Artificial Intelligence

Fundamental with Python

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Introduction to Artificial Intelligence

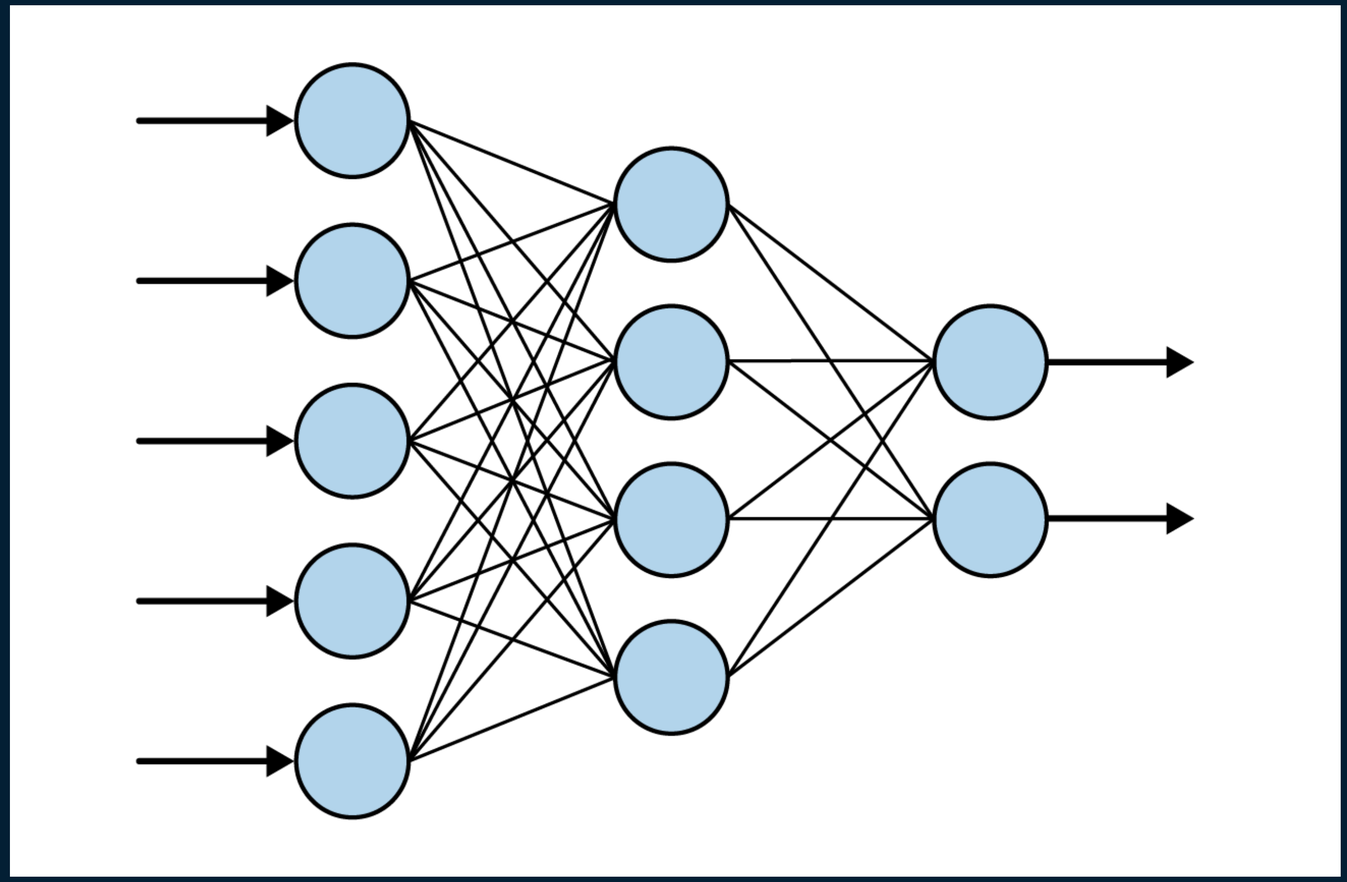
What is Artificial Intelligence?

Artificial Intelligence

- **Artificial Intelligence** or **AI**
- Making computer smart, learn and predict and think by itself

What is Artificial Intelligence

- AI is a the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

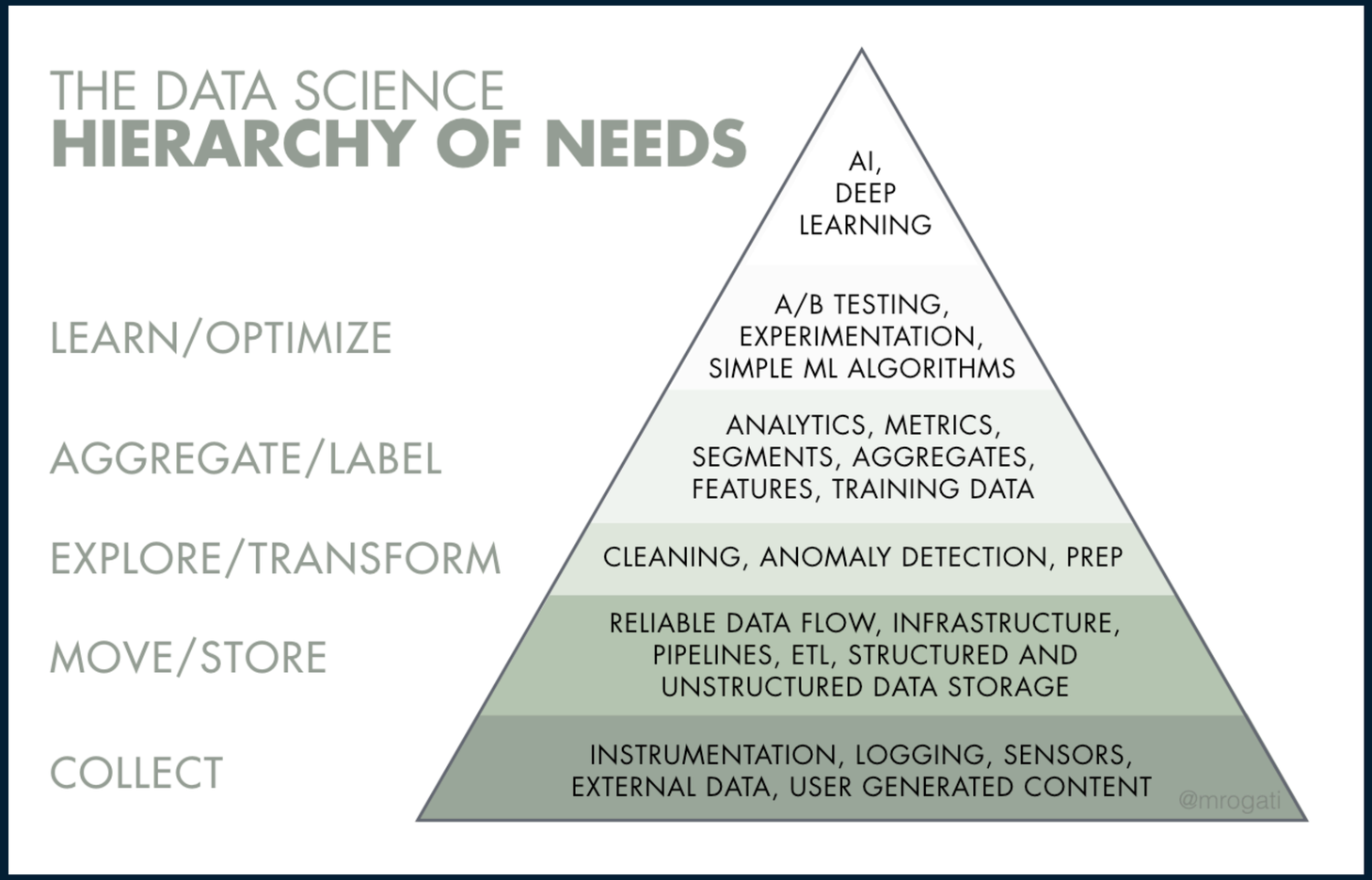


A typical neural network

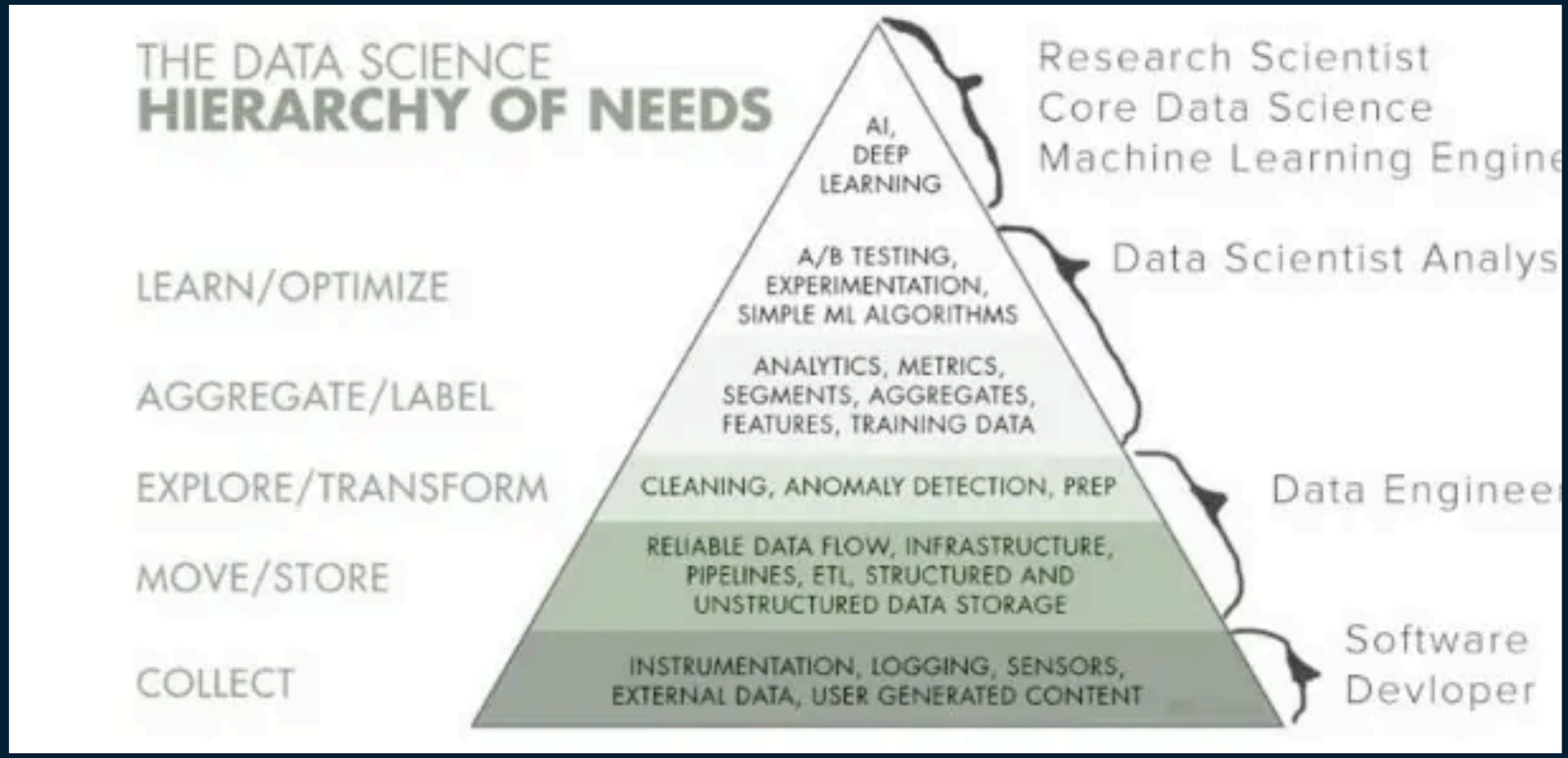
ANN is a kind of machine learning

Families of Intelligence Fields

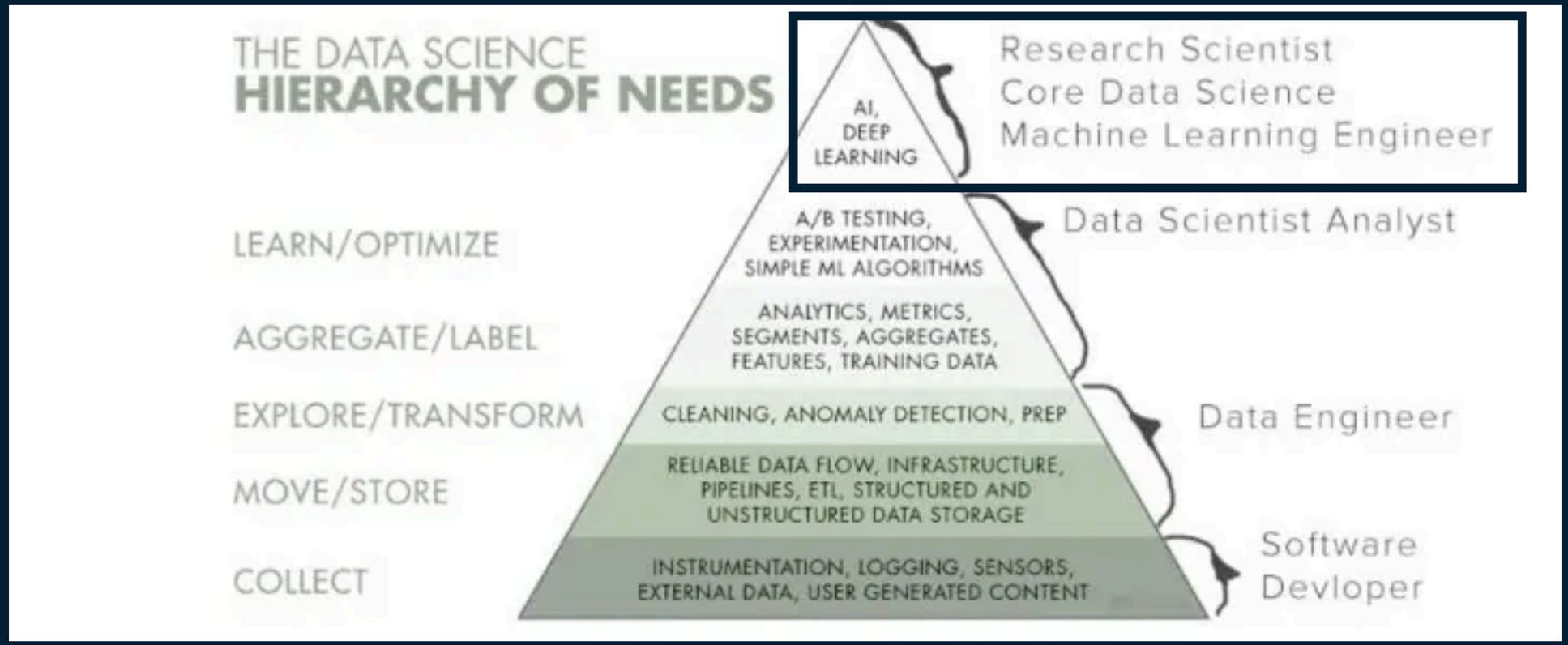
- Computer Science (CS)
- Computer Intelligence (CI)
- Artificial Intelligence (AI)
- Machine Learning (ML)
- Deep Learning(DL)



AI in The Data Science Hierarchy of Needs



AI in The Data Science Hierarchy of Needs



AI in The Data Science Hierarchy of Needs

Mobile-first > AI-first > ?

Earlier 2016 2022

What do Artificial Intelligence Engineers do?

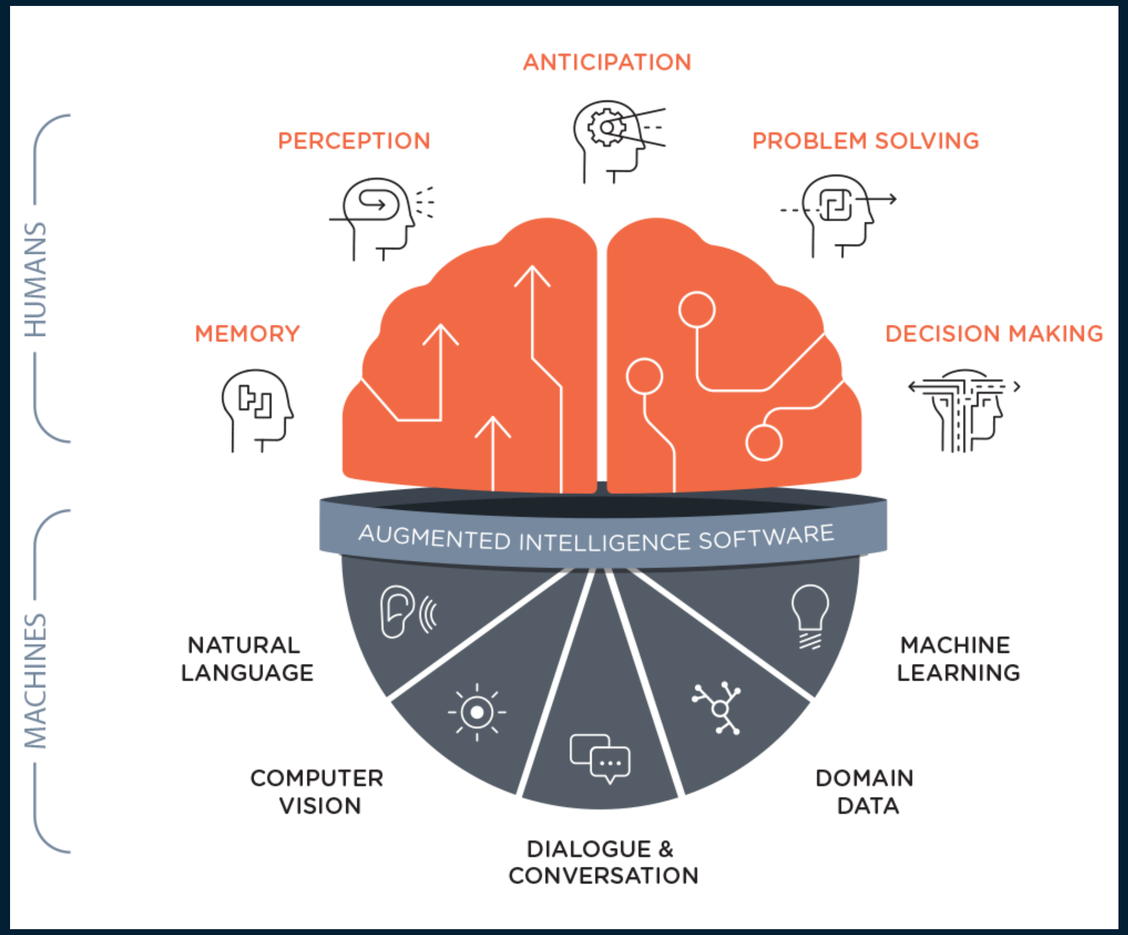
AI Goals and Applications

AI Application

AI Research is majorly focussed in developing intelligent programs which can simulate human intelligence

Major sub-fields of AI

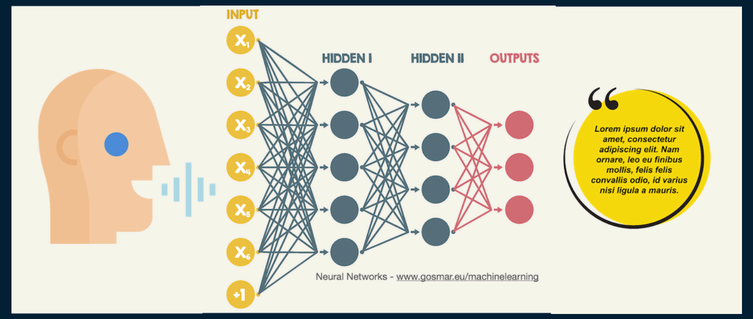
- Reasoning, Problem Solving
- Knowledge representation
- Planning, Automated planning and scheduling
- Learning
- Natural Language Processing (NLP)
- Perception Building
- Motion and manipulation
- Social intelligence
- General intelligence

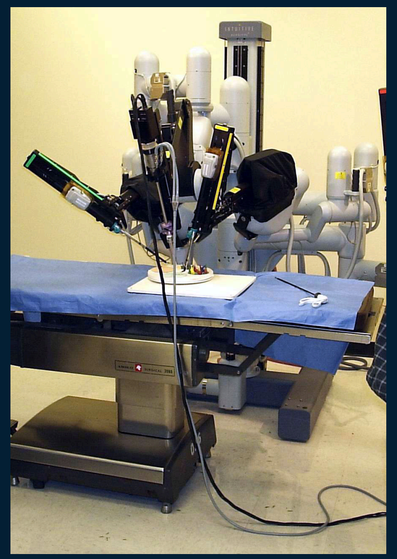


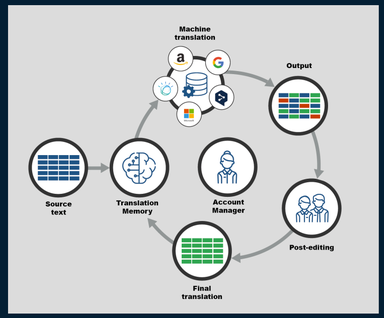
AI Research major focussed*

AI Application

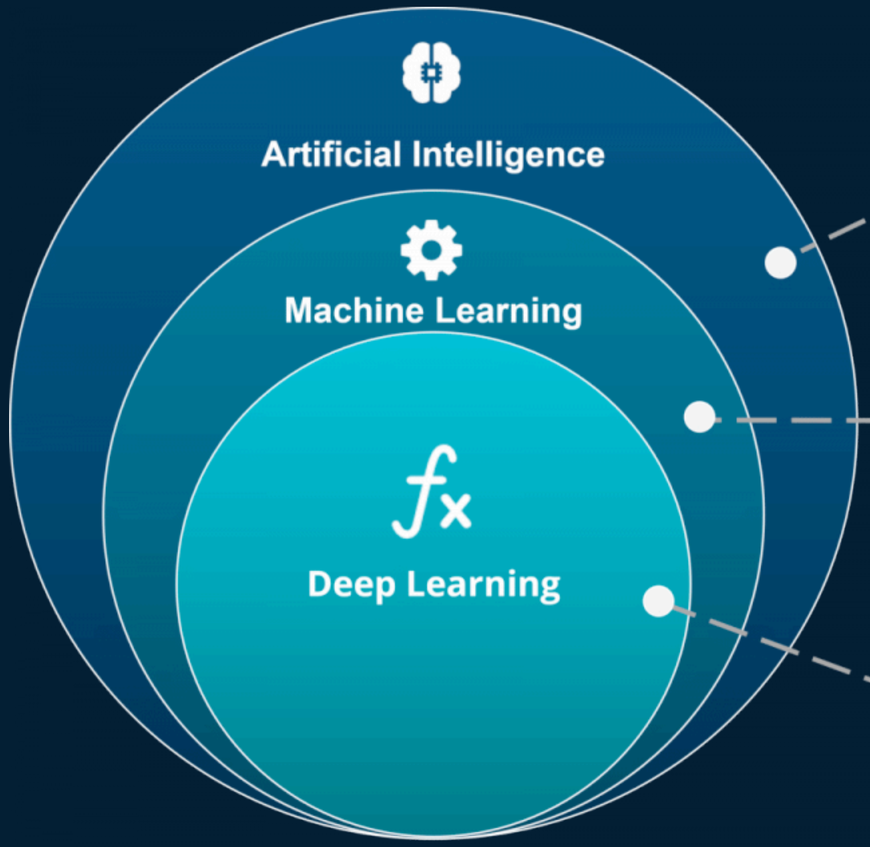
- Robotic vehicles
- Legged locomotion
- Autonomous planning and scheduling
- Machine translation
- Speech recognition
- Recommendations
- Game playing
- Image understanding
- Medicine
- Climate science







Artificial Intelligence, Machine Learning and Deep Learning



ARTIFICIAL INTELLIGENCE

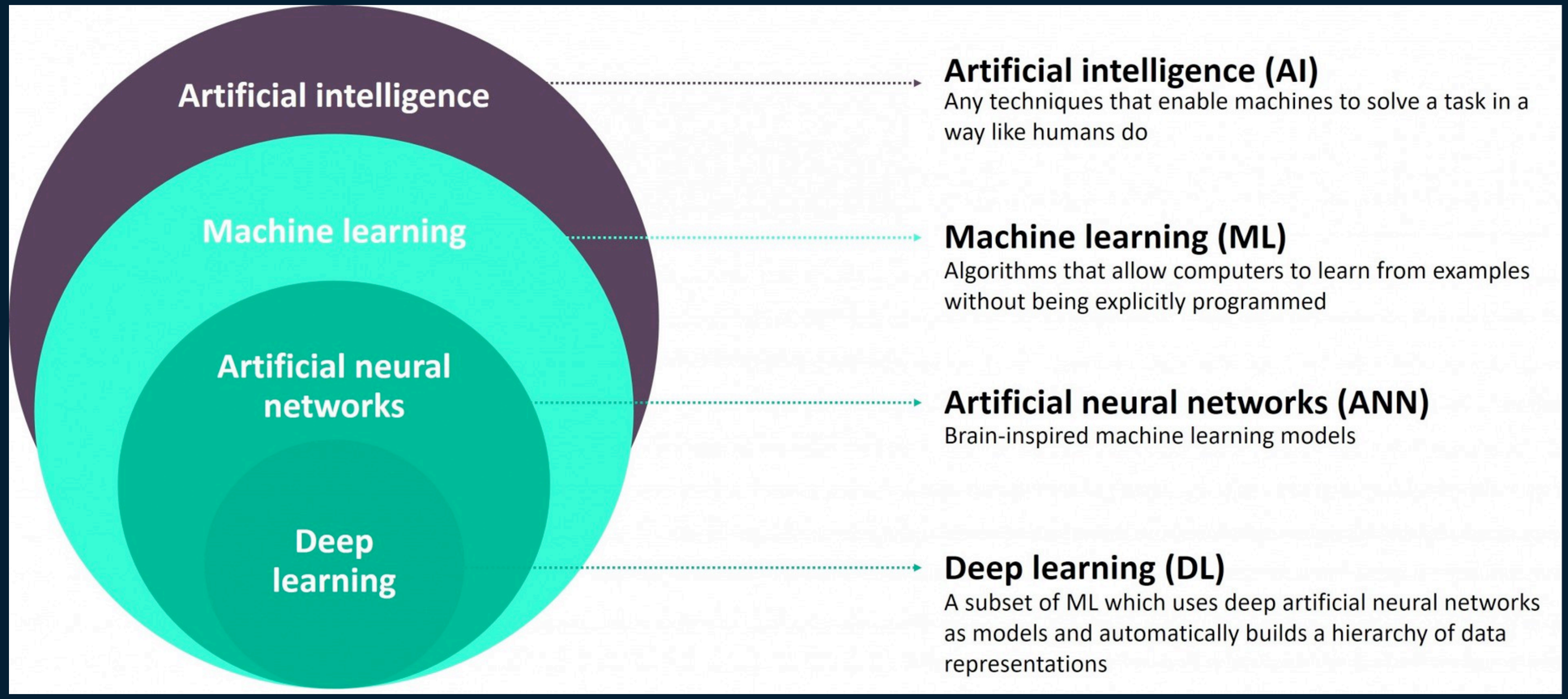
A technique which enables machines to mimic human behaviour

MACHINE LEARNING

Subset of AI technique which use statistical methods to enable machines to improve with experience

DEEP LEARNING

Subset of ML which make the computation of multi-layer neural network feasible



AI, ML, ANN, and DL

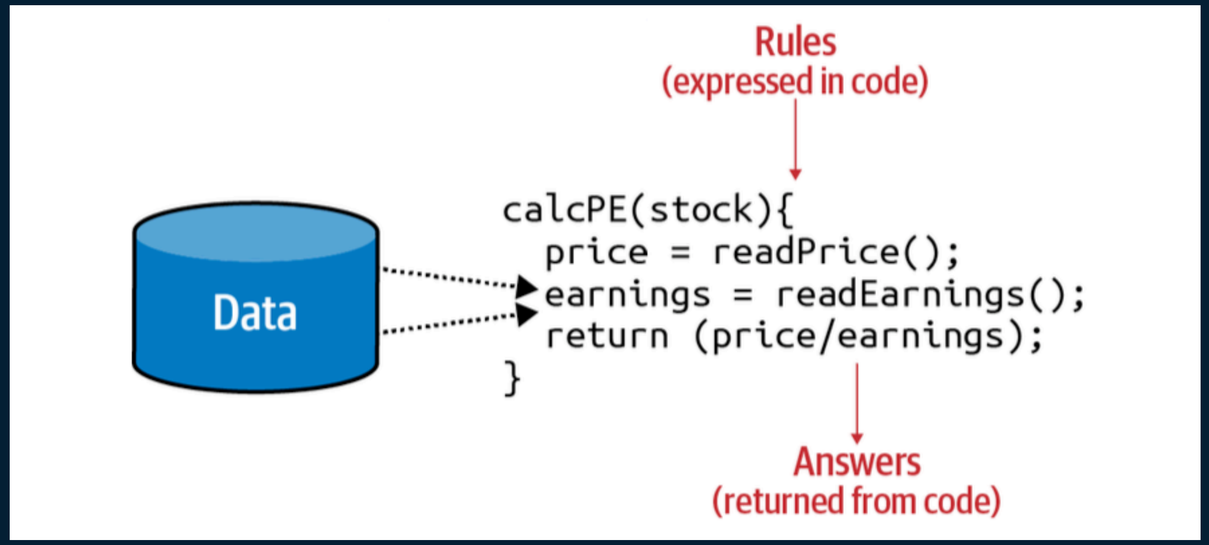
Machine Learning

What is Machine Learning

Machine learning (ML) is the **study of computer algorithms** that can **improve automatically** through **experience** and by the use of **data**. It is seen as **a part of artificial intelligence**. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so.

Machine Learning

Machine Learning is the science (and art) of programming computers so they can learn from data.



Code in a financial services scenario

High-level view of traditional programming

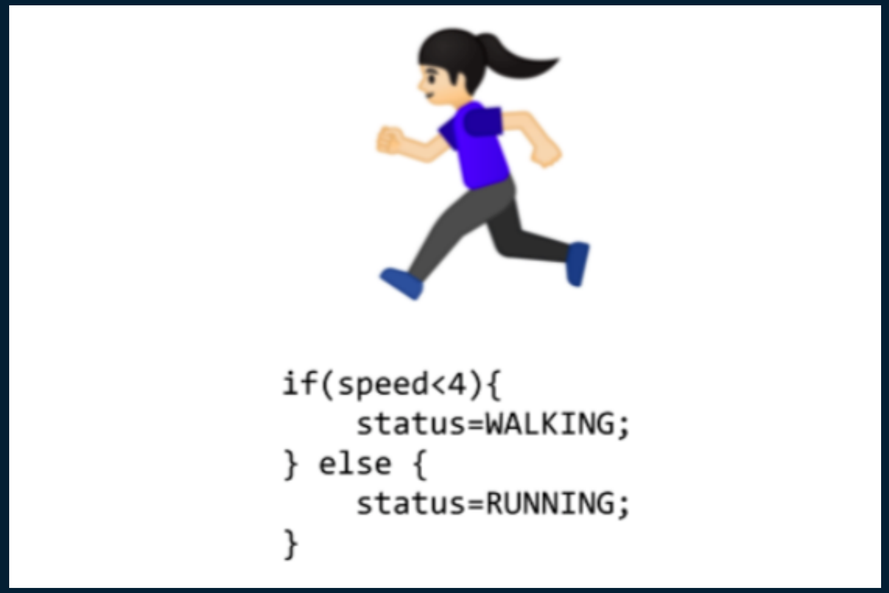
Limitations of Traditional Programming

Limitations of Traditional Programming

```
if(speed<4){
    status=WALKING;
}
```

Algorithm for activity detection

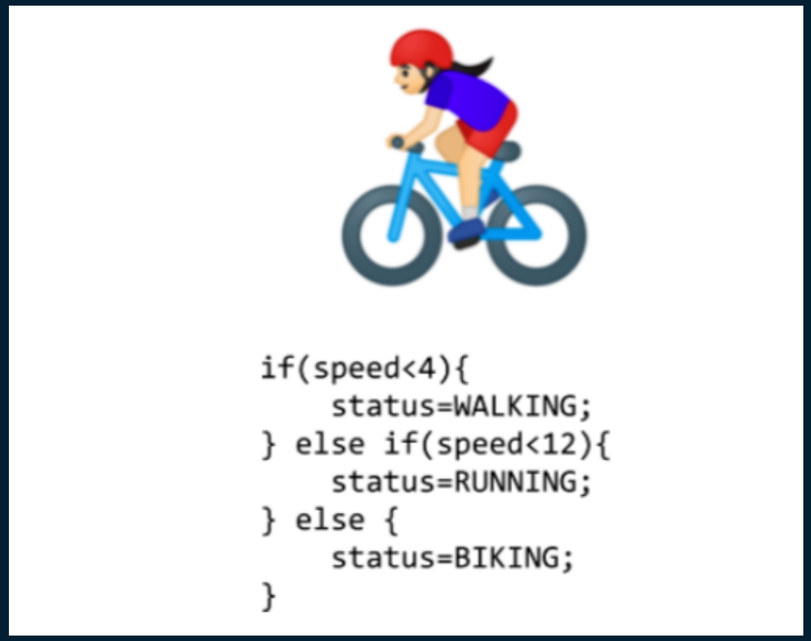
Limitations of Traditional Programming



```
if(speed<4){
    status=WALKING;
} else {
    status=RUNNING;
}
```

Extending the algorithm for running

Limitations of Traditional Programming



```
if(speed<4){
    status=WALKING;
} else if(speed<12){
    status=RUNNING;
} else {
    status=BIKING;
}
```

Extending the algorithm for biking

Limitations of Traditional Programming

How do we write a golfing algorithm?

From Programming to Learning

From Programming to Learning

The traditional programming flow

From Programming to Learning

The traditional programming flow

Changing the axes to get machine learning

From coding to ML: gathering and labeling data

```
01010010101001010101
10010101010010111101
01001010100101010010
01010010101001010101
```

Label = WALKING

```
10101001010010101010
01010100100100100001
00100111110101011111
10101001001111010111
```

Label = RUNNING

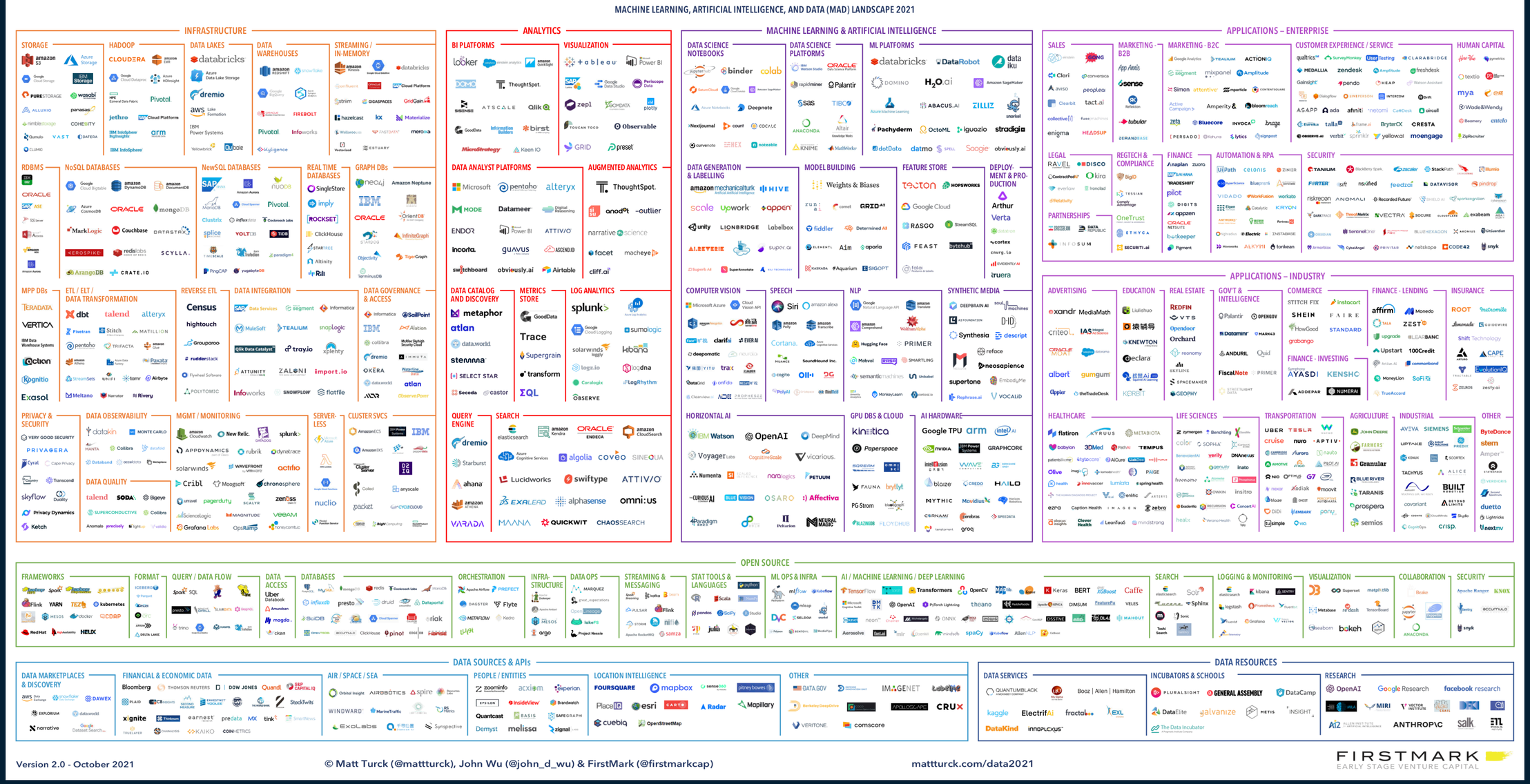
```
10010100111110101010
11010101110101011100
10101011110101010110
11111100011110101010
```

Label = BIKING

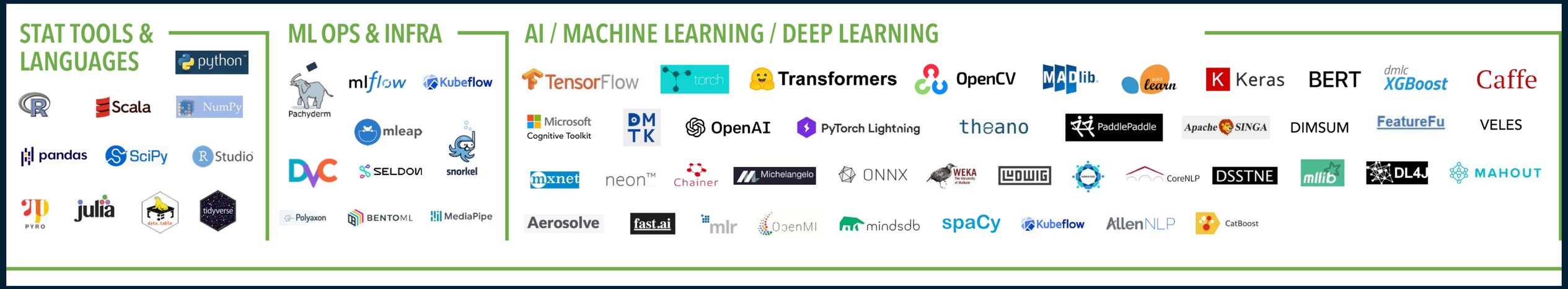
```
11111111110100111010
00111111010111101010
01011101010101011100
10101010101001111100
```

Label = GOLFING

Machine Learning Tools



ML, AI, DS landscape 2021, by Matt Turck



Open source AI/ML/DL landscape 2021, by Matt Turck

AI/ML Tools

Programming language
Libraries
Datasources
Software Platform

Programming languages

Python

Essential Python Libraries

Python **AI and ML ecosystem**

NumPy

Numerical Python, has long been a cornerstone of numerical computing in Python. It provides the **data structures**, **algorithms**, and library glue needed for most **scientific applications** involving numerical data in Python.

Pandas

pandas provides **high-level data structures** and functions designed to make working with structured or tabular data fast, easy, and expressive.

Matplotlib

matplotlib is the most popular Python library for **producing plots** and other two- dimensional **data visualizations**.

IPython and Jupyter

It is project to make a better **interactive Python interpreter**. It is designed to maximize your productivity in both interactive computing and software development. It encourages an **execute-explore workflow** instead of the typical edit-compile-run workflow. IPython can help you get the job done faster.

IP[y]:

SciPy

SciPy is a collection of packages addressing a number of different standard problem domains in scientific computing. Here is a sampling of the packages included: `scipy.integrate, scipy.linalg, scipy.optimize, scipy.signal scipy.sparse, scipy.special, scipy.stats`

statsmodels

statsmodels is a statistical analysis package. It contains algorithms for classical (primarily frequentist) statistics and econometrics. This includes such submodules as: `Regression models, Time series analysis, Nonparametric methods, Visualization of statistical model results`

Scikit-learn

scikit-learn is general-purpose machine learning toolkit in Python. It includes submodules for such models as: `Classification, Regression, Clustering, Dimensionality reduction, Model selection, Preprocessing`

TensorFlow

TensorFlow is a free and open-source software library for machine learning and artificial intelligence.

Keras

Keras is an open-source software library that provides a Python interface for artificial neural networks and deep learning

Datasources

Dataset

Structured Data

- **Tabular** or spreadsheet-like data (**CSV**, Excel files)
- **Multidimensional** arrays (matrices)
- **Multiple tables** of data interrelated by key columns (**SQL**)
- **Time series**

AI/ML Software Platform

It provides an **integrated environment** for data preparation, machine learning, deep learning, text mining, and predictive analytics.

AI/ML Software Platform

Anaconda
Weka
RapidMiner

Weekly Open Questions

Reply through @thefutureisdata

LANG
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Python เพียงพอสำหรับงาน**ปัญญาประดิษฐ์**หรือไม่? อย่างไร?

(Is Python enough for artificial intelligence?)

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