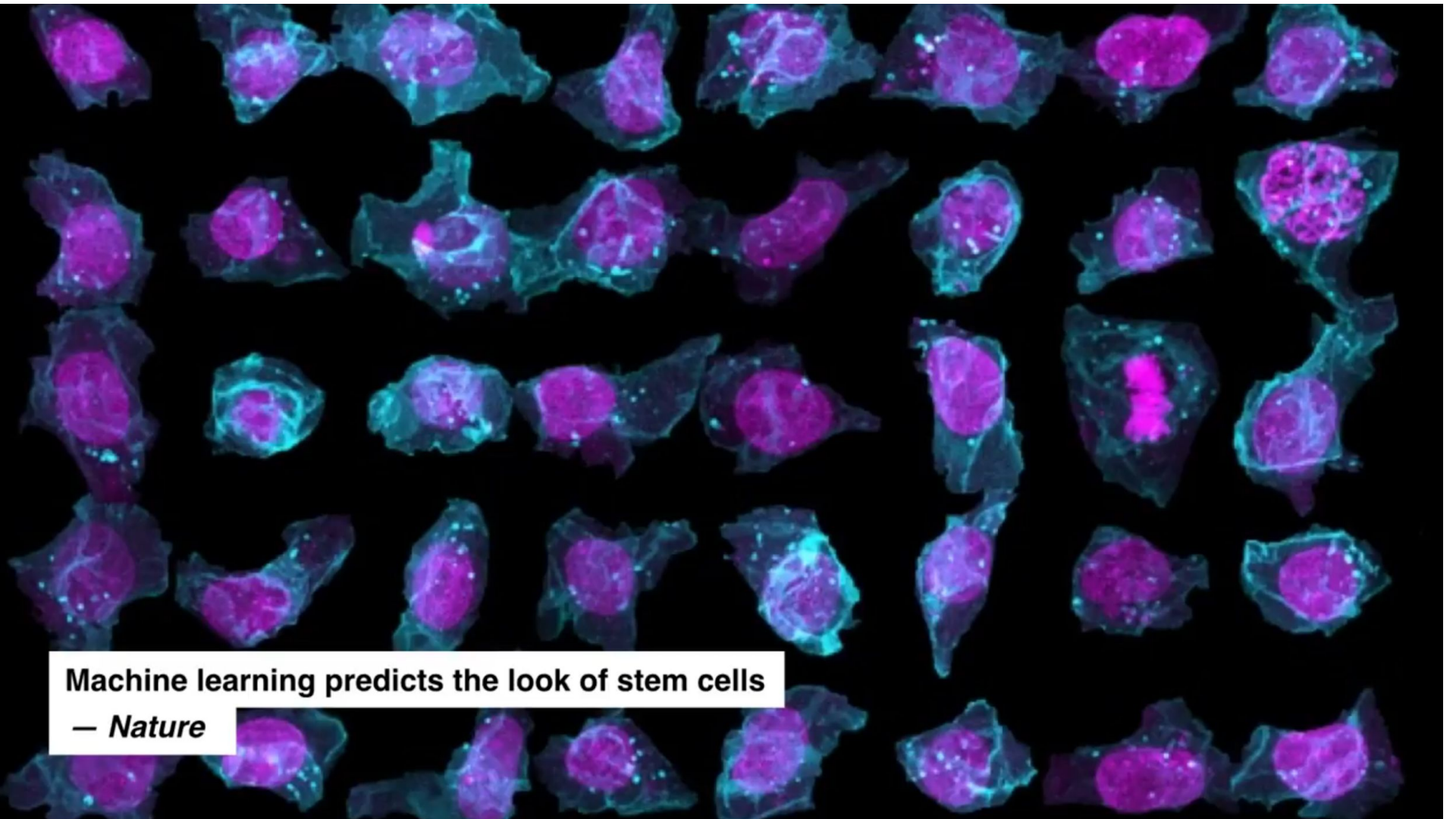
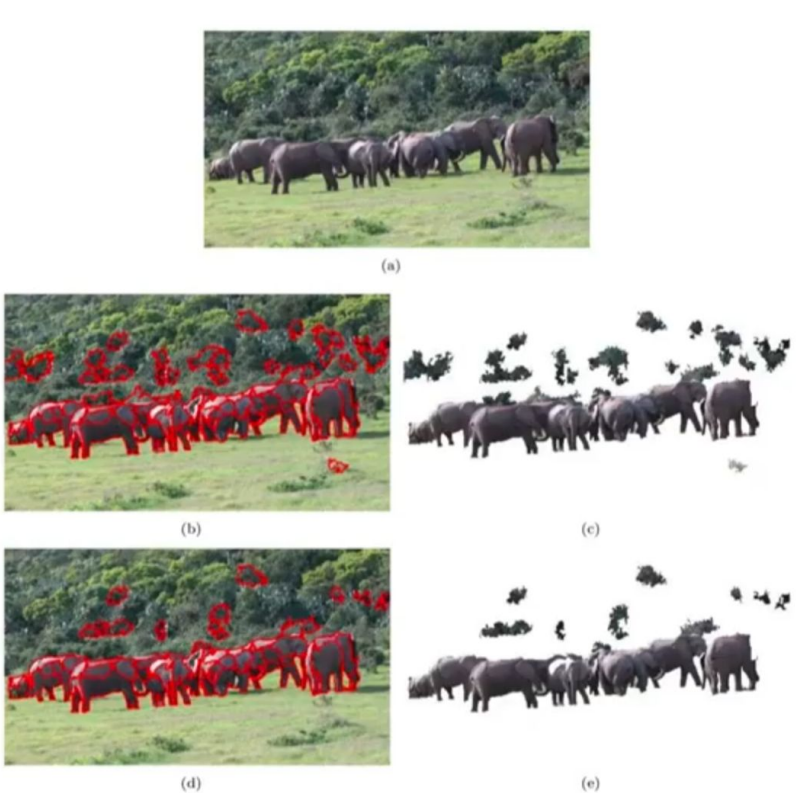
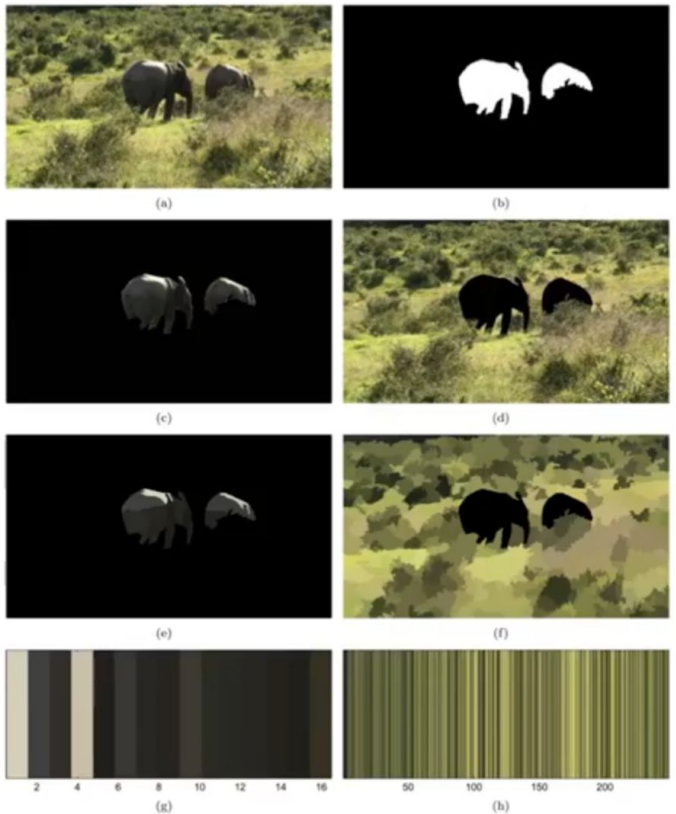
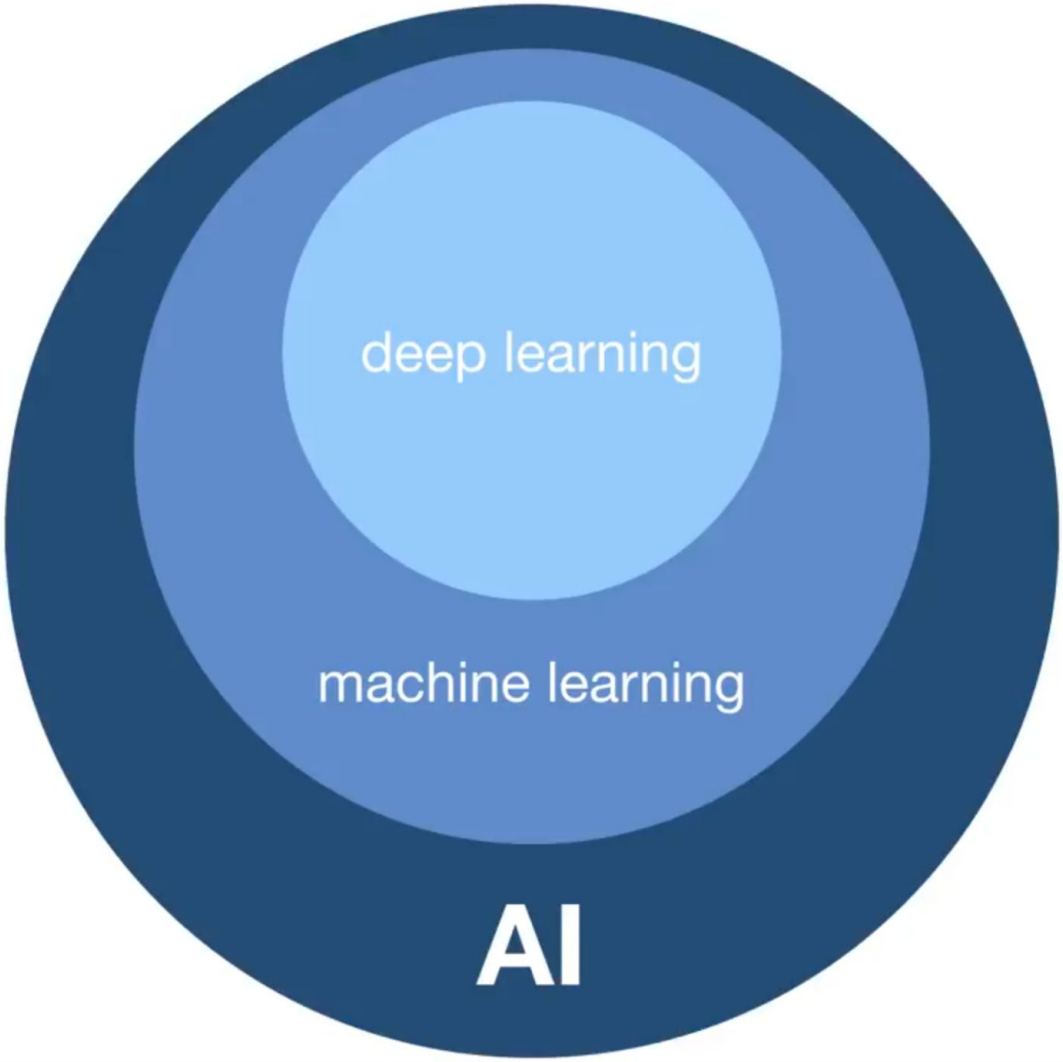

Machine learning predicts the look of stem cells
— *Nature*

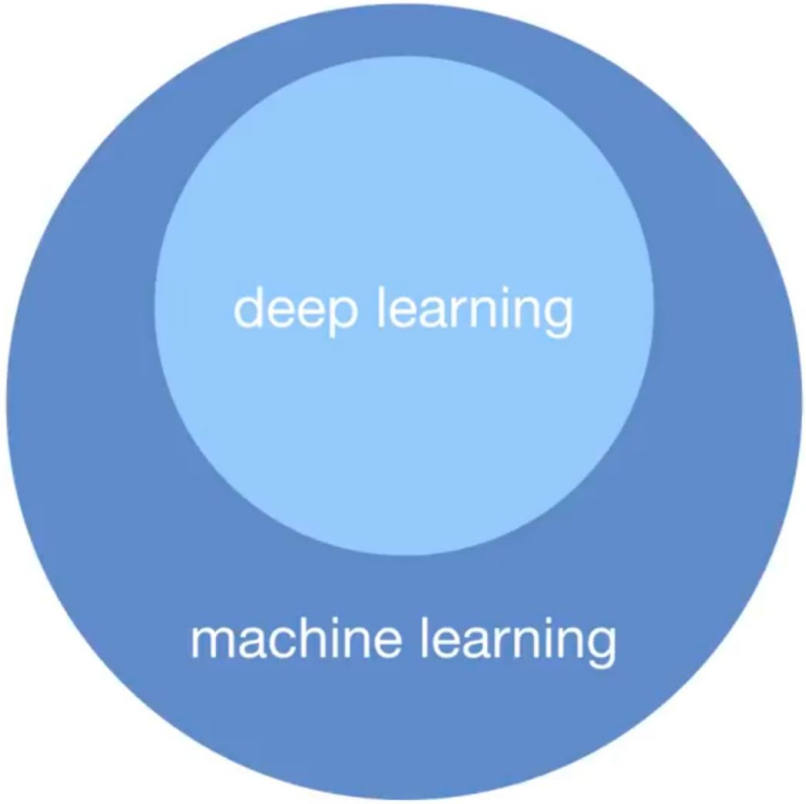
Automated detection of elephants in wildlife video



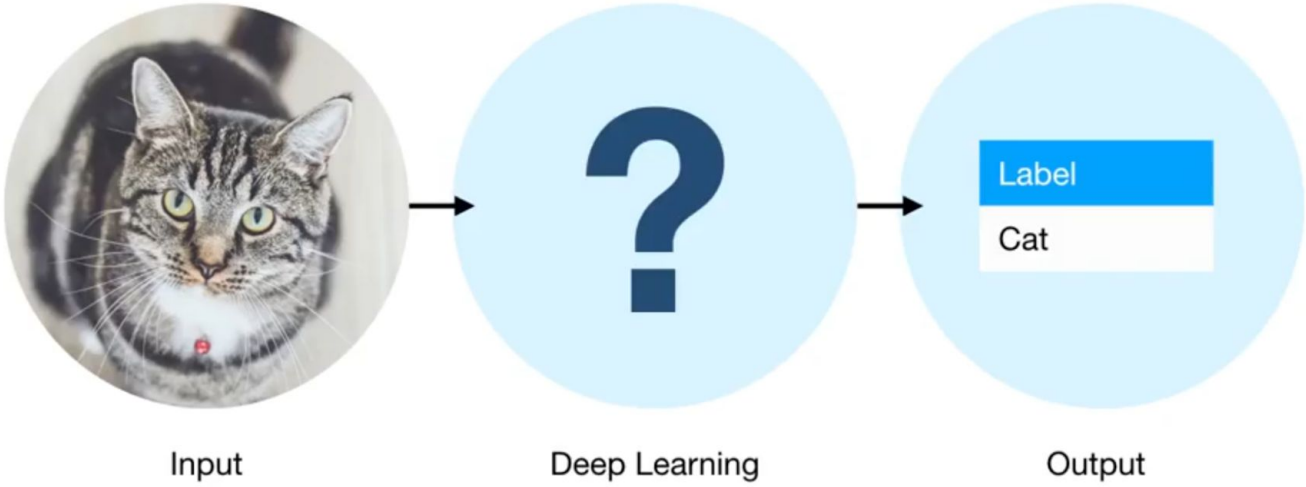



“Precision is the key to efficient agriculture.”
— *Bayer Crop Science*


deep learning
machine learning
AI


deep learning
machine learning

Machine Learning 101



Statistics 101

Training Data

Age (days)	Weight (grams)
2	49
12	122
8	74
21	205
4	80

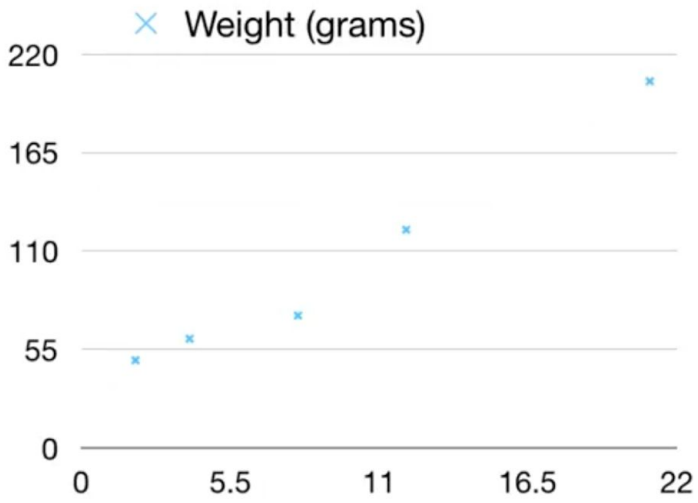
Test Data

Age (days)	Weight (grams)
18	?

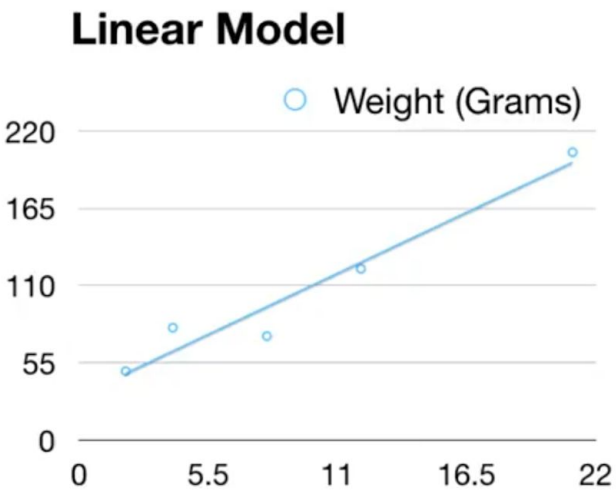
Linear Regression

Training Data

Age (days)	Weight (grams)
2	49
12	122
8	74
21	205
4	80



Linear Regression

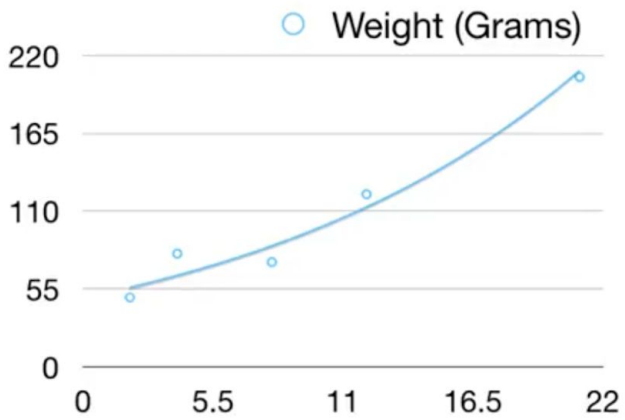


Test Data

Age (days)	Weight (grams)
18	170

Non-Linear Regression

Non-Linear Model

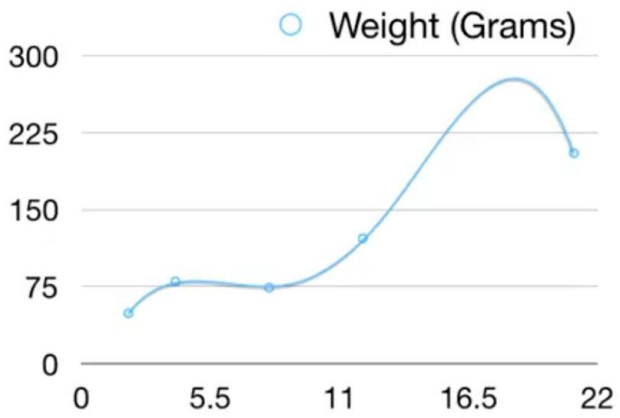


Test Data

Age (days)	Weight (grams)
18	166

Non-Linear Regression

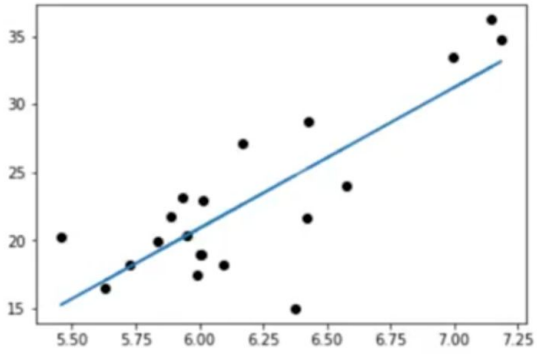
Non-Linear Model

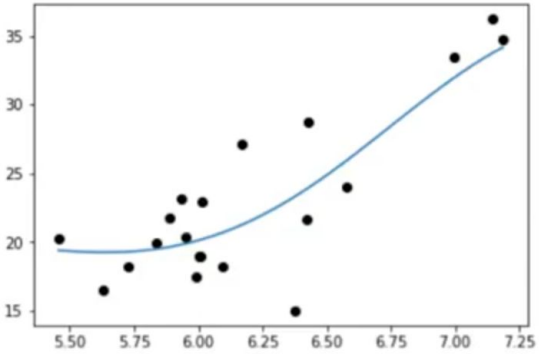


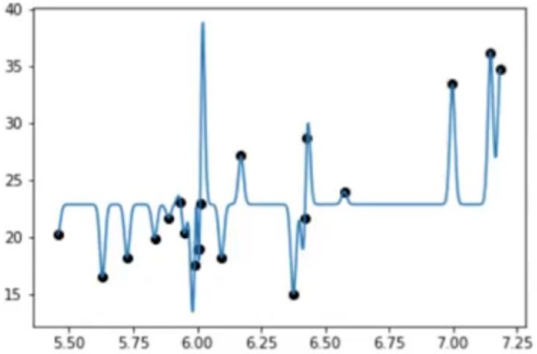
Test Data

Age (days)	Weight (grams)
18	270

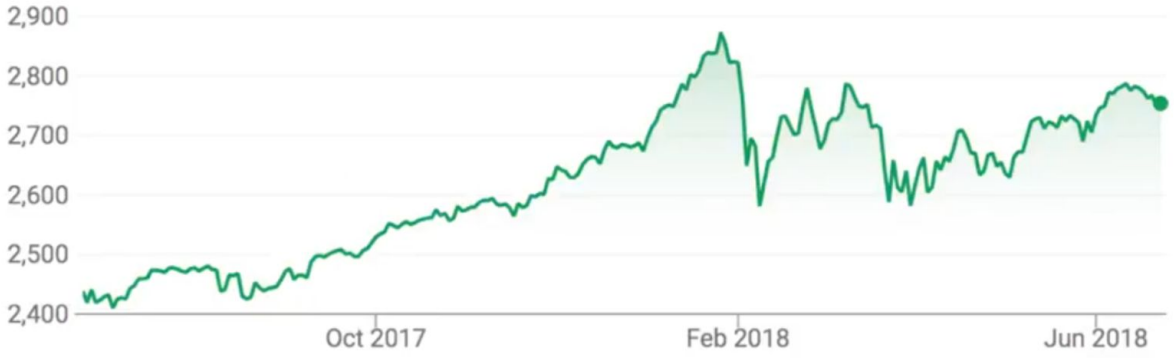
Overfitting



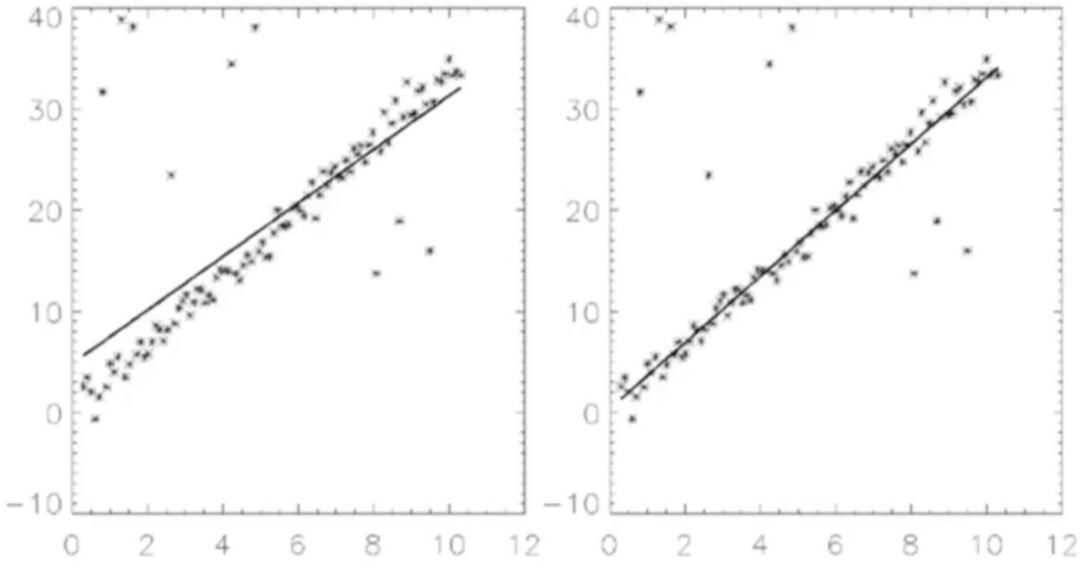




Non-Linear Regression



What makes a good model?



Multivariate Linear Regression

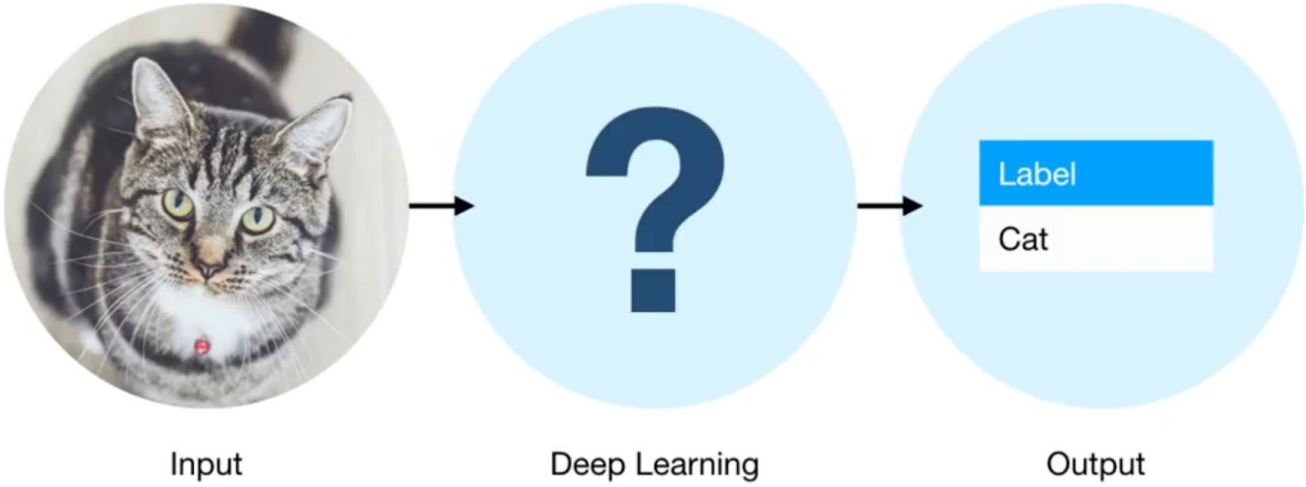
Training Data

Age (days)	Diet	Weight (grams)
2	0	49
12	0	122
8	0	74
21	0	205
4	1	80

Test Data

Age (days)	Diet	Weight (grams)
18	0	?

Machine Learning 101



“API”

Statistics API

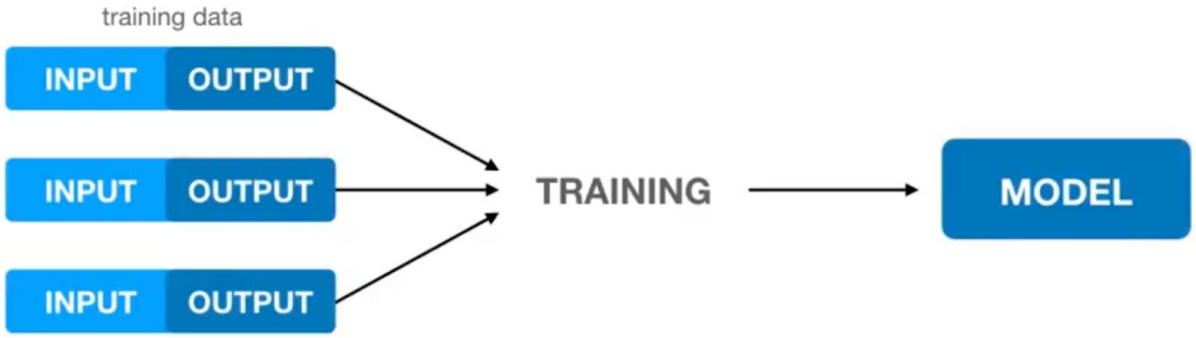
INPUT fixed-length list of numbers

OUTPUT fixed-length list of numbers

Machine Learning API

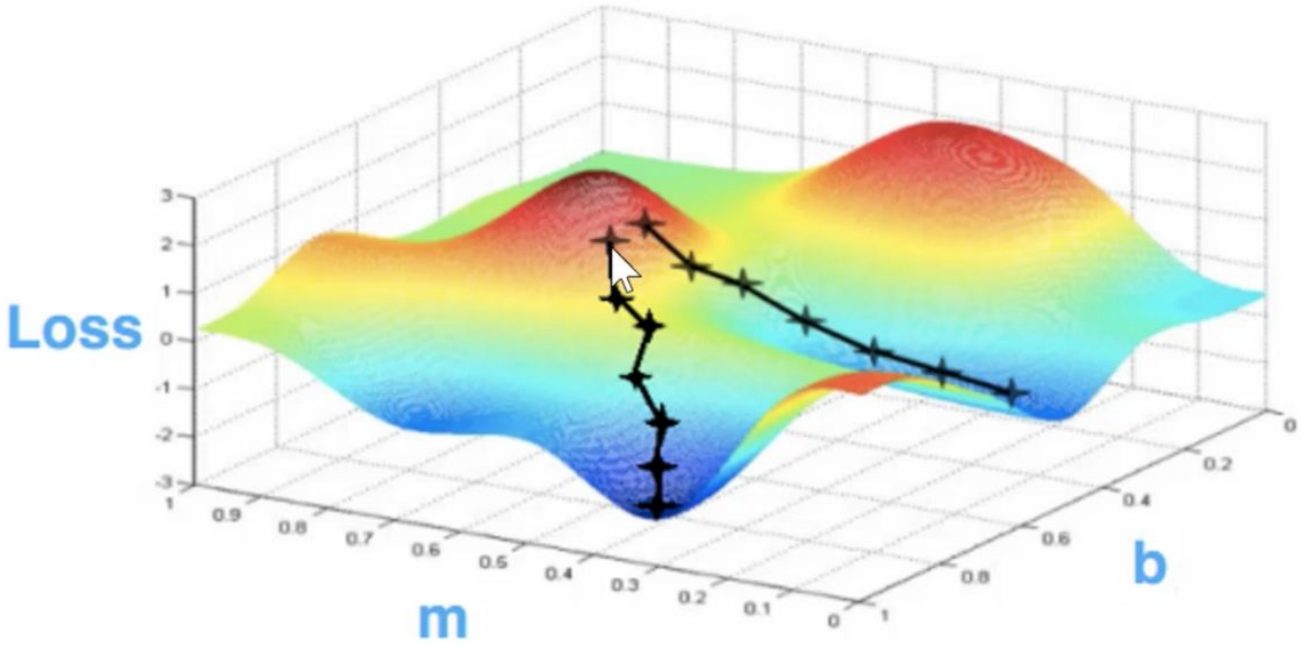
INPUT fixed-length list of numbers

OUTPUT fixed-length list of numbers

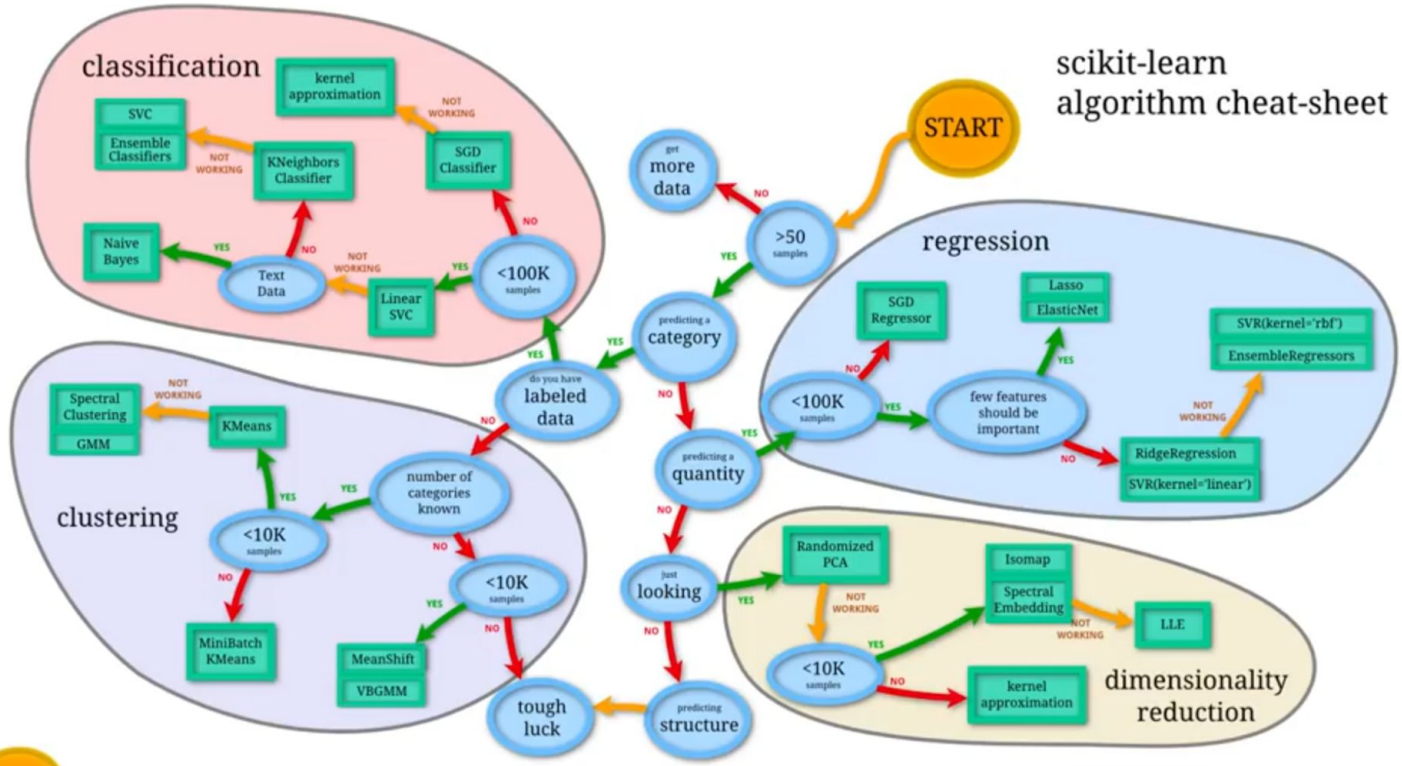


Gradient Descent

f (x) = nonlinear function of x

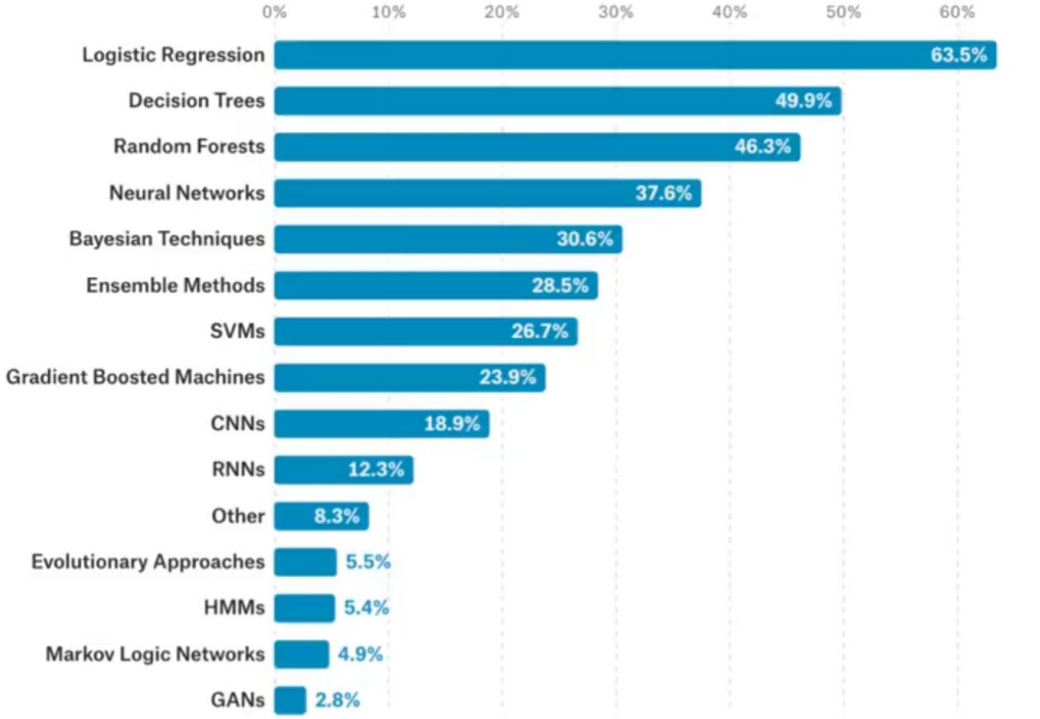


Choose an algorithm



http://scikit-learn.org/stable/tutorial/machine_learning_map/

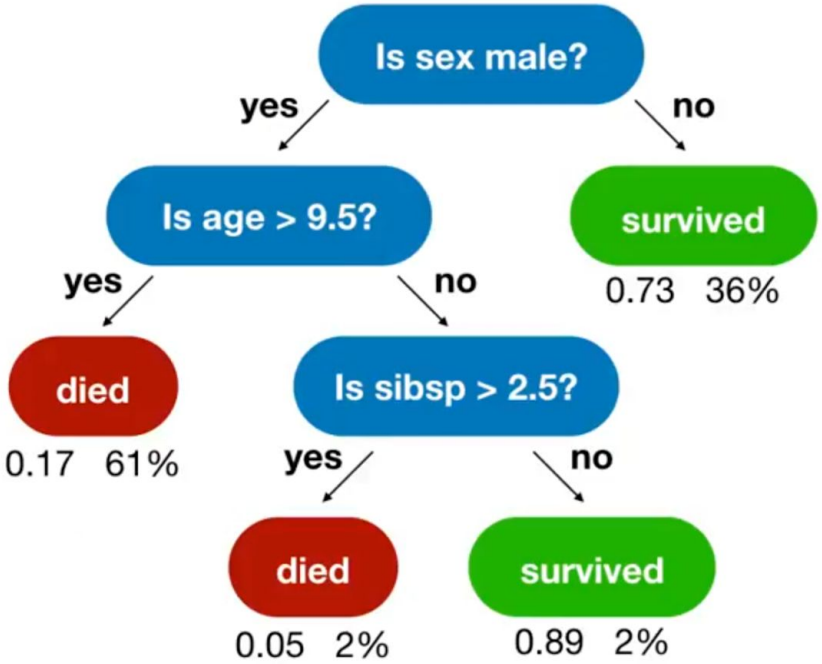
Kaggle Survey



7,301 responses

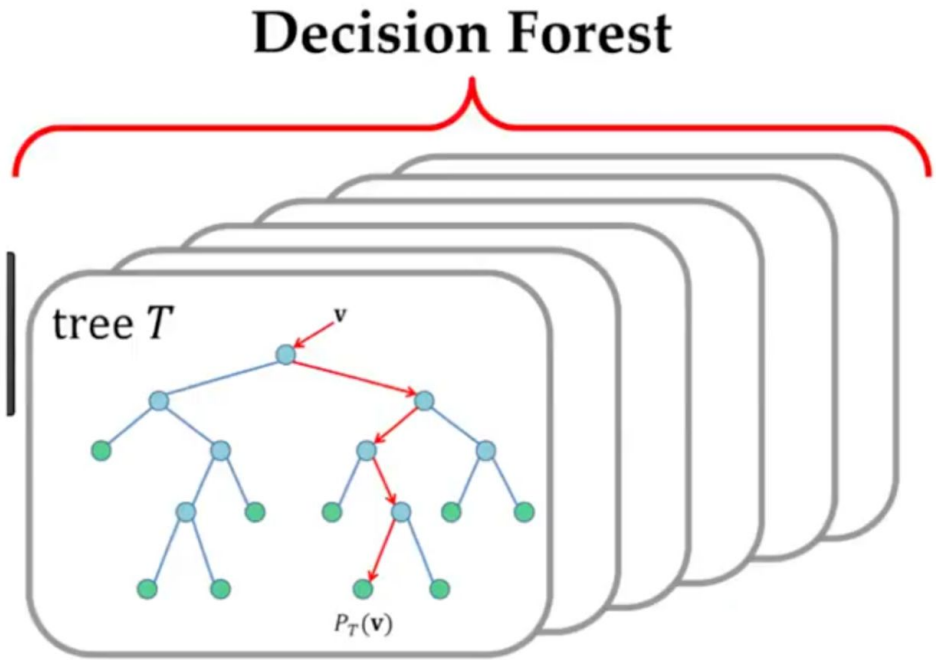
View code in Kaggle Kernels

Decision Trees

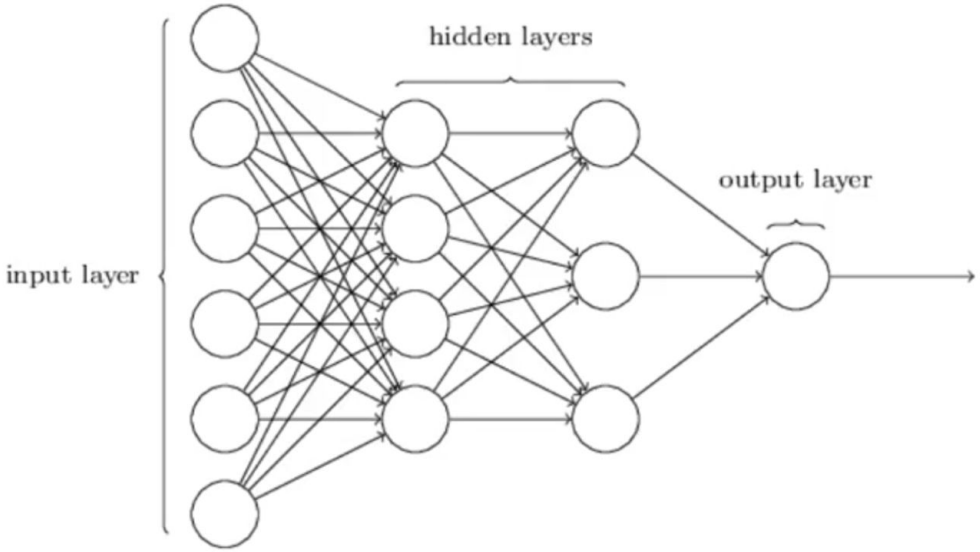


example decision tree from the Titanic dataset

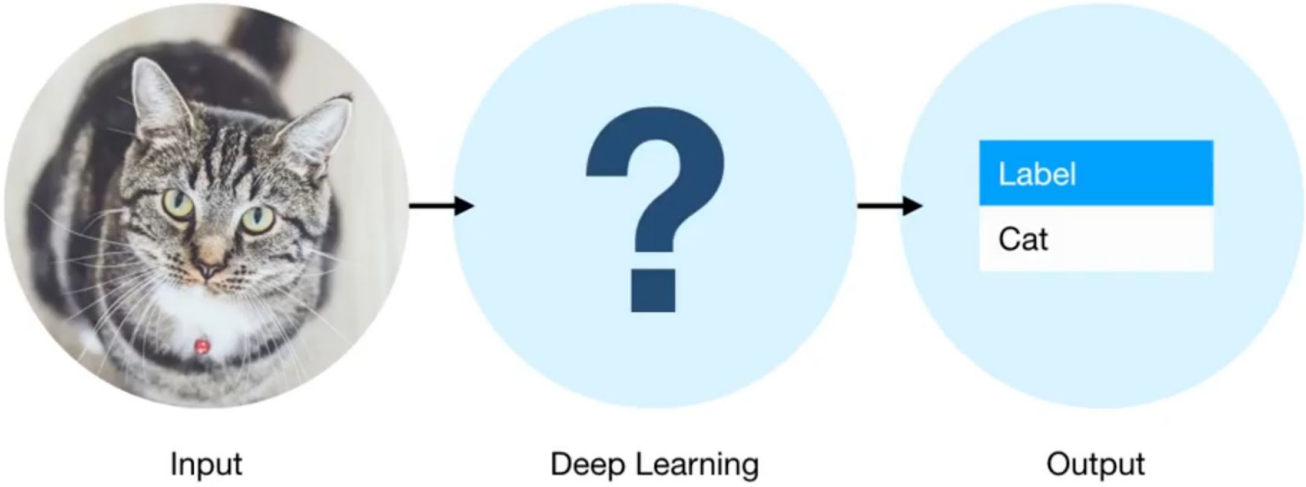
Random Forest



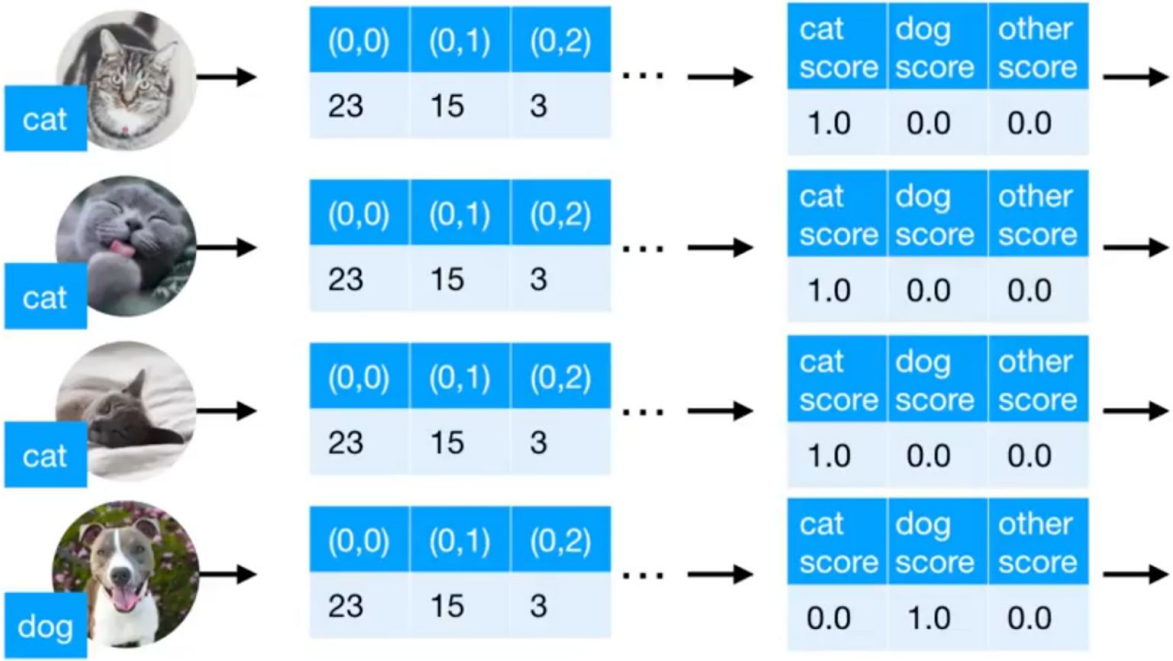
Neural Networks



Machine Learning 101



Training

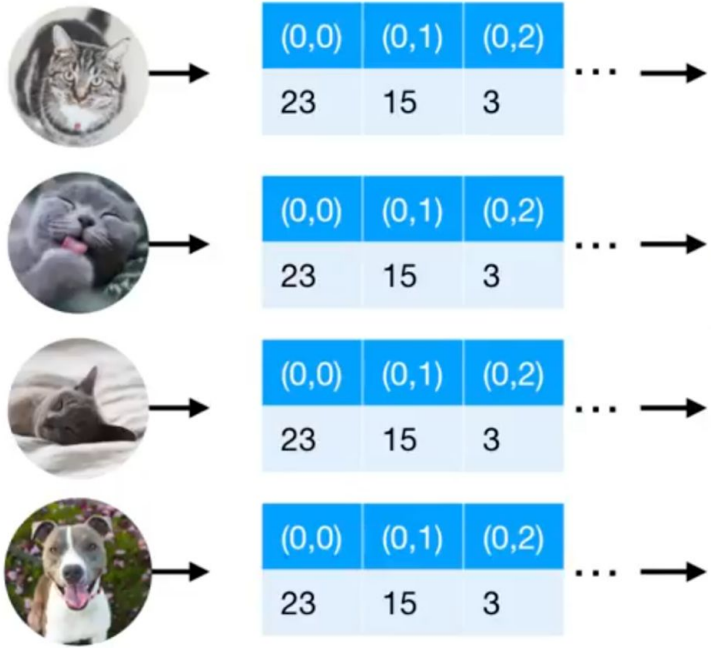


Labeled Images

Fixed-length list of numbers

Machine Learning

Testing



Labeled Images

Fixed-length list of numbers

Scores

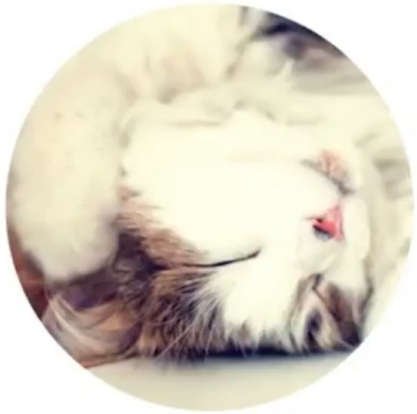
Labels

Deep Learning 101

Label
Cat

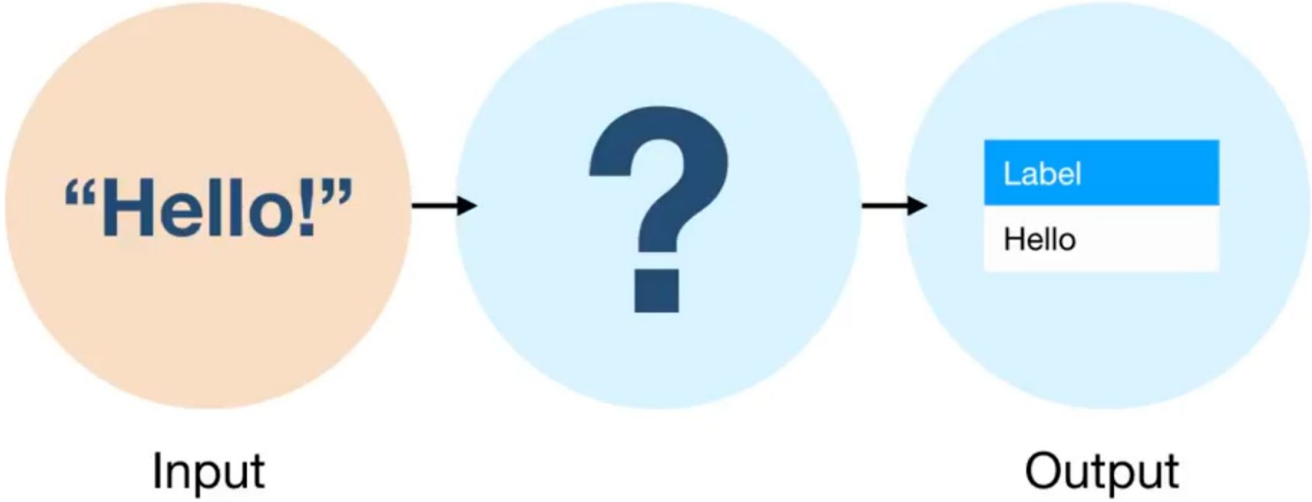
Label
Cat

Label
Cat

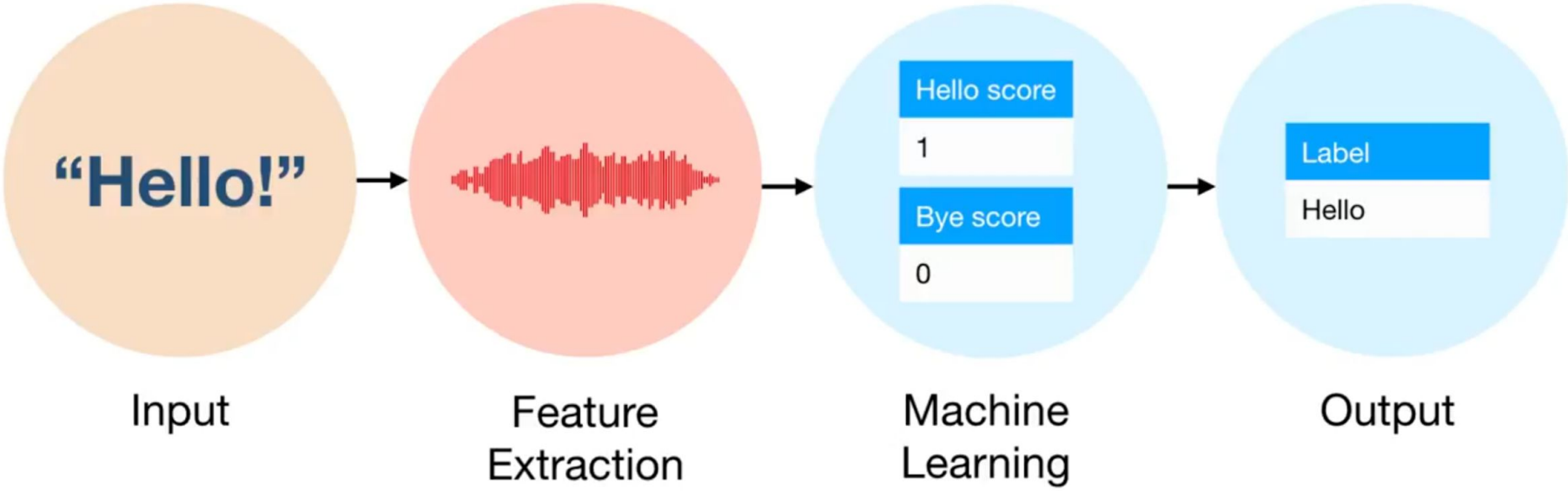


Label
Cat

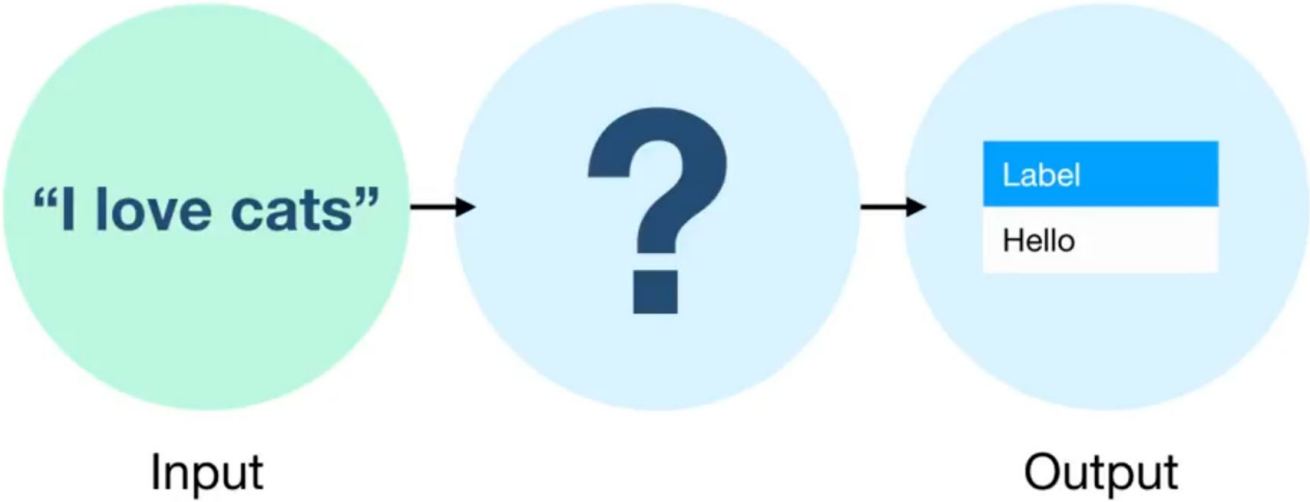
Machine Learning on Speech



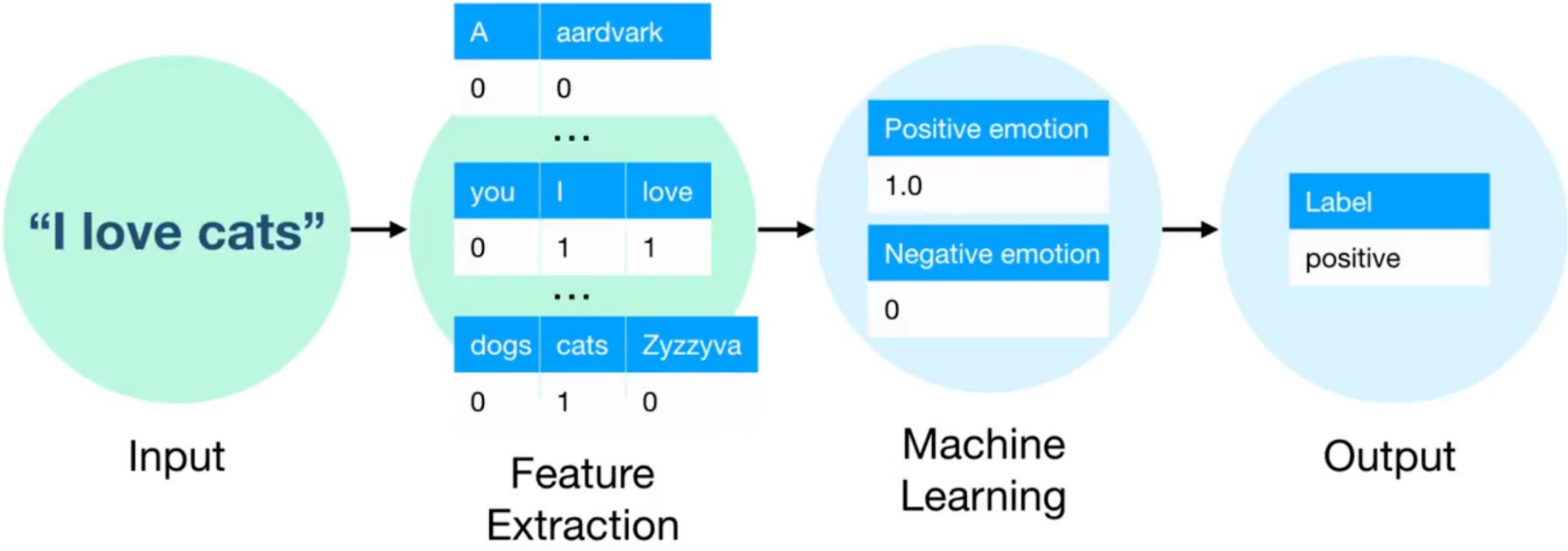
Machine Learning on Speech



Machine Learning on Text



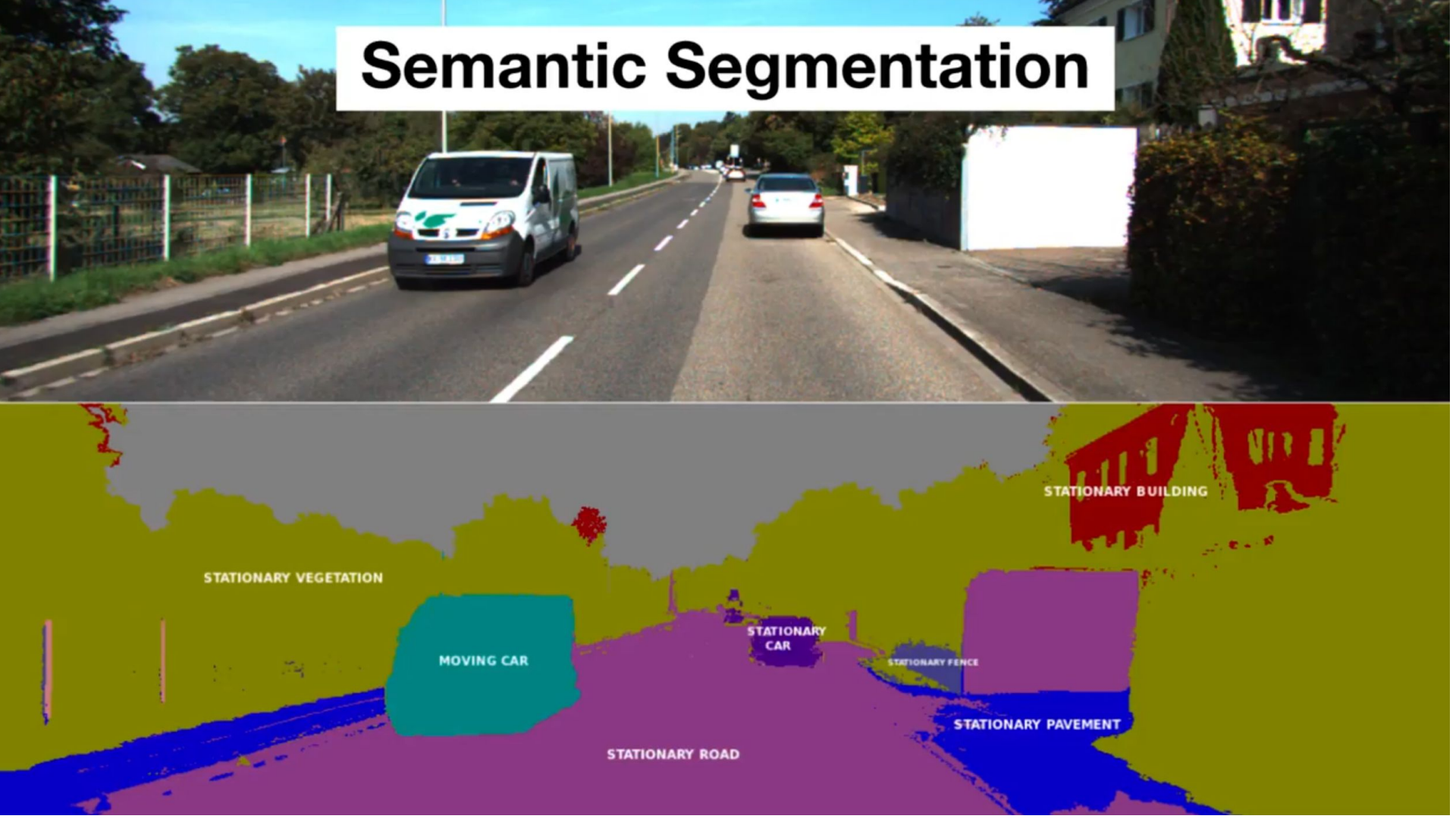
Machine Learning on Text



Semantic Segmentation

Input

Output


Semantic Segmentation
STATIONARY BUILDING
STATIONARY VEGETATION
STATIONARY CAR
MOVING CAR
STATIONARY FENCE
STATIONARY PAVEMENT
STATIONARY ROAD

Semantic Segmentation

Input

(0,0)	(0,1)	(0,2)
23	15	3
...		
(1,0)	(1,1)	(1,2)
56	23	12
...		
(2,0)	(2,1)	(2,2)
56	23	12

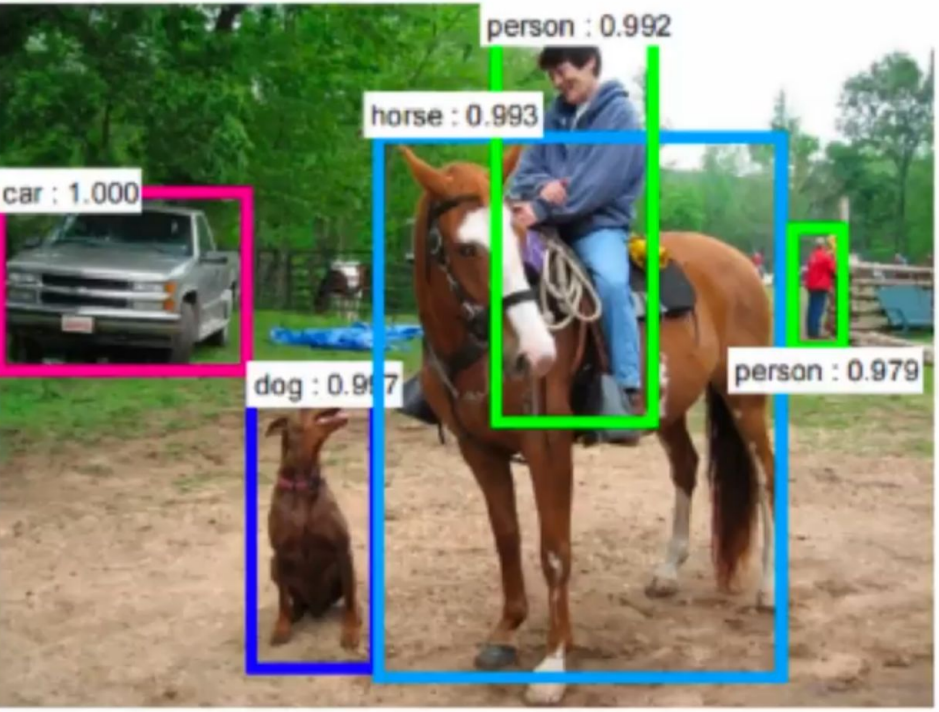
Feature Extraction

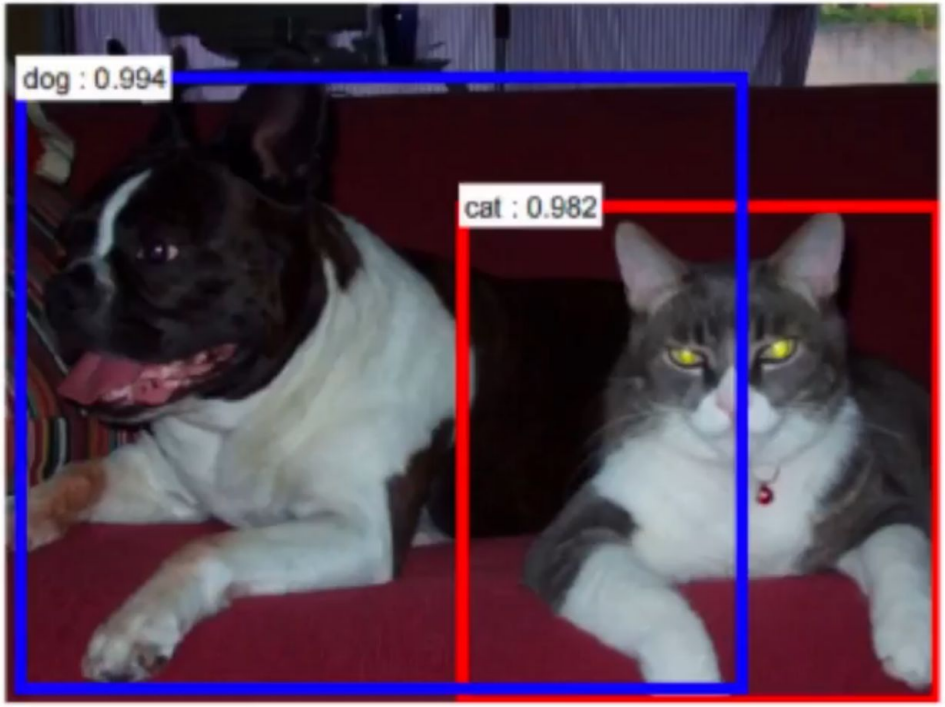
Label (0,0)	Label (1,0)	Label (1,1)
Tree	Car	Tree

Machine Learning

Output

Bounding Boxes





Bounding Boxes

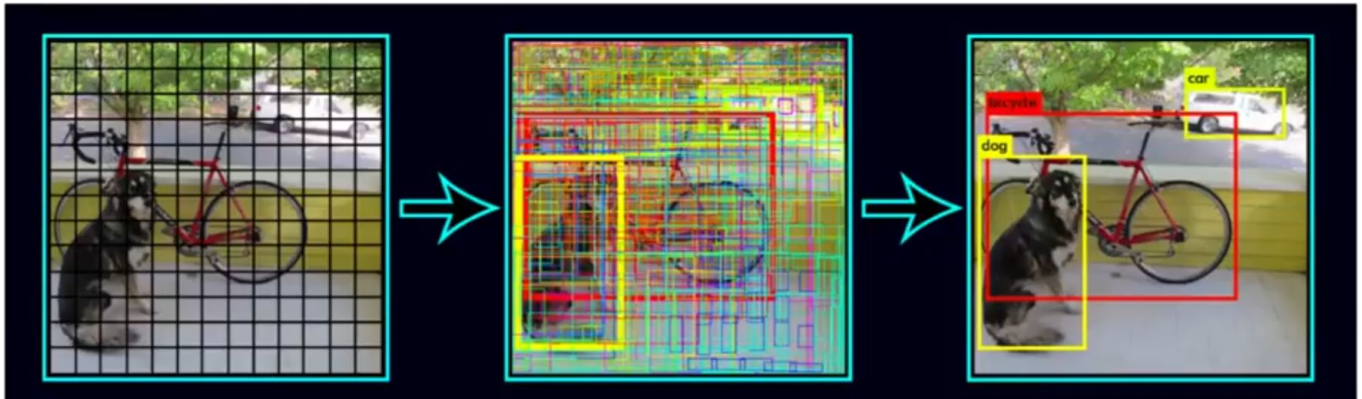
INPUT

(0,0)	(0,1)	(0,2)		(1,0)	(1,1)	(1,2)	Box Upper Left X	Box Upper Left Y
23	15	3		123	89	56	15	90
23	15	3	...	123	89	56	23	23
23	15	3		123	89	56	56	23

→

OUTPUT

Good Box	Object
True	Bicycle
False	Bicycle
False	Dog



One-Shot Learning

https://sorenbouma.github.io/blog/oneshot/

Was haben alle gemeinsam?

Alle lassen sich in das gleiche gemeinsame API Muster zwängen

- Inputs fixed length of numbers
- Outputs fixed length of numbers
- Kann ich genung training daten sammeln?

Wenn alle drei antworten ja sind dann hat man ein problem das mit machine learning gelöst werden kann.