

Deep Learning

Loay Wael
Computer Vision & DL Engineer



ABOUT ME

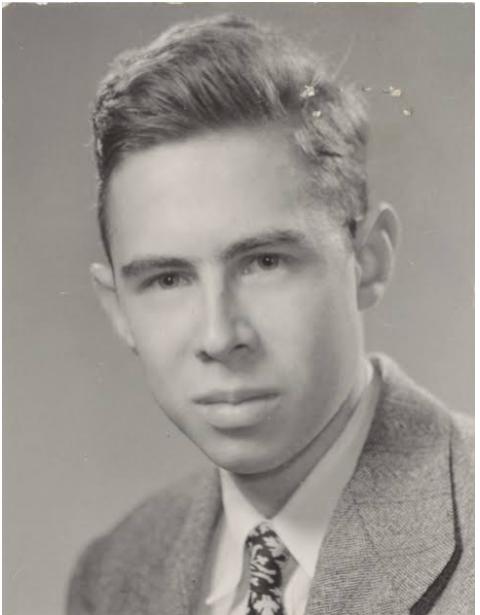
M.Sc. Research student @ASU in Perception

Deep Learning Instructor @Epsilon AI

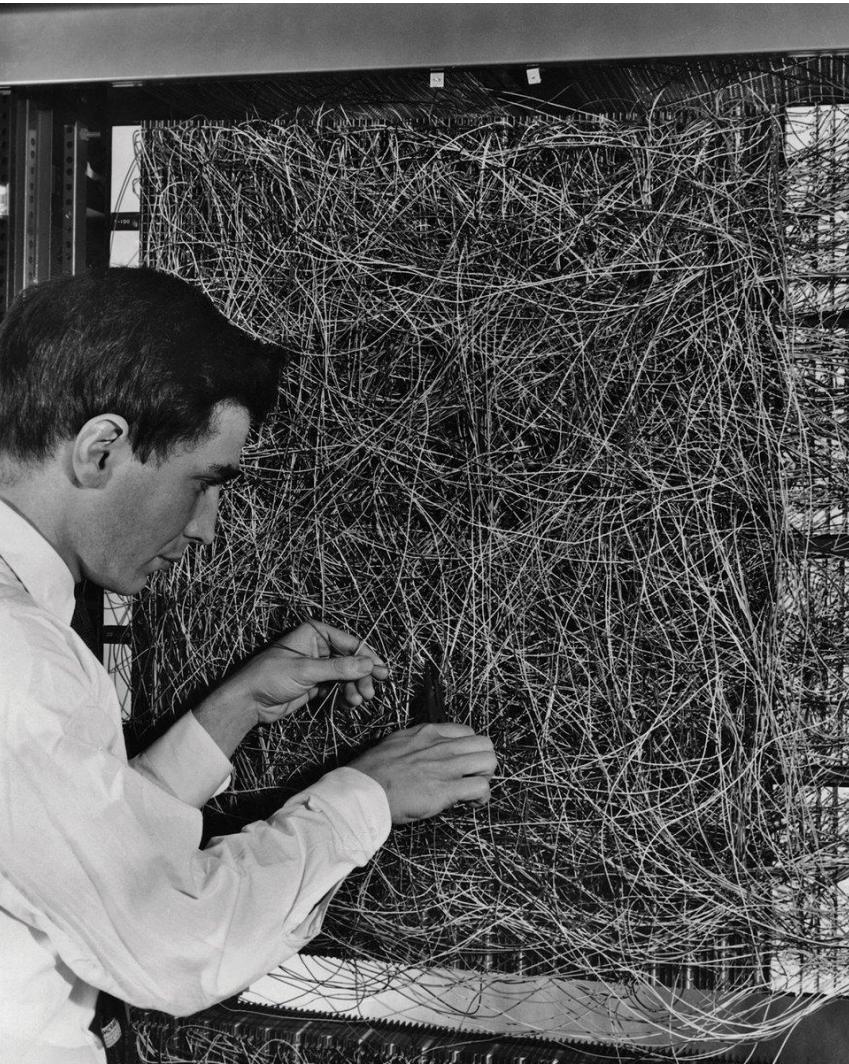
B.Sc. Mechatronics Engineering @HTI

3 years practitioner experience in ML/DL

Rosenblatt Perceptron



1950



A black and white photograph of Stephen Hawking, a theoretical physicist and cosmologist. He is seated in his signature motorized wheelchair, wearing glasses and a dark jacket over a light shirt. He is smiling warmly at the camera. In the background, there's a desk with papers, a computer monitor, and other office equipment.

Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks.

- Stephen Hawking -

IMAGE CLASSIFIER | Dogs & Cats

Define the program rules

Cat

Features

- Four Legs
- Two Eyes
- Two Ears
- Multiple Colors
- Says Miao!



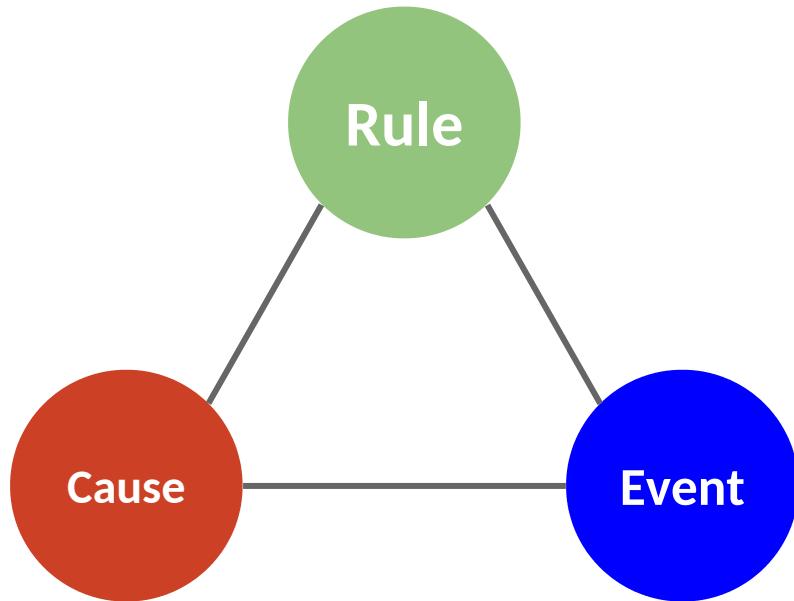
Dog

Features

- Four Legs
- Two Eyes
- Two Ears
- Multiple Colors
- Says Haow!

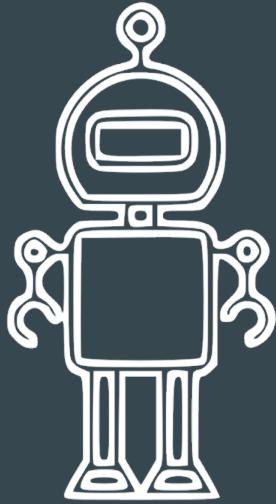
SMART SYSTEM

- Classifying & Reasoning events
- Deducing rules from experience
- Predict events and forces actions



Smarter Problem Solving Strategy





ARTIFICIAL
INTELLIGENCE

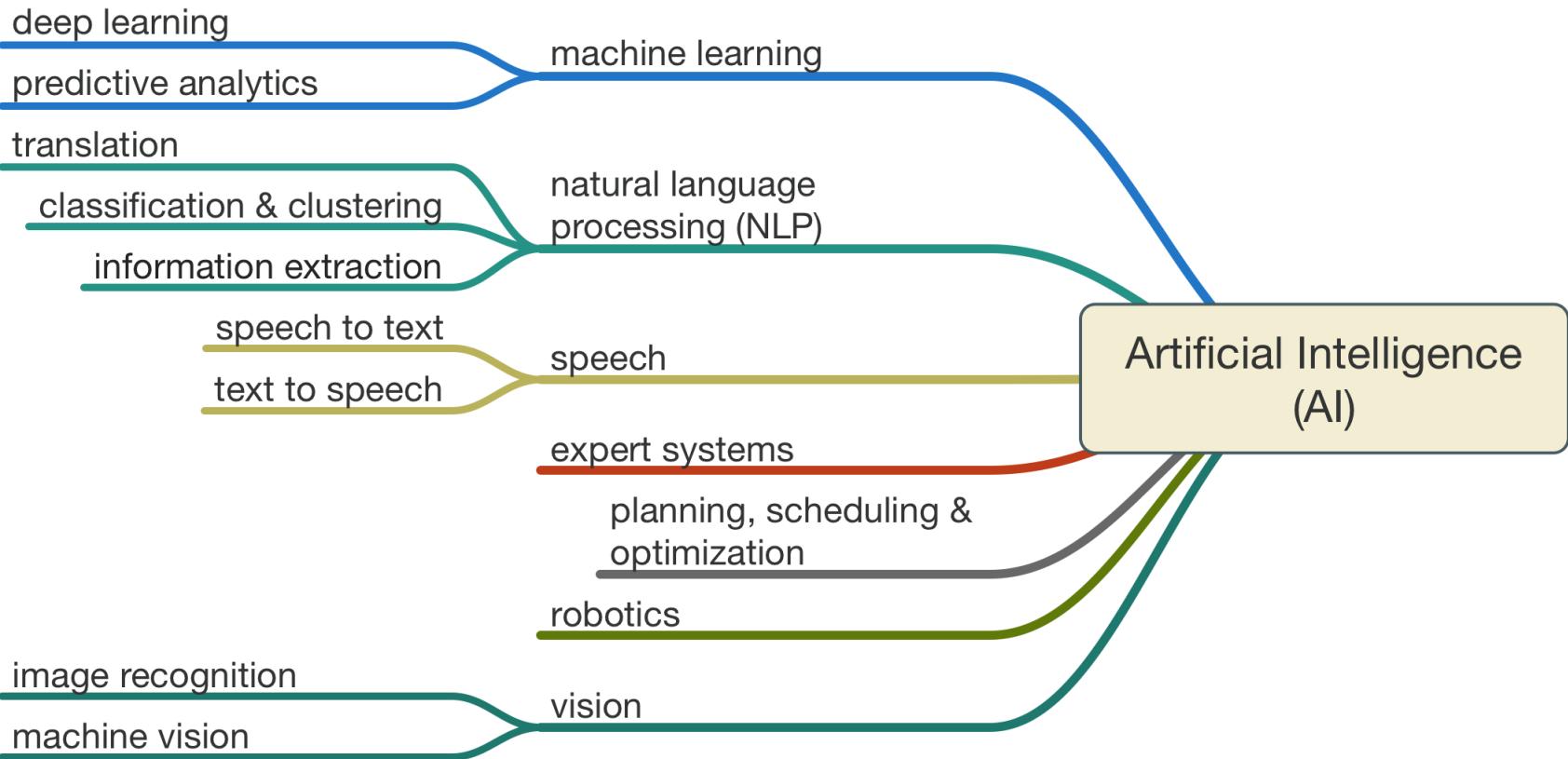


MACHINE
LEARNING



DEEP
LEARNING

What is Artificial Intelligence (AI)



Supervised Machine Learning

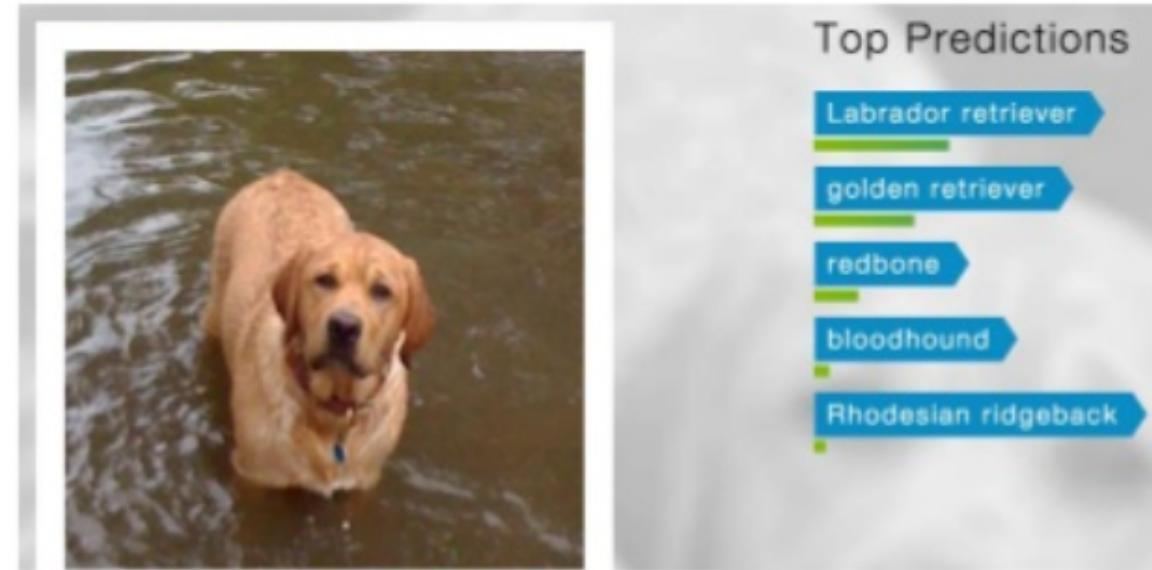


“Dog”



“Cat”

Closer to the main goal



Input

Output

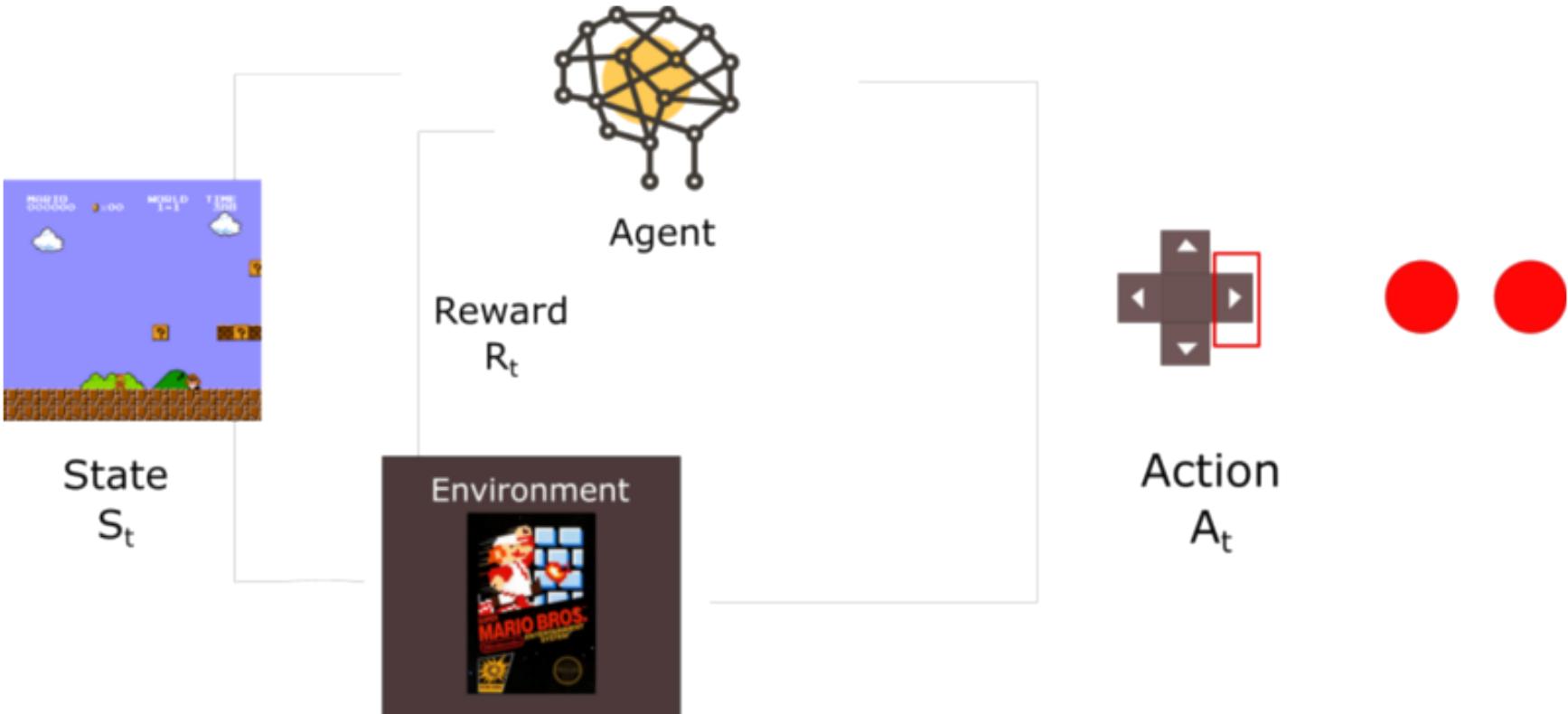
Unsupervised Machine Learning



Smarter Algorithms is Needed



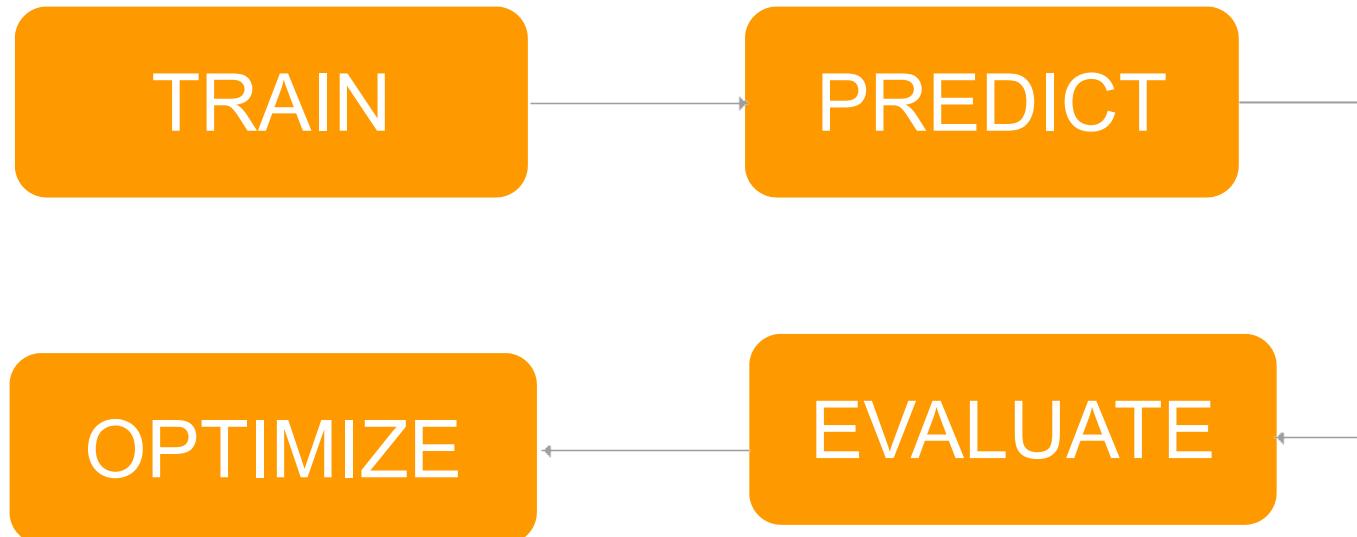
Reinforcement Learning



Machine Learning Algorithms

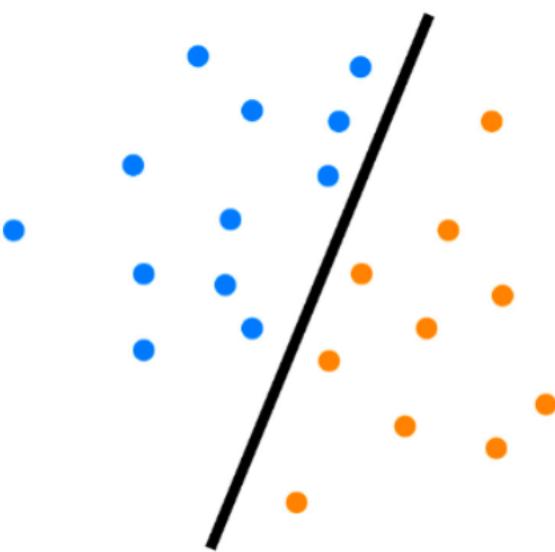


MACHINE LEARNING STRATEGIES

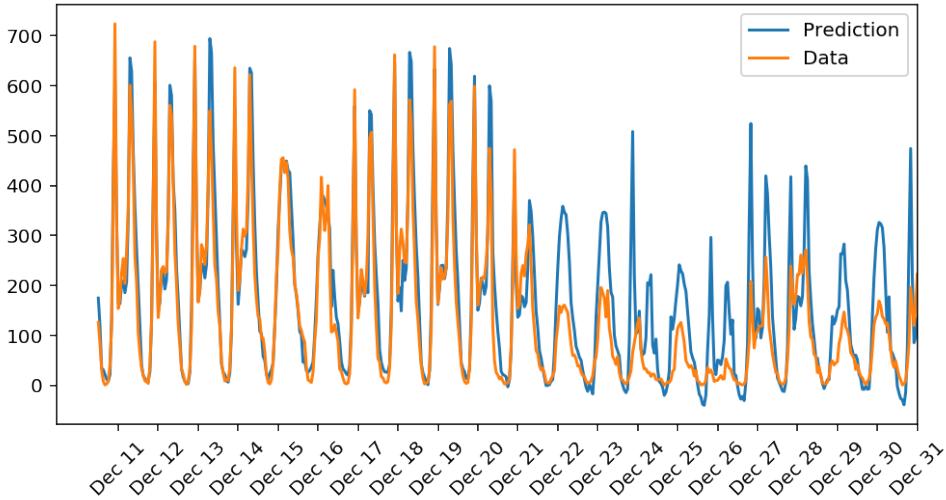


MACHINE LEARNING TARGETS

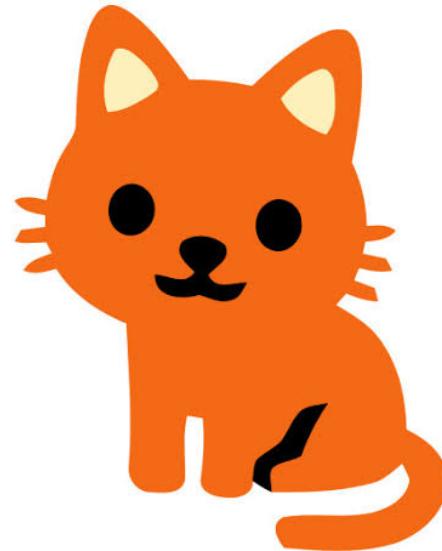
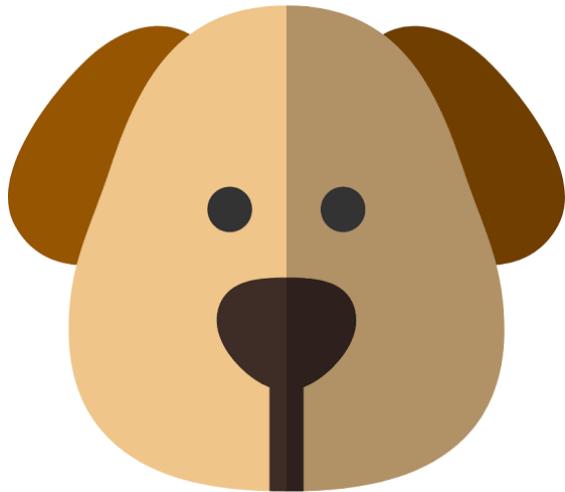
CLASSIFICATION



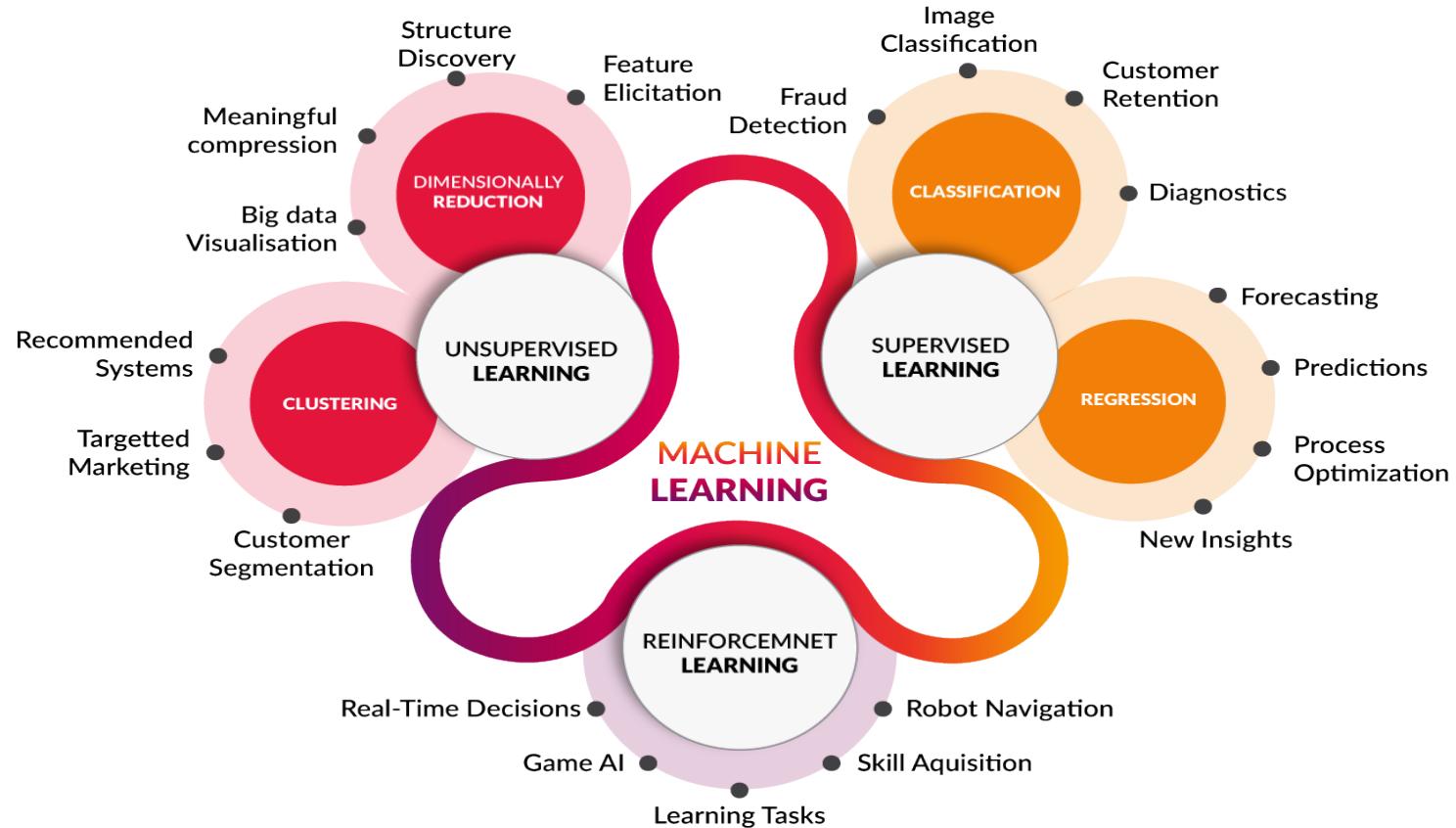
PREDICTION



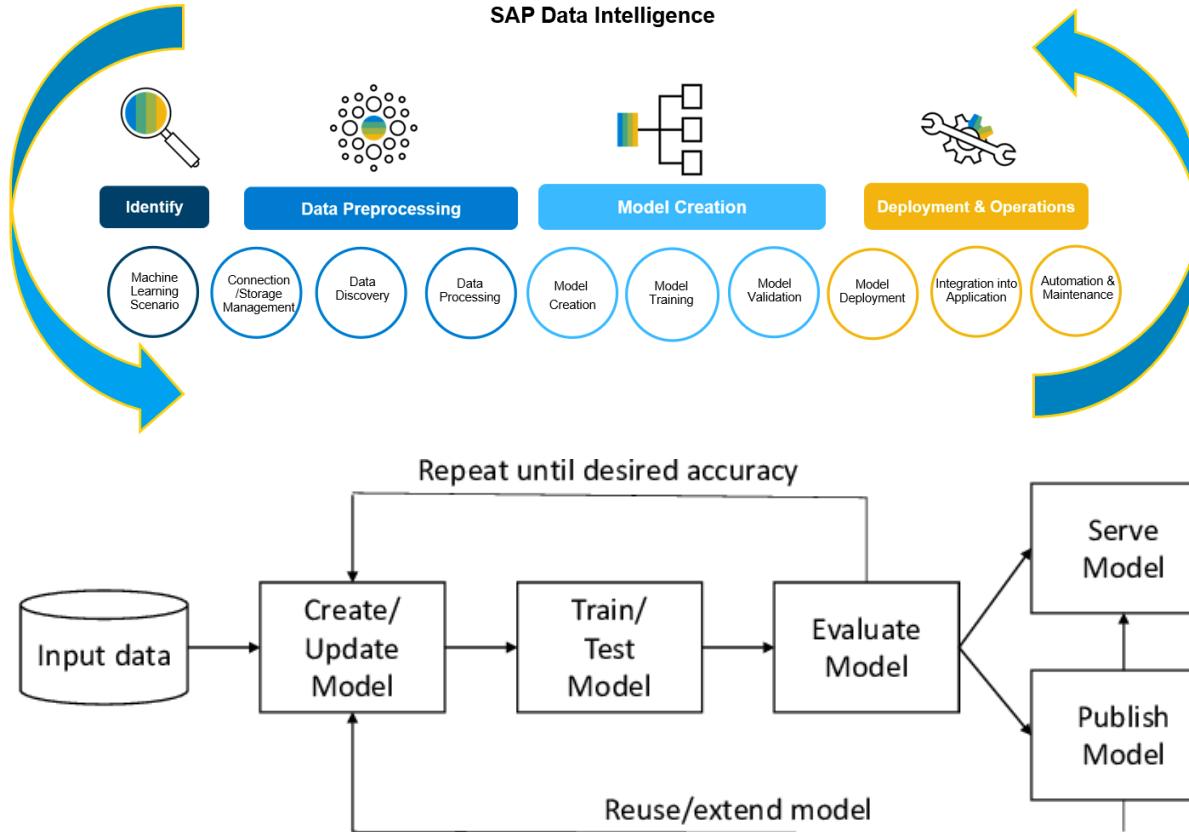
CHALLENGE FOR GIVEAWAY



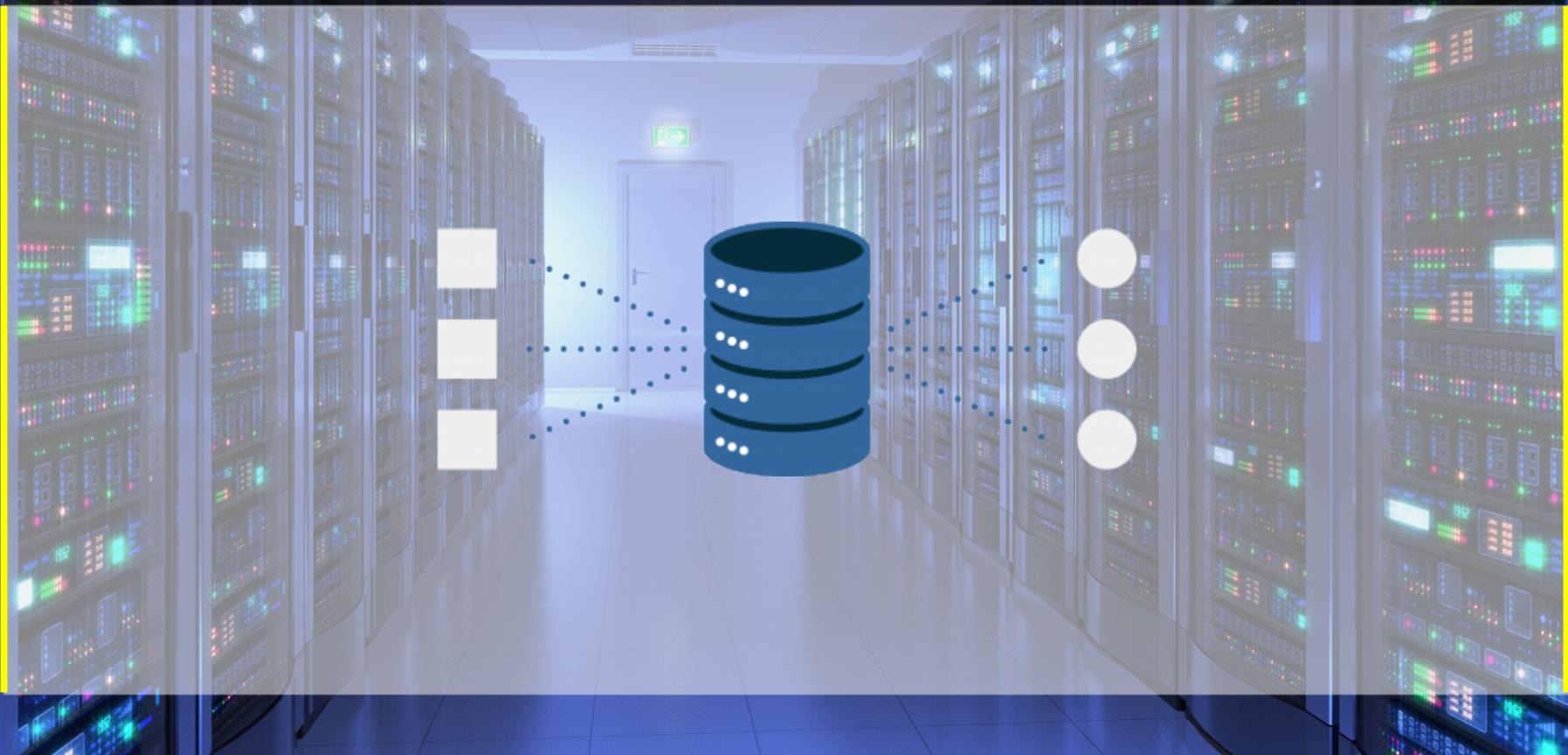
MACHINE LEARNING | APPLICATIONS



MACHINE LEARNING | Life Cycle



DATA IMPORTING & HANDLING



DATA TYPES & NATURE

Data Formats



Unstructured

PDFs, JPEGs, MP3,
Movies, ...



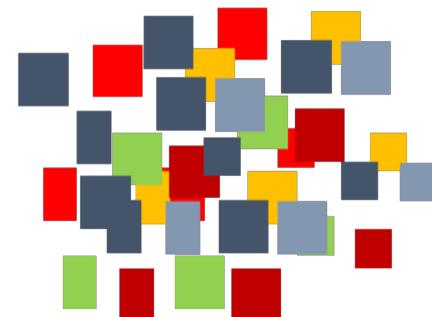
Structured

Oracle, MSSQL, MySQL,
DB2, ...

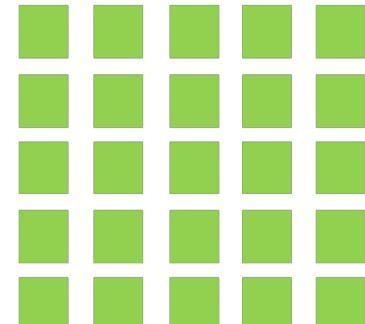
Semi-structured

CSV, JSON, XML,
MongoDB, ...

Unstructured Data



Structured Data



DATA SOURCES | Frameworks



DATA QUALITY

Have deep search in data before using!



What this could be !!

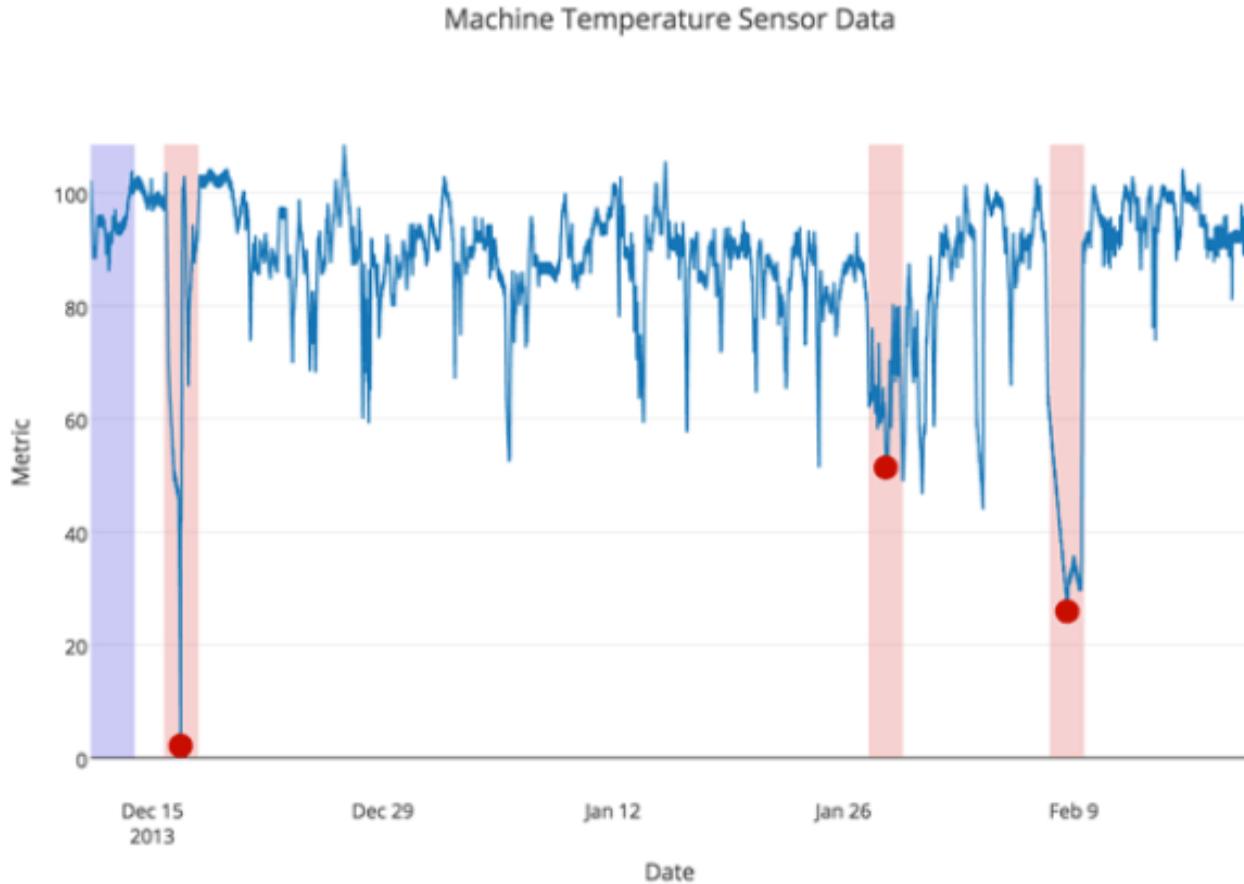
DATA PREPROCESSING



DATA PREPROCESSING | Missing Data

ID	Color	Weight	Broken	Class
1	Black	80	Yes	1
2	Yellow	100	No	2
3	Yellow	120	Yes	2
4	Blue	90	No	2
5	Blue	85	No	2
6	?	60	No	1
7	Yellow	100	?	2
8	?	40	?	1

DATA PREPROCESSING | Anomaly Detection



Data Preprocessing | Outliers

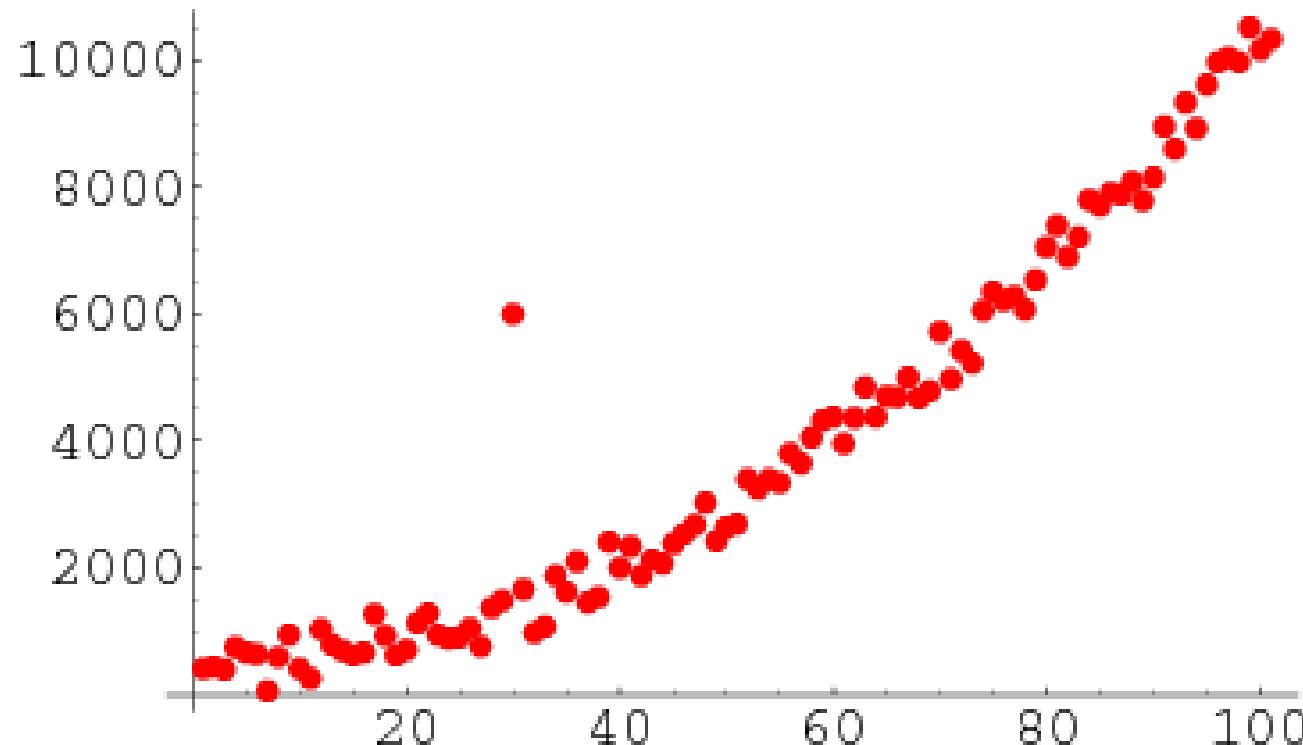
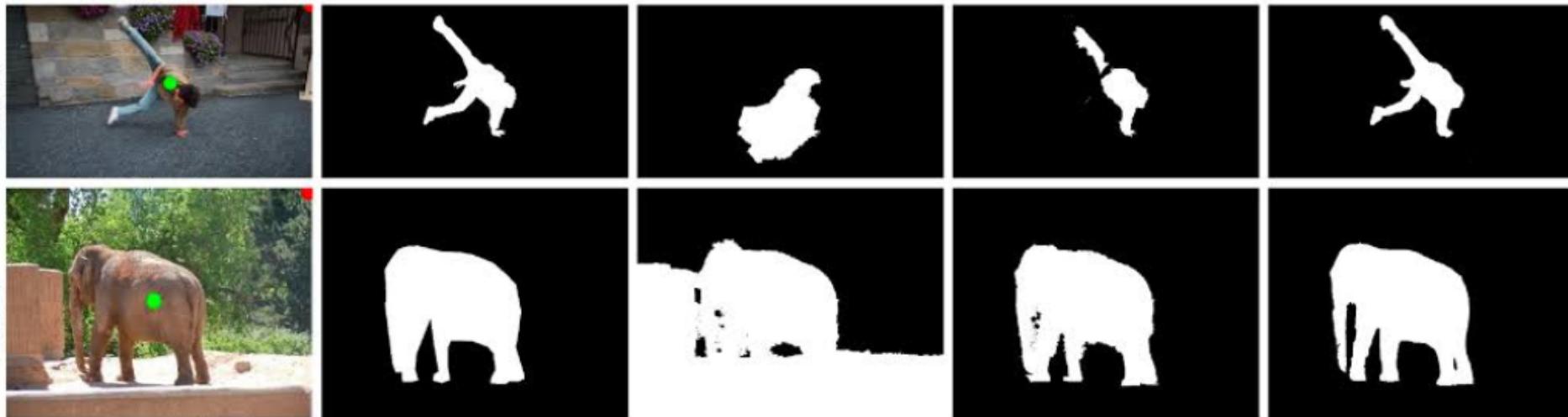


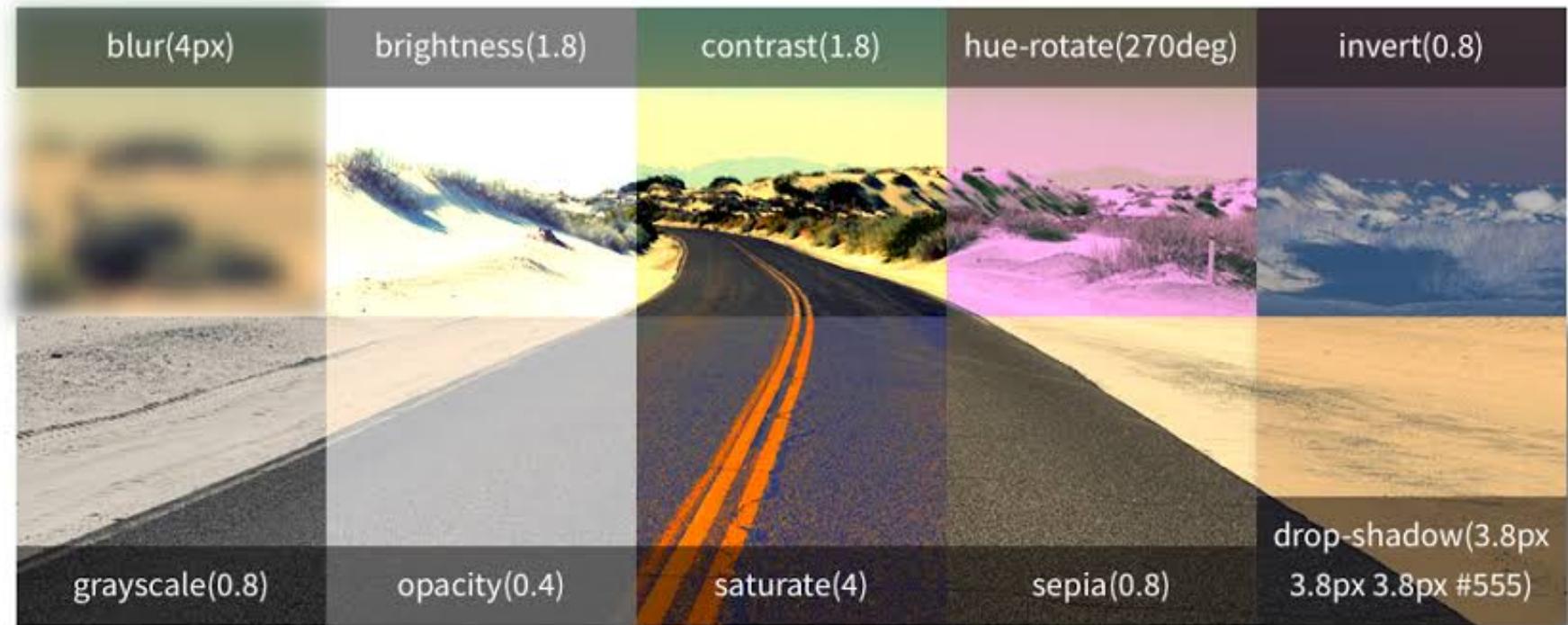
IMAGE PROCESSING | Edge Detector



IMAGE PROCESSING | Image Segmentation



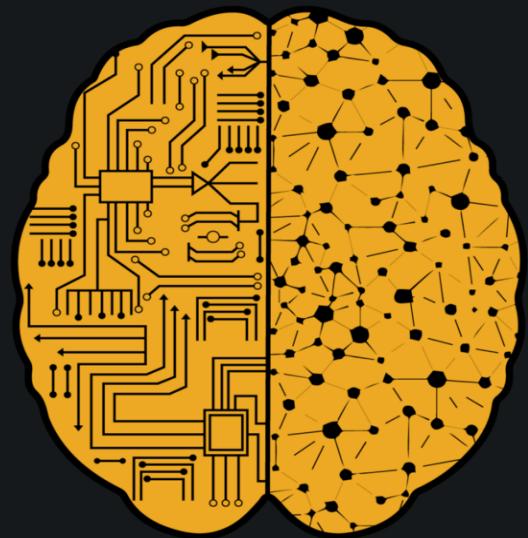
DATA PREPROCESSING | Batch Normalization



CHALLENGE FOR GIVEAWAY



Temperature Sensor Data

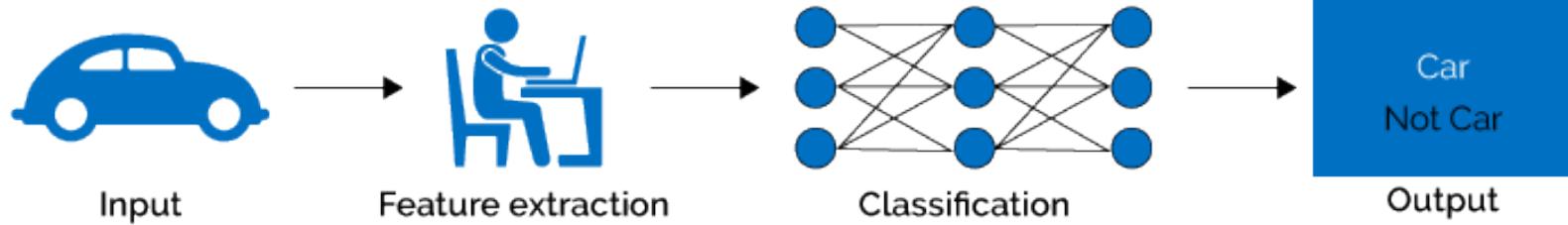


Deep Learning

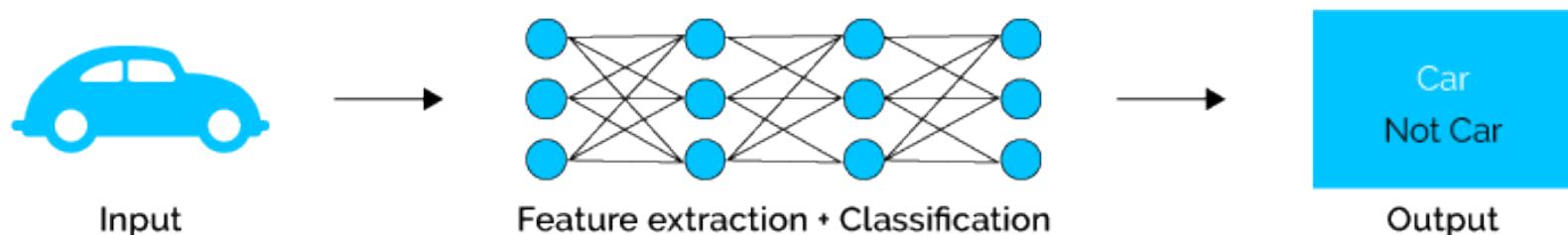
WHY SO POPULAR !!

MACHINE LEARNING VS DEEP LEARNING

Machine Learning



Deep Learning



How Machine Learning Works!

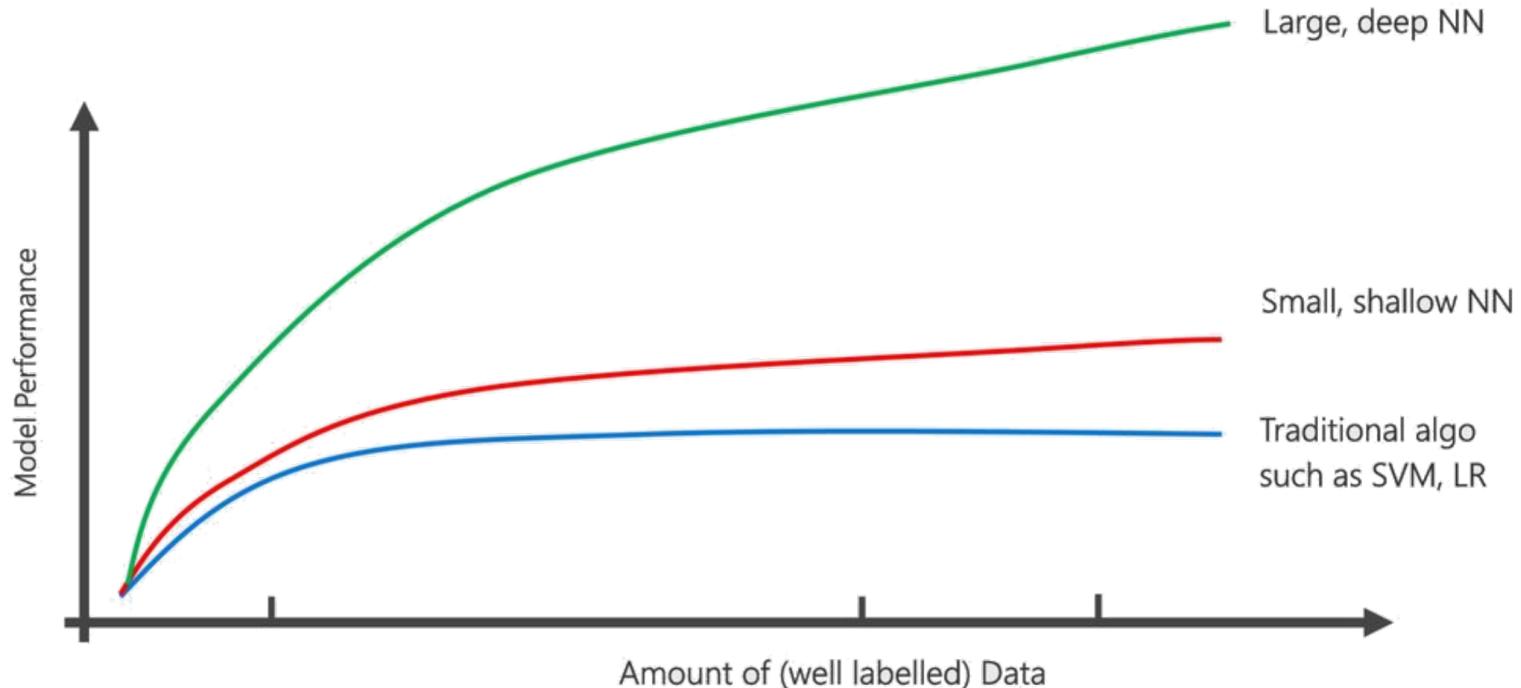
Traditional Computer Vision



Solving complex AI Problems

DEEP LEARNING | Data Size & Accuracy

Scales drives deep learning progresses



DEEP LEARNING | The Opportunity

Advancements of Technology allowed AI to take a next move

Supercomputers



1 hour vs 30 years

5G Networks



100 times faster than 4G
4G Down 150MB, UP 50MB

Quantum Computers

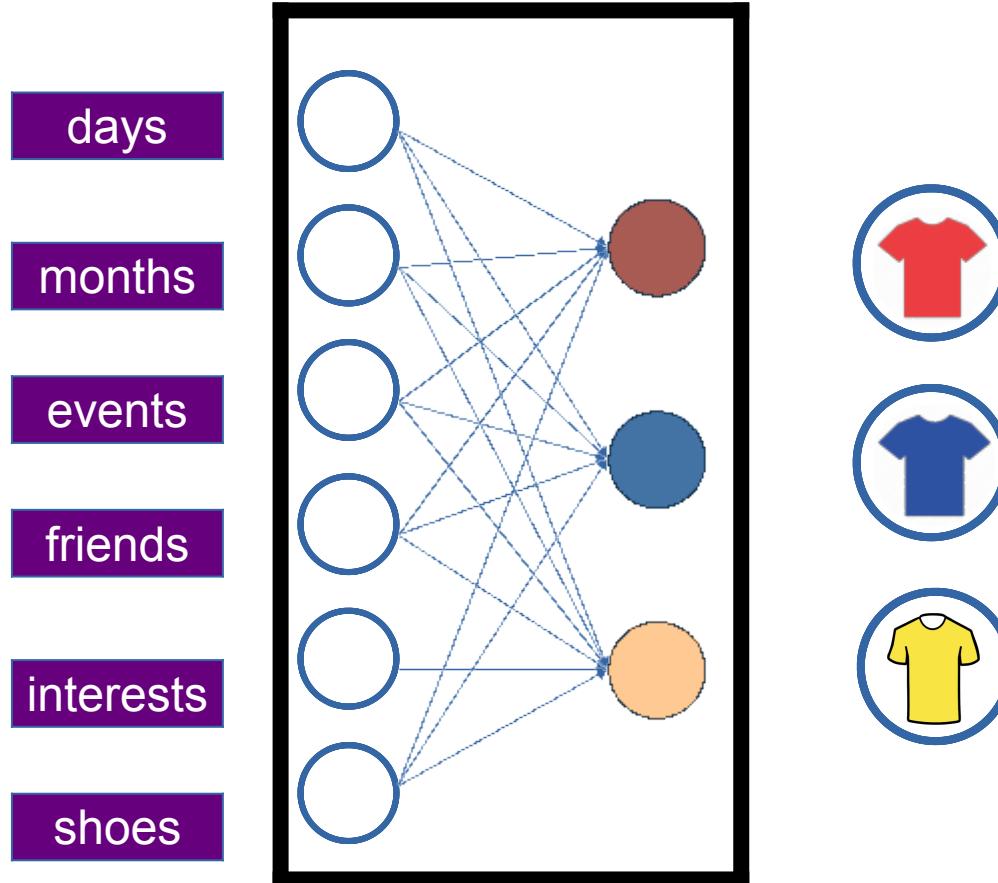


Quantum vs Supercomputer
3 min vs 10^4 thousands years

DEEP LEARNING ARCHITECTURE

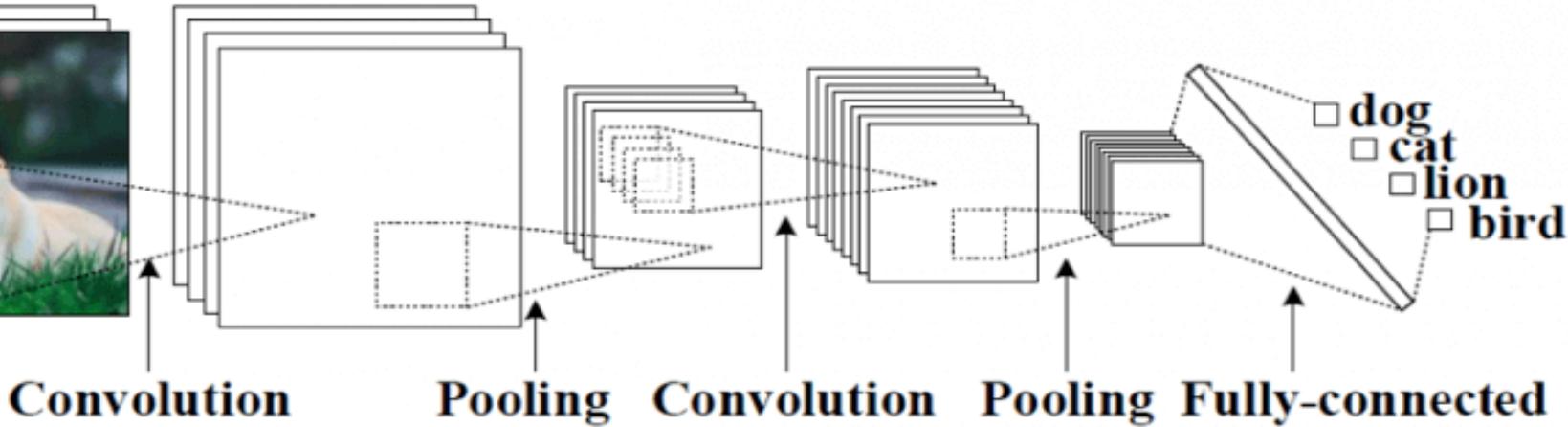


Neural Networks



CONVOLUTION NEURAL NETWORK (CNN)

Sliding kernel of random numbers



DEEP LEARNING FOR COMPUTER VISION

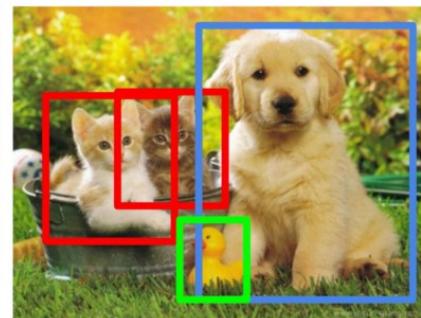
Classification



Classification + Localization



Object Detection



Instance Segmentation



CAT

CAT

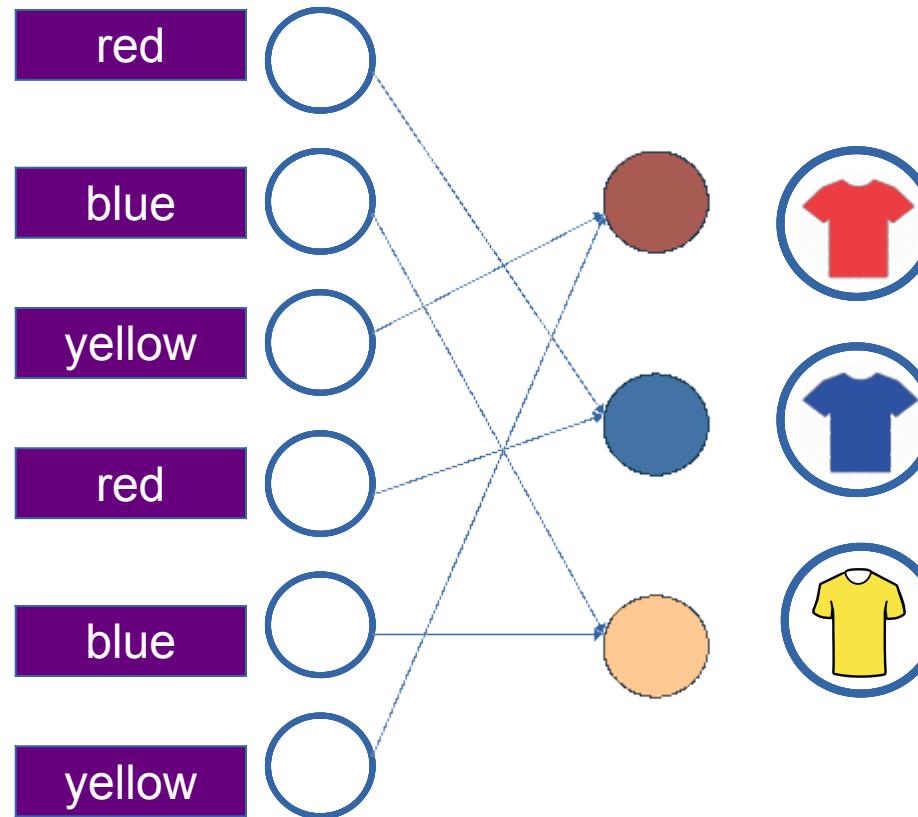
CAT, DOG, DUCK

CAT, DOG, DUCK

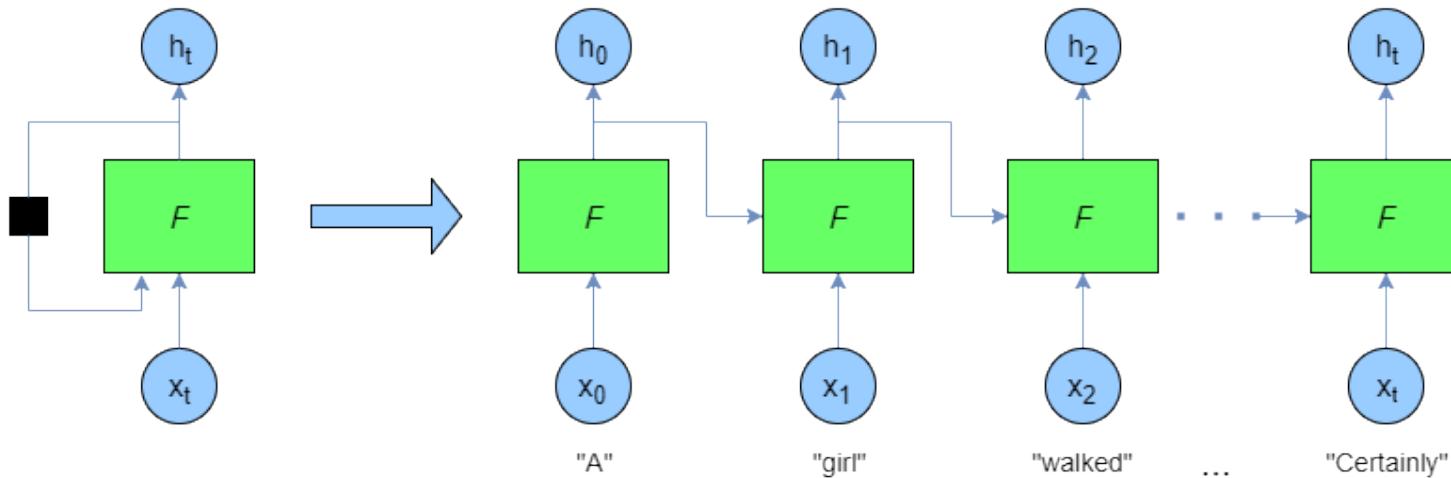
Single object

Multiple objects

SEQUENTIAL DATA



DEEP LEARNING | Recurrent Neural Networks



RNN Applications



AI | Applications

Stock Market



Prediction

Music/Speech



Recognition

Self-Driving Car



Computer Vision

Video Games



Smart Agent

IoT



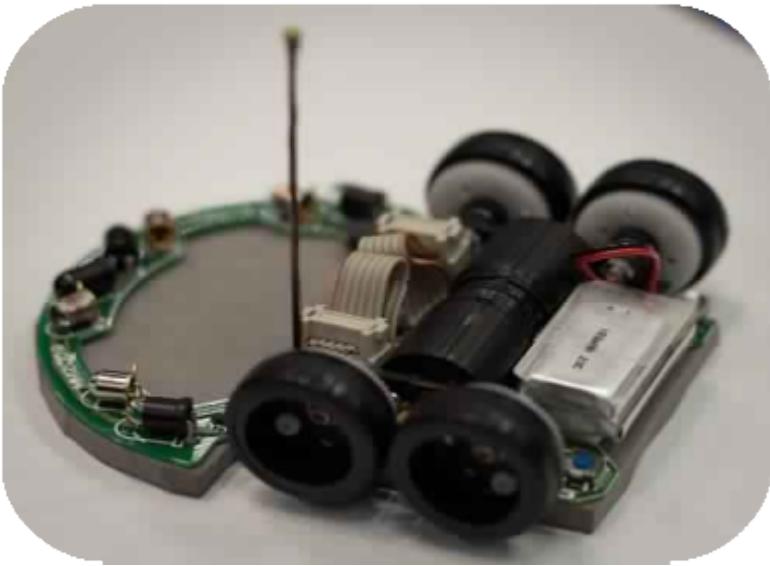
Sensor Analysis

Natural Language



Processing

CHALLENGE FOR GIVEAWAY



Maze Solving Robot

AI | Case Studies

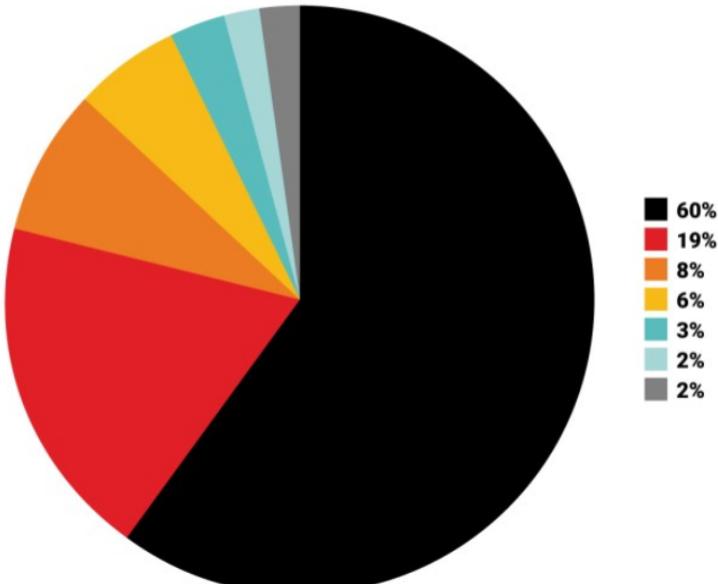
AI Career Development



JOB MARKET

EMERGING TECH SKILLS INDIAN DEVELOPERS ARE LEARNING OR LOOKING TO LEARN IN THE NEXT YEAR

■ QUANTUM COMPUTING ■ COMPUTER VISION ■ ROBOTICS ■ VR / AR / MIXED REALITY
■ BLOCKCHAIN ■ INTERNET OF THINGS ■ MACHINE LEARNING / DEEP LEARNING



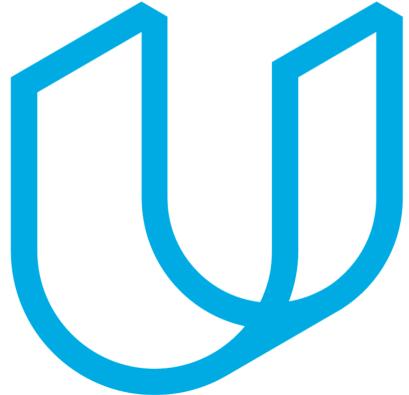
SOURCE: HACKERRANK

The Best Jobs in the U.S. 2018 (Based on Salary and Opportunity)

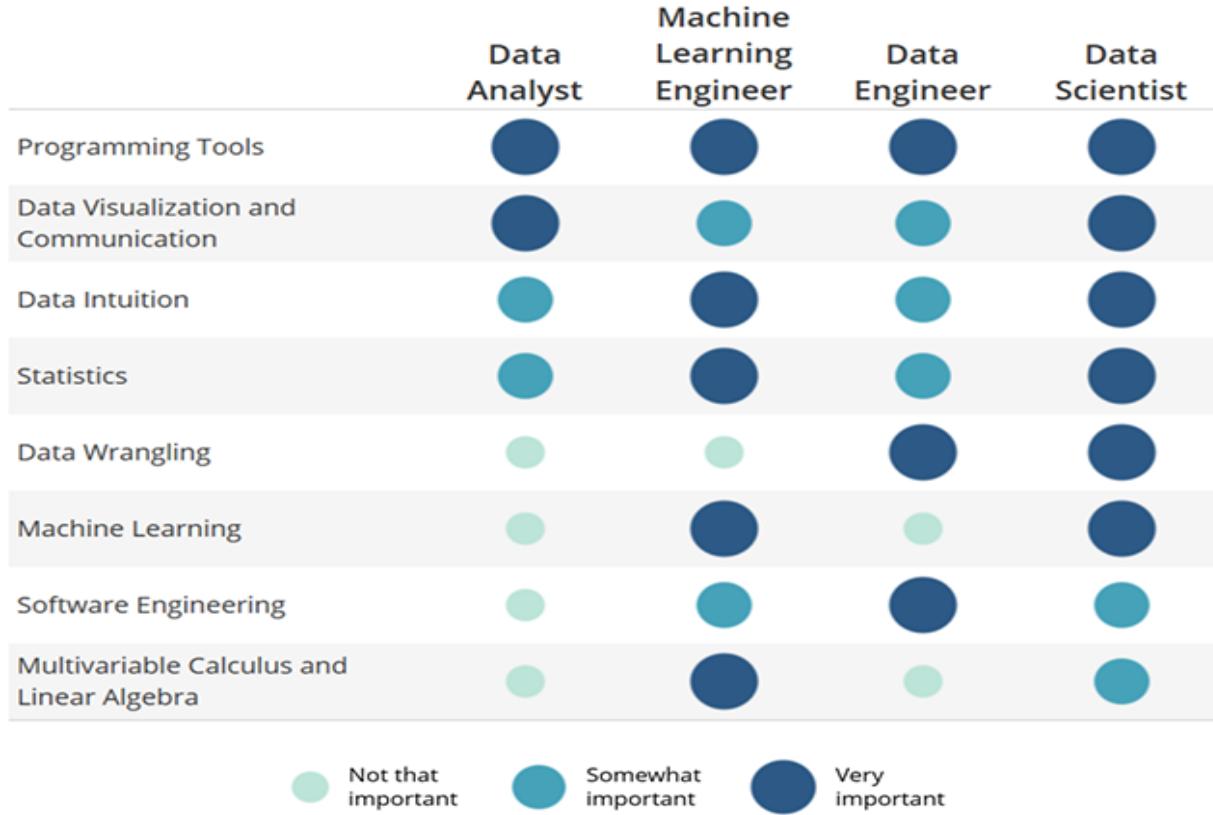
Percent growth in number of postings	Job Title	Average base salary (\$)	Percent growth
>130%	Machine learning engineer	\$136,241	166%
91% - 130%	Data scientist	\$132,915	106%
51% - 90%	Optometrist	\$131,692	118%
31% - 50%	Computer vision engineer	\$131,297	169%
<31%	Development operations engineer	\$125,714	91%
	Agile coach	\$120,142	80%
	Chief estimator	\$116,848	101%
	Full stack developer	\$111,640	198%
	Head of sales	\$108,788	42%
	Staff pharmacist	\$107,584	42%
	Product owner	\$101,857	33%
	User experience researcher	\$99,551	28%
	Preconstruction manager	\$95,337	126%
	Construction manager	\$85,655	37%
	Construction superintendent	\$85,170	122%
	Senior talent acquisition manager	\$85,076	55%
	Project superintendent	\$83,326	48%
	Plumbing engineer	\$82,063	51%
	Commercial project manager	\$81,023	277%
	Registered nurse - Infusion	\$79,952	19%
	Commercial real estate agent	\$78,675	37%
	Construction estimator	\$78,052	76%
	Project architect	\$77,931	34%
	Partnership manager	\$76,628	19%
	Senior clinical specialist	\$76,598	30%

Article & Sources:
<https://howmuch.net/articles/the-best-jobs-in-usa-2018>
<https://www.indeed.com>

AI | Job Titles



UDACITY



AI | Industry



Mercedes-Benz



TESLA



WUZZUF

Machine Learning Jobs In Egypt 1161 jobs found

Filter your results

Country

City

Area

Career Level

Job Role

Job Type

Industry

Date Posted

All (1161)

Past 24 Hours (31)

Past Week (199)

Past Month (728)

1161 jobs found

Senior Machine Learning Engineer - NLP New 2 days ago

The D. GmbH - Maadi, Cairo
Full Time · Experienced · 3+ Yrs of Exp · Startup · Information Technology (IT) · Matlab · C++ · Computer · Machine Learning · OpenCV · Computer Science · Python · NLP · Statistics · Mathematics

Sr. Machine Learning Engineer (Computer Vision) 8 days ago

The D. GmbH - Maadi, Cairo
Full Time · Experienced · 2+ Yrs of Exp · Startup · Information Technology (IT) · Software Development · Computer Vision · Data Analysis · Research · C++ · Python · Machine Learning · Mathematics

Senior R&D Engineer – Machine Learning 14 days ago

Advansys ESC - Maadi, Cairo
Full Time · Experienced · 3+ Yrs of Exp · Artificial Intelligence · Machine Learning · R&D · Software Engineering · Information Technology (IT) · Computer Science · Python · Hadoop · Big Data

Senior Machine Learning Engineer (Computer Vision) 1 month ago

The D. GmbH - Maadi, Cairo
Full Time · Experienced · 2+ Yrs of Exp · Startup · Information Technology (IT) · Software Development · Computer Vision · Data Analysis · Research · C++ · Python · Machine Learning · Mathematics

K-12 E-Learning Consultant 1 month ago

Confidential - Cairo, Egypt
Full Time · Experienced · 2+ Yrs of Exp · Sales · Telesales · Corporate Sales · Education · Customer Service · Customer Care · Customer Support · Microsoft Office · Sales Skills · K-12 · Teaching

Technical Operator - CNC Machines 24 days ago

SERV-QUAL - New Cairo, Cairo
Full Time · Experienced · 2-5 Yrs of Exp · SolidWorks · CNC · CNC Router · Design · CNC Engineer · Artcam software · Corel Draw · Aspire · Laser Cut · CNC Laser · Advertising · Decoration

NBS Time Management, Training & Learning... New 2 days ago

Nestle - Cairo, Egypt
Full Time · Experienced · 2+ Yrs of Exp · Time Management · Badging Corrections · Leaves · Technical Issues · Holidays · Flextime · Overtime · Illness · Accident · Course Assessment · Training



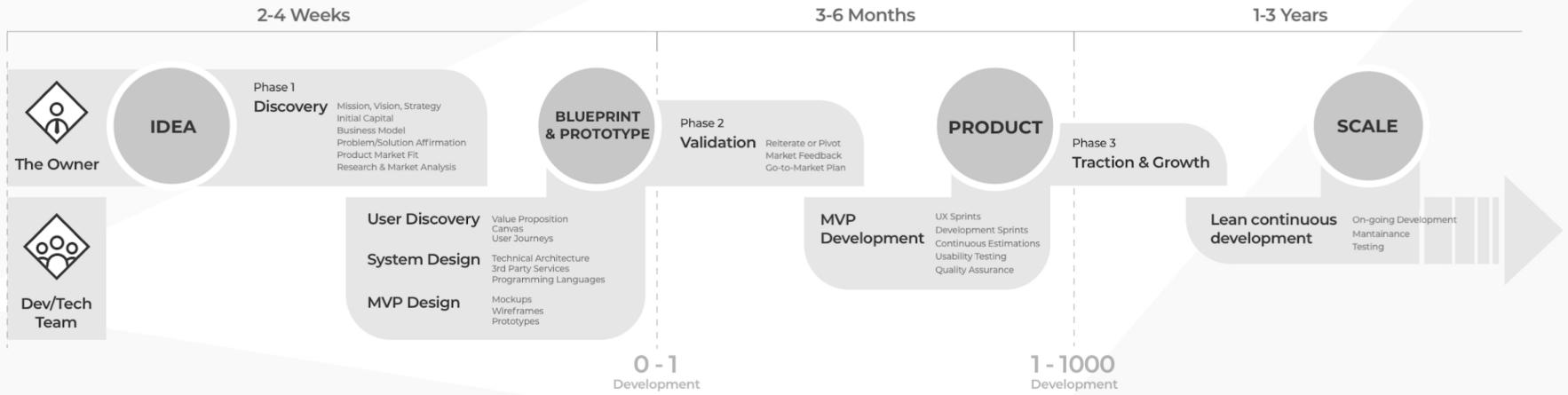
SQ

SATURDAY

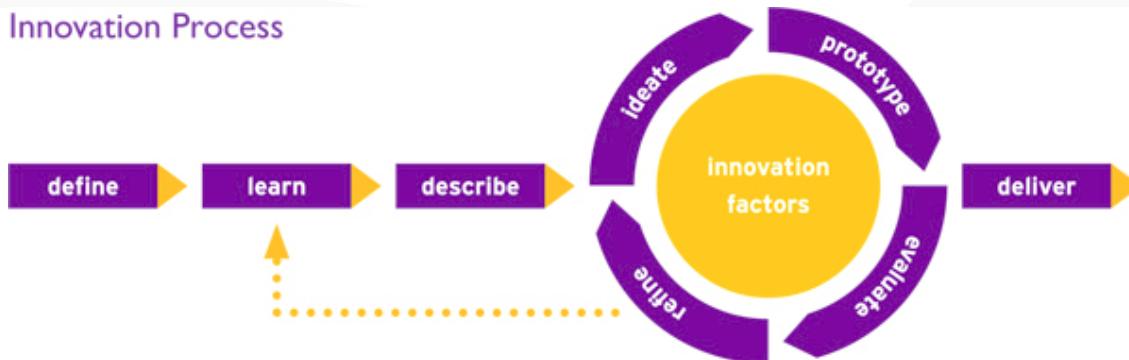


Lead Your AI Startup

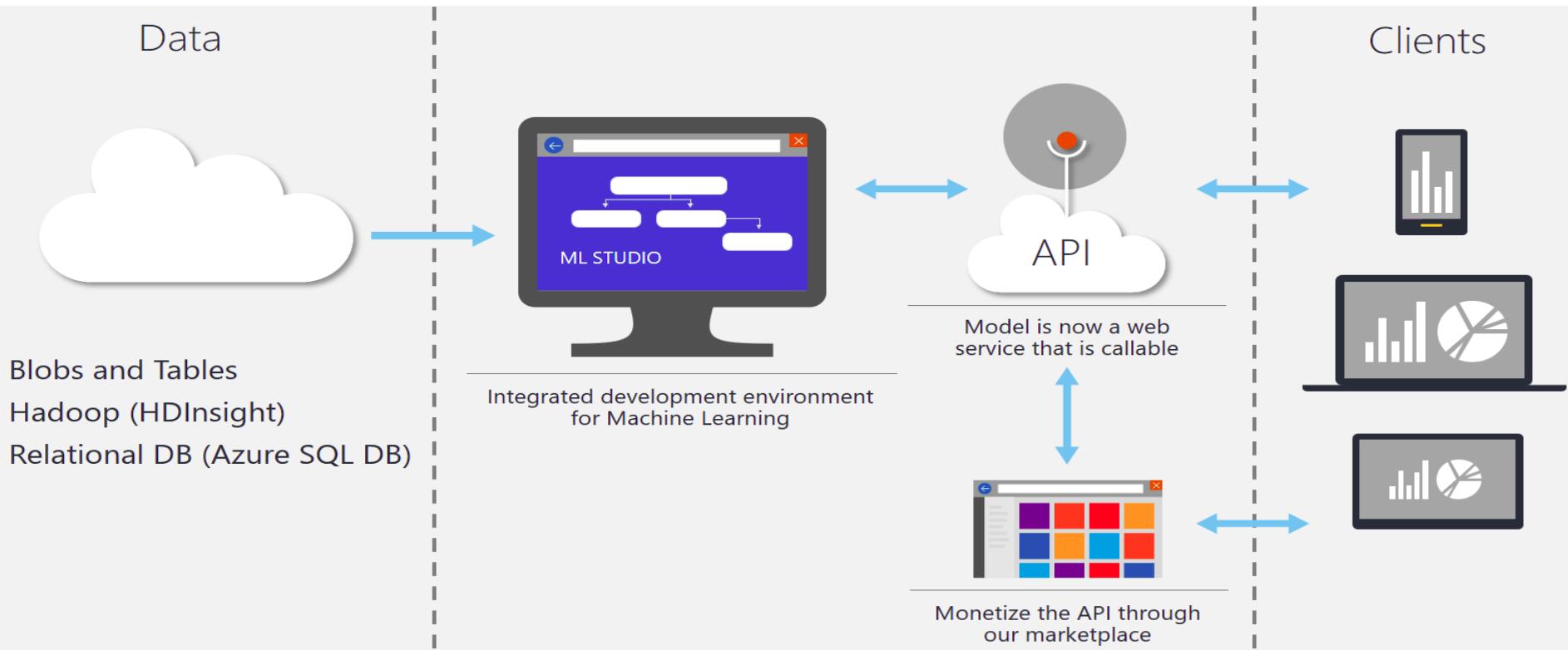
Digital Product Innovation Cycle



Innovation Process



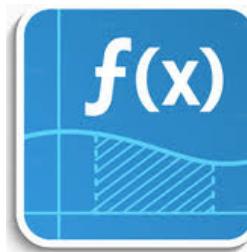
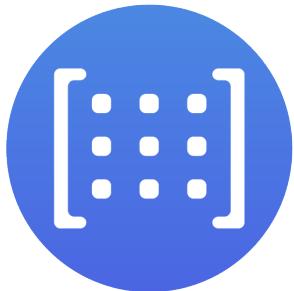
AI | Solution Components



MACHINE LEARNING SKILLS



MATH SKILLS FOR MACHINE LEARNING



LINEAR ALGEBRA

CALCULUS

STATISTICS

Mathematics For Machine Learning Specialization
Imperial College London @coursera

PREPARE FOR AI DEGREE!

Programming

- Python 3: Michigan uni @coursera | Solo-Learn
- Computer Science Basics: Harvard CS50 @edx
- C++: Udacity | Solo-Learn



MACHINE LEARNING CURRICULUM

Machine Learning

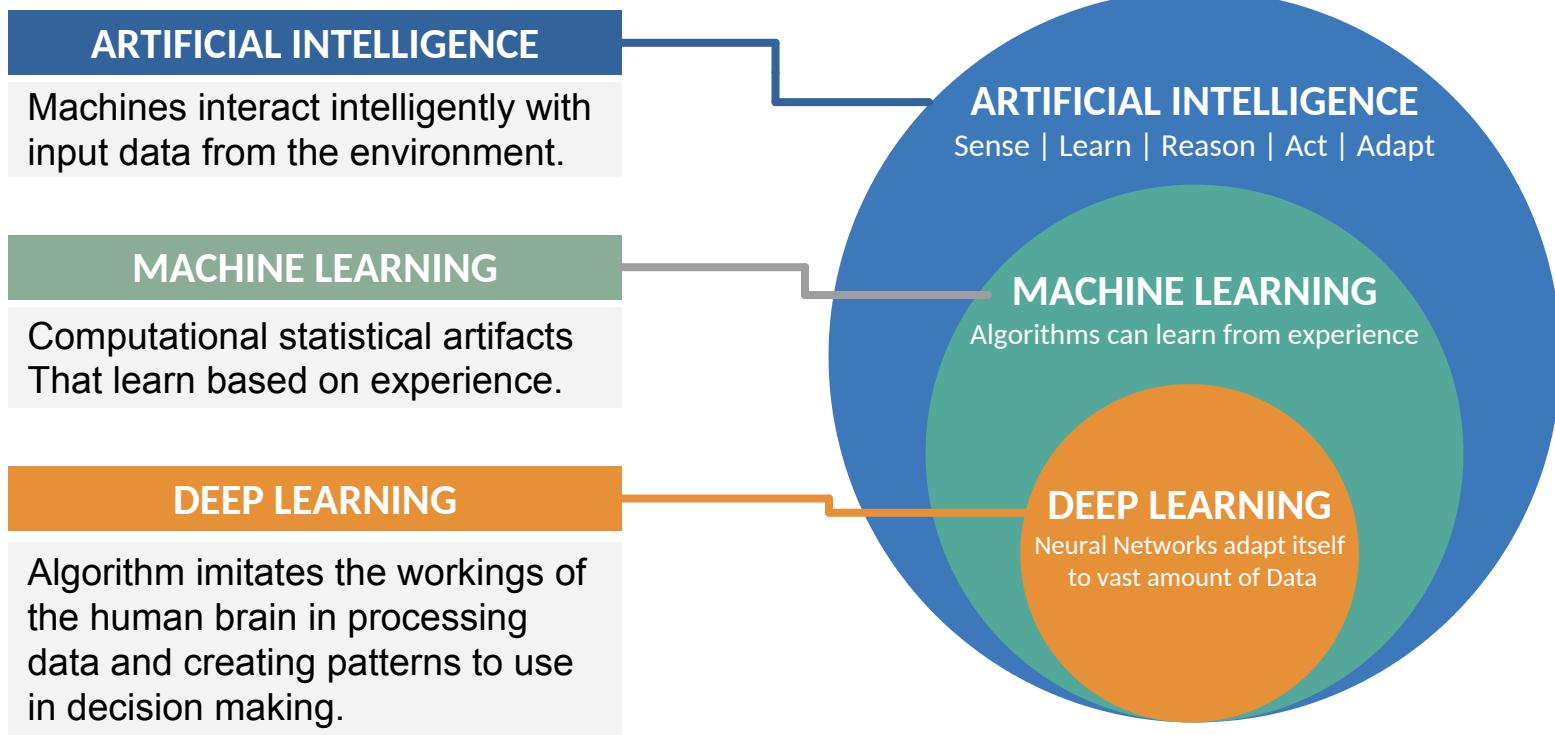
- Stanford uni Online prof: Andrew NG [@coursera](#)
- Machine Learning Nano-degree [@Udacity](#)
- Machine Learning by Hesham Asem [@Youtube](#)

GO DEEPER IN MACHINE LEARNING!

Deep Learning

- Deep Learning speacialization by prof: Andrew NG @coursera
- Deep Learning Nano-degree @Udacity
- Deep Learning by Ahmed Fathi @Youtube

THE BIG PICTURE | Summary



DEEP FAKE

AI | Creativity



Sunspring | A Sci-Fi Short Film

SUPER INTELLIGENCE

NARROW INTELLIGENCE



SURPASSES HUMANS

50 Years !!!
Or More ?!



NEEDS ASSISTANCE
LAKES CREATIVITY

Less Artificial More Intelligent is **NOT** a threat

Human and Machine Vs Problem





Having any question !?

CONTACTS

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Thank You