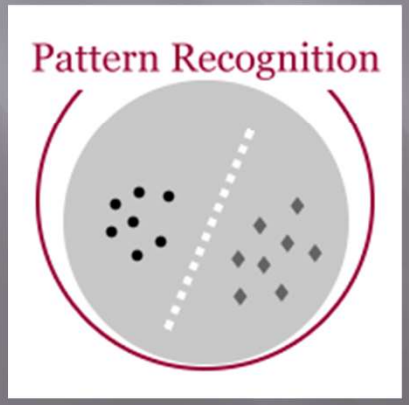
WHAT IS MACHINE LEARNING?



WHAT IS PATTERN RECOGNITION?

Pattern Classification vs. Machine Learning

- "Pattern recognition has its origin in engineering whereas machine learning grew out of computer science." –Christopher M. Bishop, Author of Pattern Recognition and Machine Learning
- Both can be viewed as two facets of the same field
- Both undergone significant developments in the past ten years

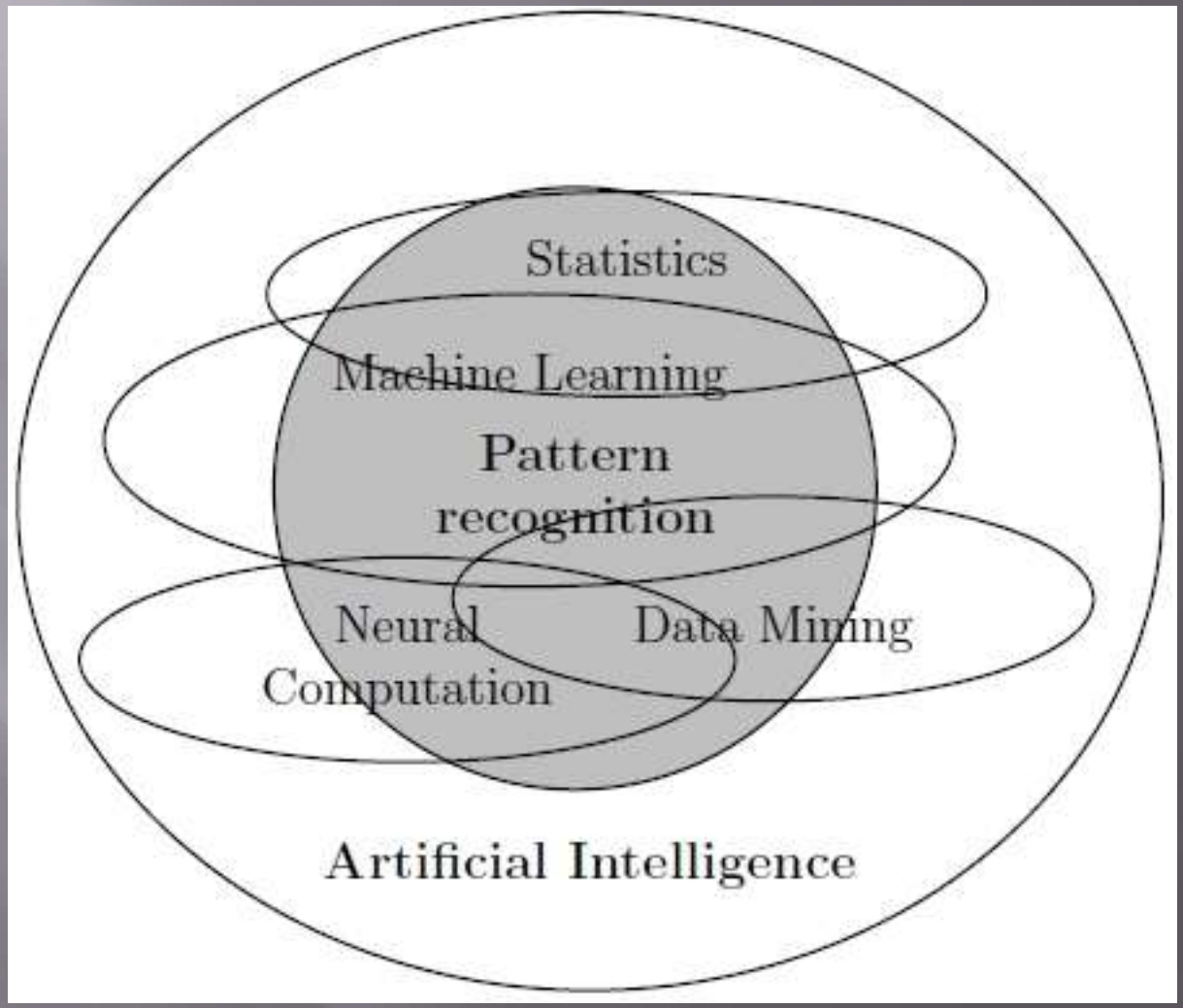
When the monster came, Lola, like the peppered moth and the arctic hare, remained motionless and undetected. Harold, of course, was immediately devoured.

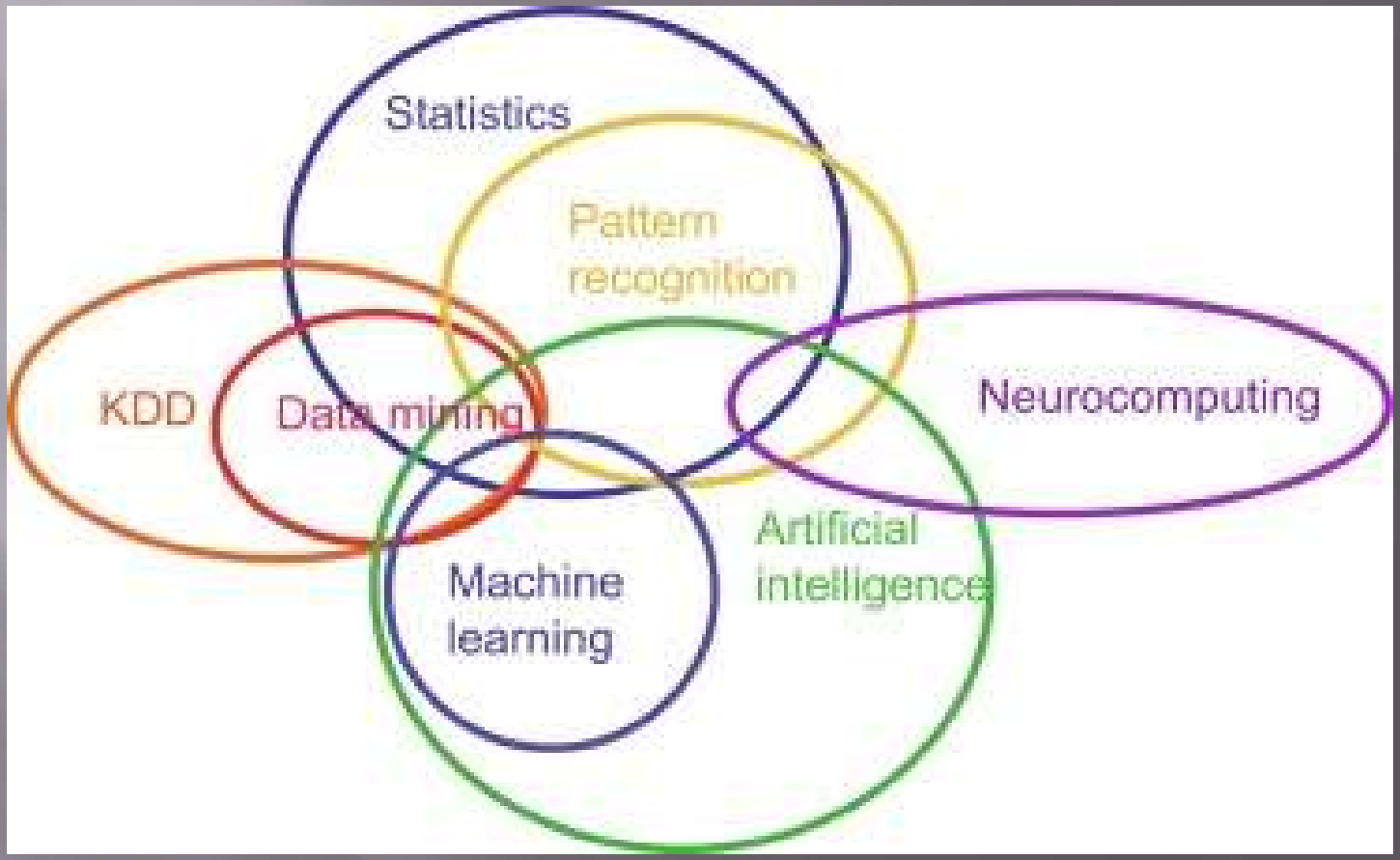
What is Machine Learning?

- Machine learning is a scientific discipline that is concerned with the design and development of algorithms that allow computers to learn based on data from sensors or databases.
- Major focus of ML is to automatically learn to recognize complex patterns and make intelligent decisions based on data.
- ML is closely related to statistics, probability theory, data mining, pattern recognition, artificial intelligence, adaptive control, and computer science.

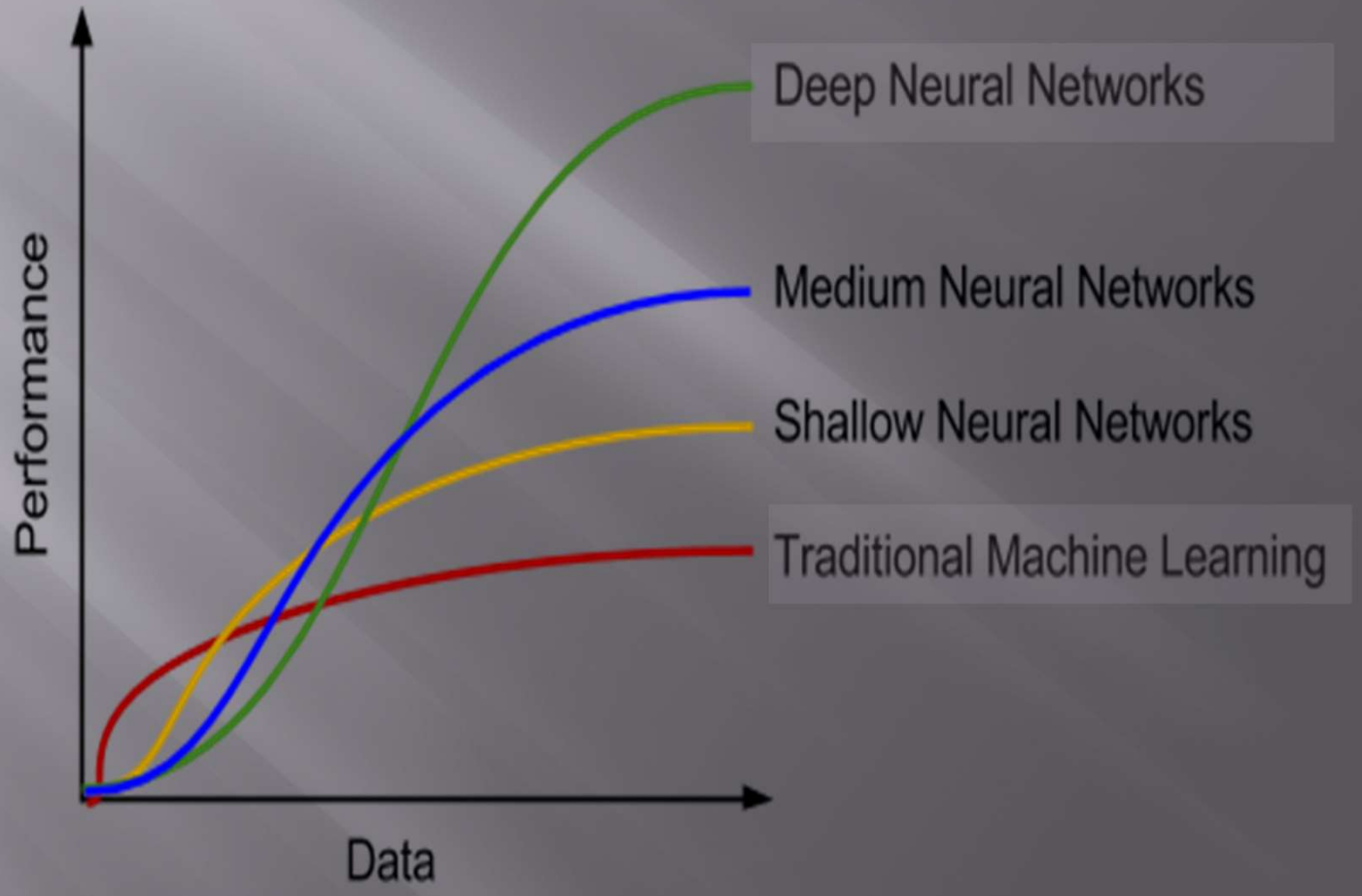
What is Pattern Recognition?

- Pattern recognition is the act of taking in raw data and taking an action based on the category of the data
- Largely divided into supervised learning and unsupervised learning.
- It aims to classify data based on a priori knowledge or on statistical information extracted from the patterns.
- The pattern classified are groups of measurements or observations, defining points in a multidimensional space.


Statistics
Machine Learning
Pattern
recognition
Neural
Computation
Data Mining
Artificial Intelligence


Statistics
Pattern recognition
KDD
Data mining
Neurocomputing
Machine learning
Artificial intelligence

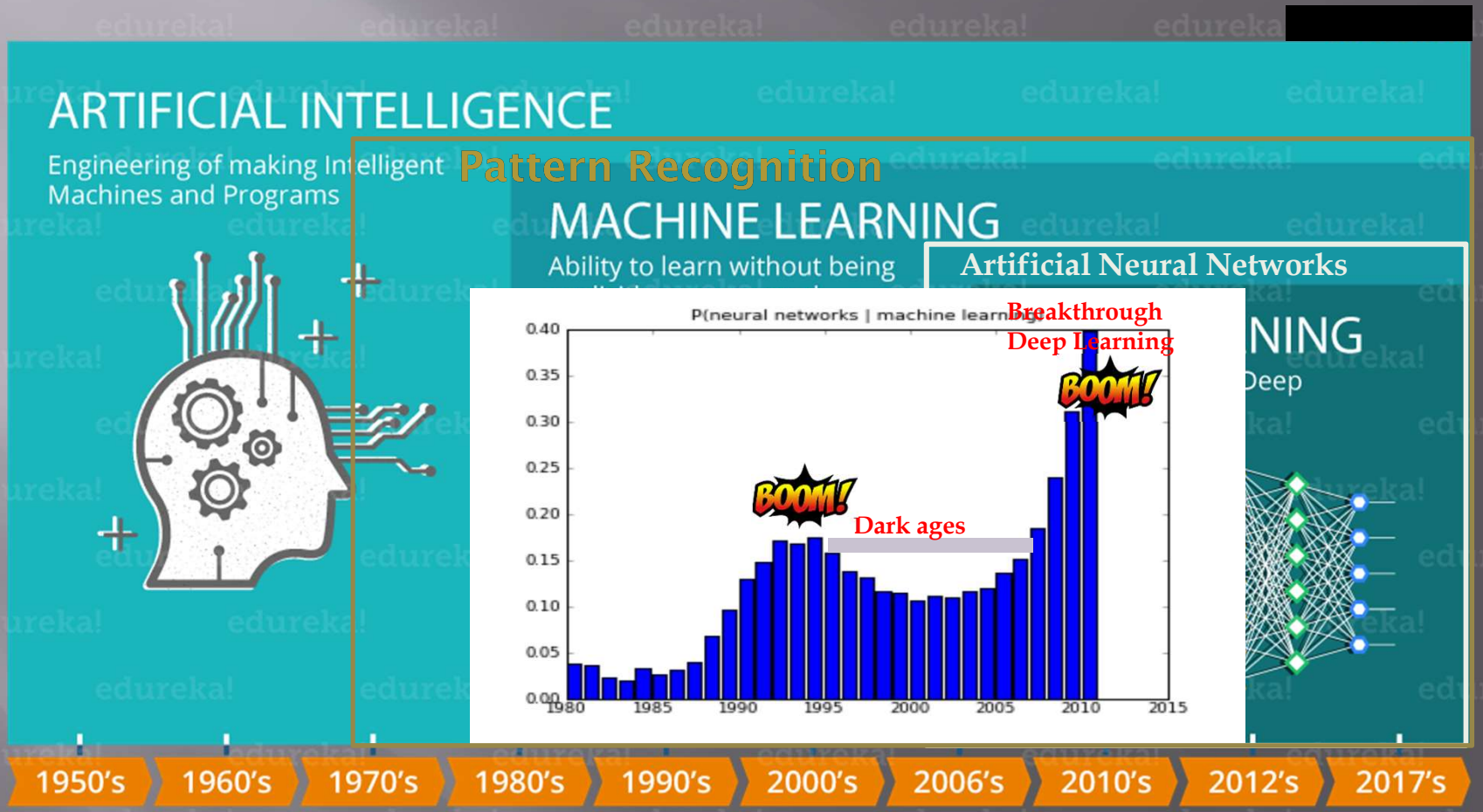
Data vs. Performance of Machine Learning & Deep Learning



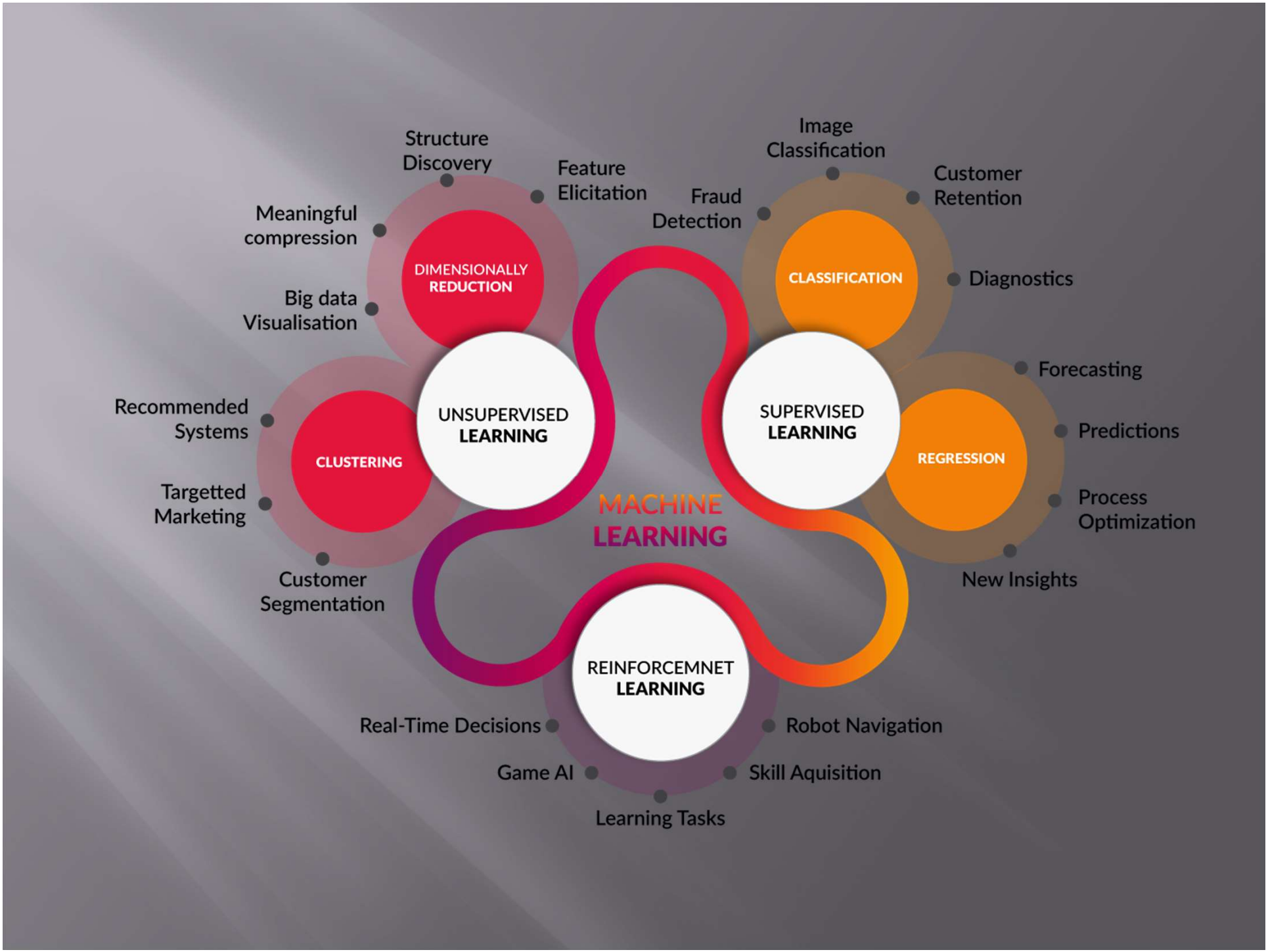
Where PR and ML Used?

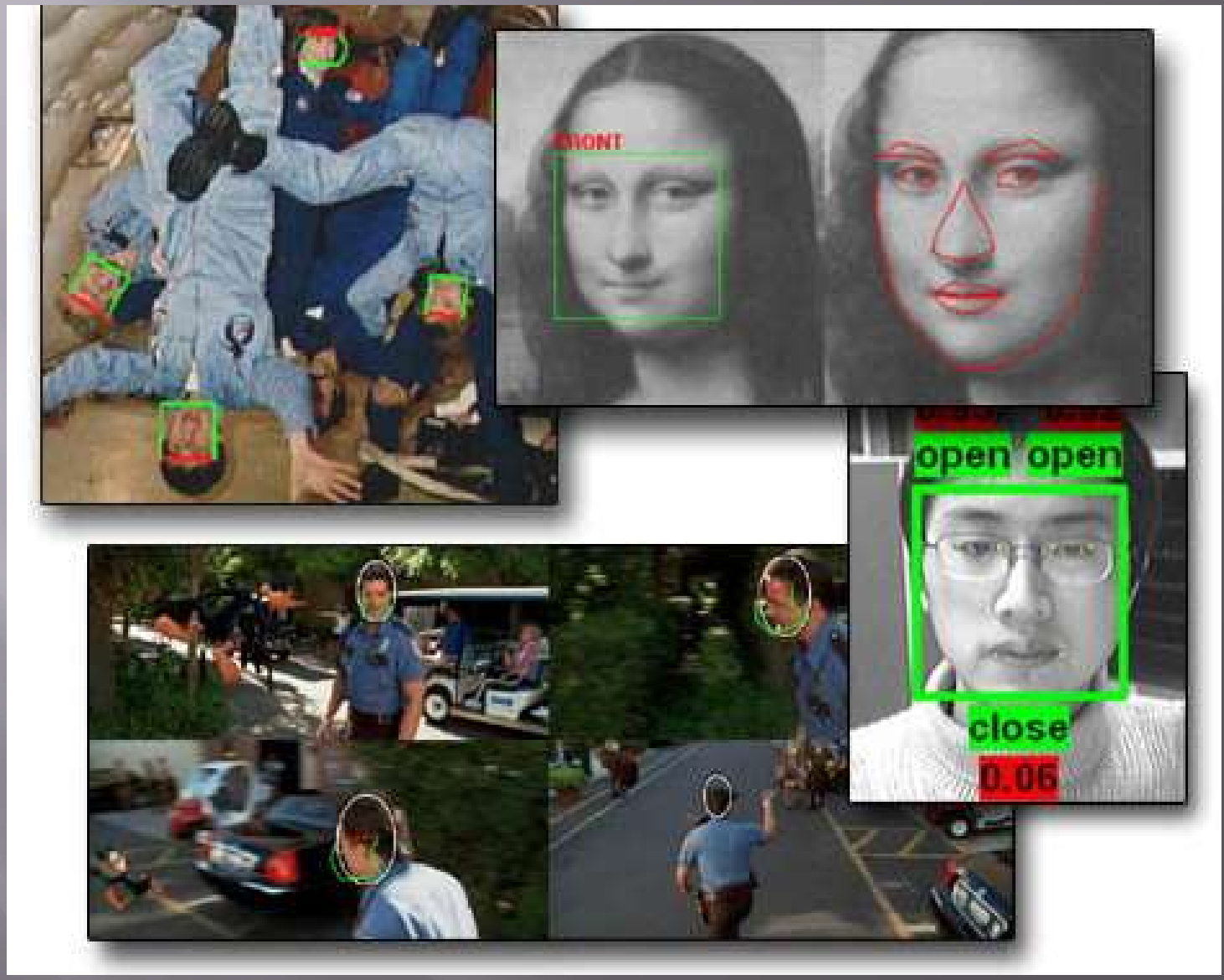
- In medical science, computer-aided diagnosis
- Speech recognition
- Text classification (spam vs. non-spam)
- Human face recognition
- Image analysis
- Data mining
- Predictive analysis (stock pricing)
- Machine intelligence
- Artificial Intelligence
- Deep Learning
- You name it

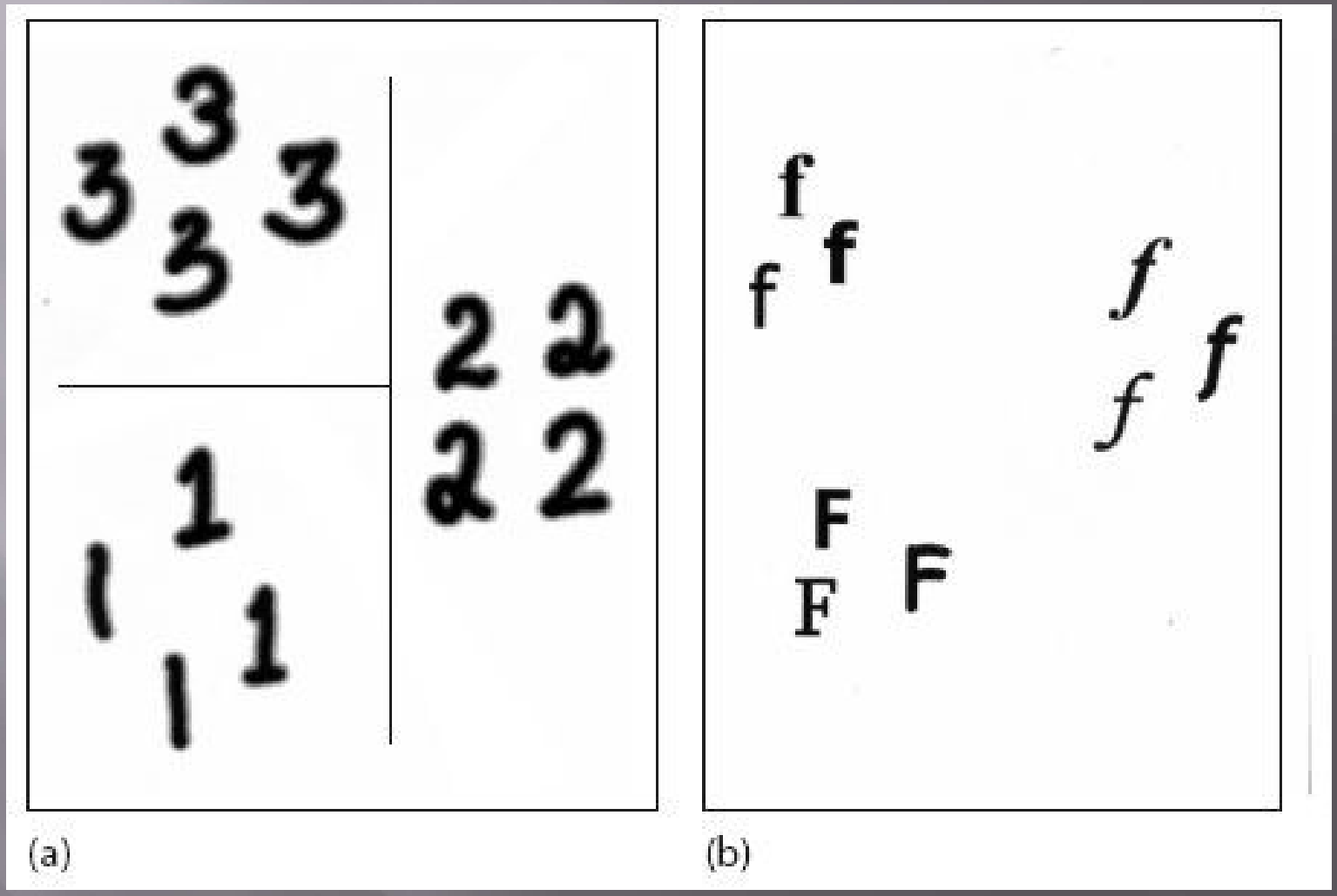
AI, Machine Learning & Deep Learning



http://houseofbots.com/news-detail/2754-1-a-take-on-deep-learning


MACHINE LEARNING
UNSUPERVISED LEARNING
SUPERVISED LEARNING
REINFORCEMNET LEARNING
DIMENSIONALLY REDUCTION
CLUSTERING
CLASSIFICATION
REGRESSION
Structure Discovery
Feature Elicitation
Meaningful compression
Big data Visualisation
Image Classification
Customer Retention
Fraud Detection
Diagnostics
Recommended Systems
Targetted Marketing
Customer Segmentation
Forecasting
Predictions
Process Optimization
New Insights
Real-Time Decisions
Robot Navigation
Game AI
Skill Aquisition
Learning Tasks


open open
close
0.06


(a)
(b)


VeriFinger Demo. Evaluation Version - Identification
File Mode View Tools Help
Waiting for image(s)
3 scanners found
Extraction complete: OK. Time: 271 ms
Matching speed: 440 fingerprints per second
G Result Similarity
126 OK 410
Records in the database: 78


CMA - COMERICA INC-COM - Daily
PatternExplorer.com - Chart Pattern Recognition 1 - CMA - Daily 22.02.2007 Open 62.9, Hi 63.28, Lo 62.69,
Close 62.97 (-0.3%) , Pattern: Rising Wedge, Sensitivity = 15
65.0
64.0
62.97
62.0
61.0
60.4342
60.0
59.0
58.6118
58.0
57.0
56.0
November
December
2007
February
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7

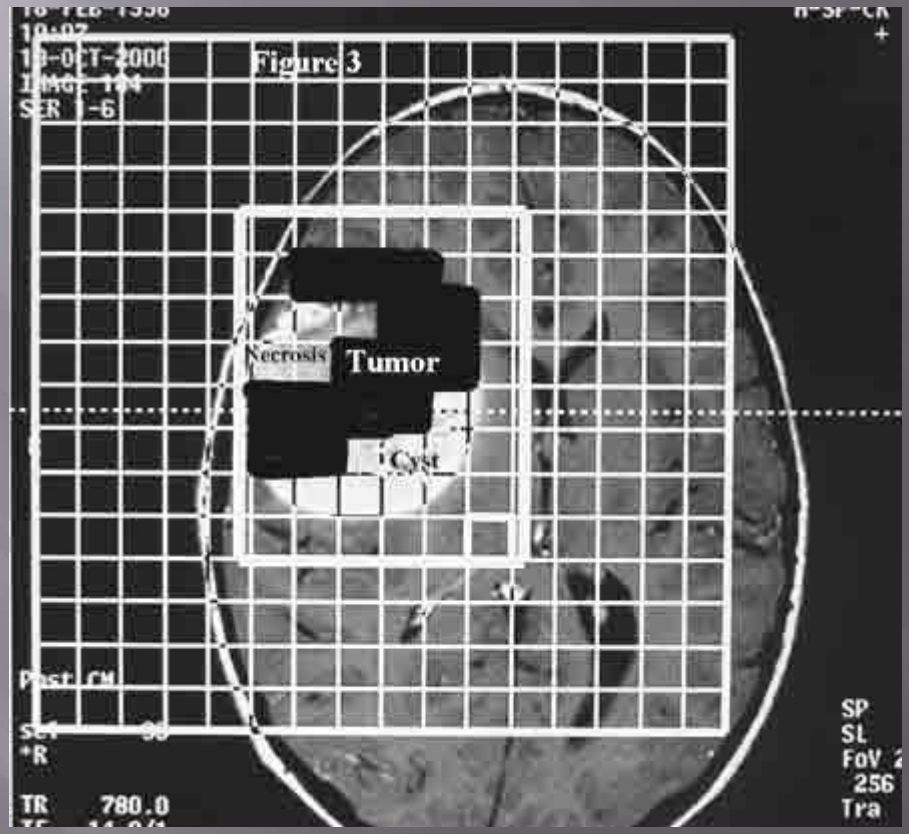
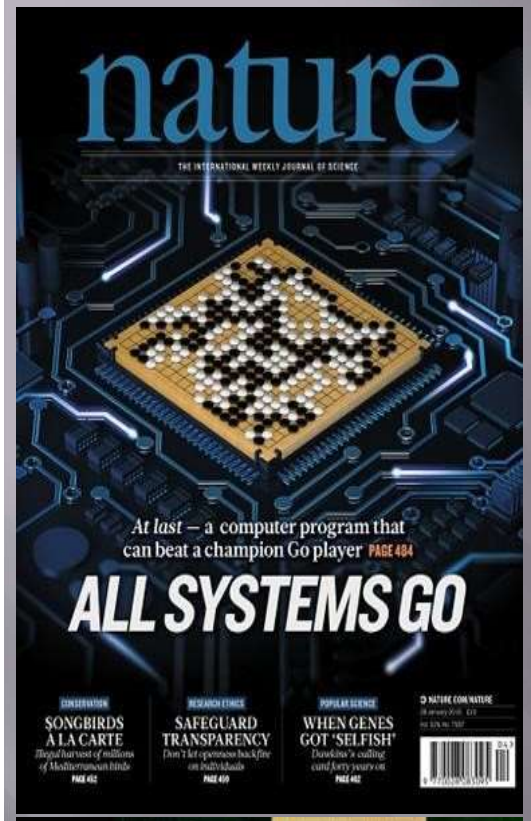
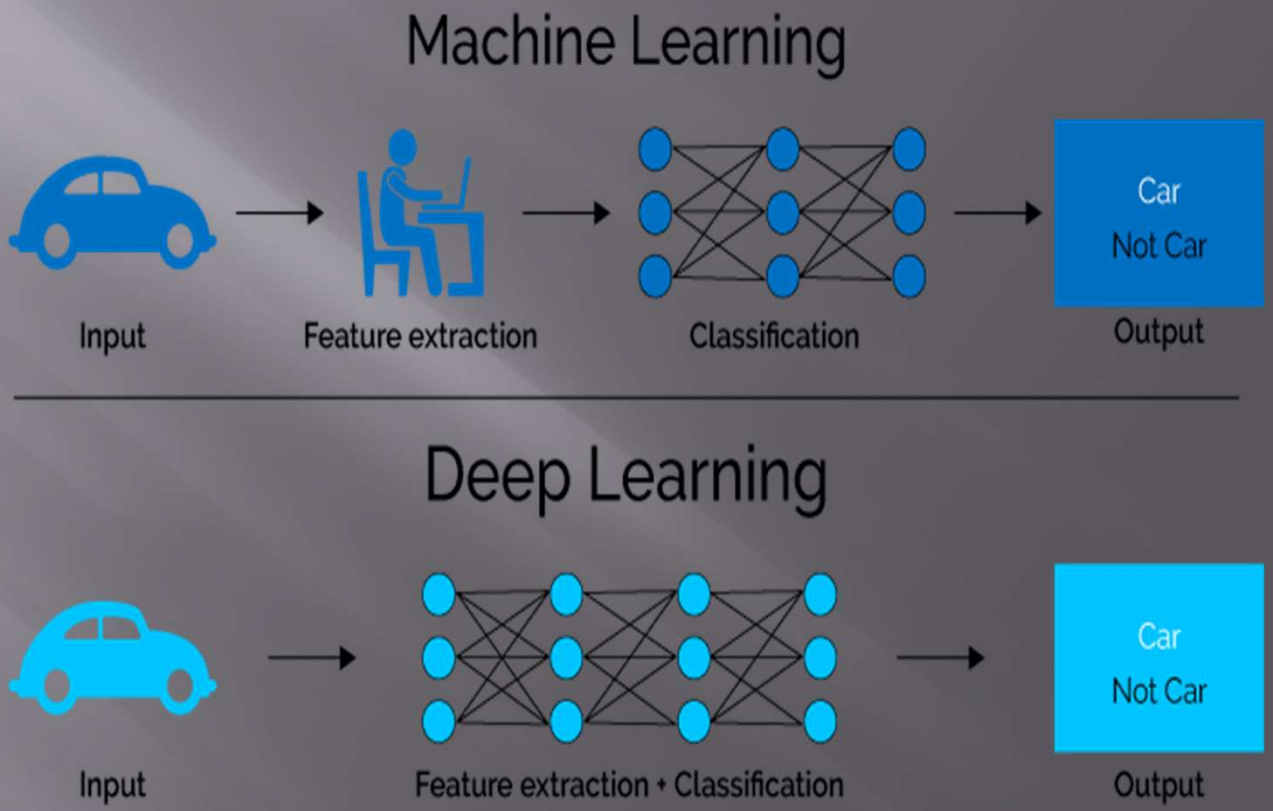


Figure 3
Necrosis
Tumor
Cyst
SER -6
TR 780.0
SP
SL
256
Tra

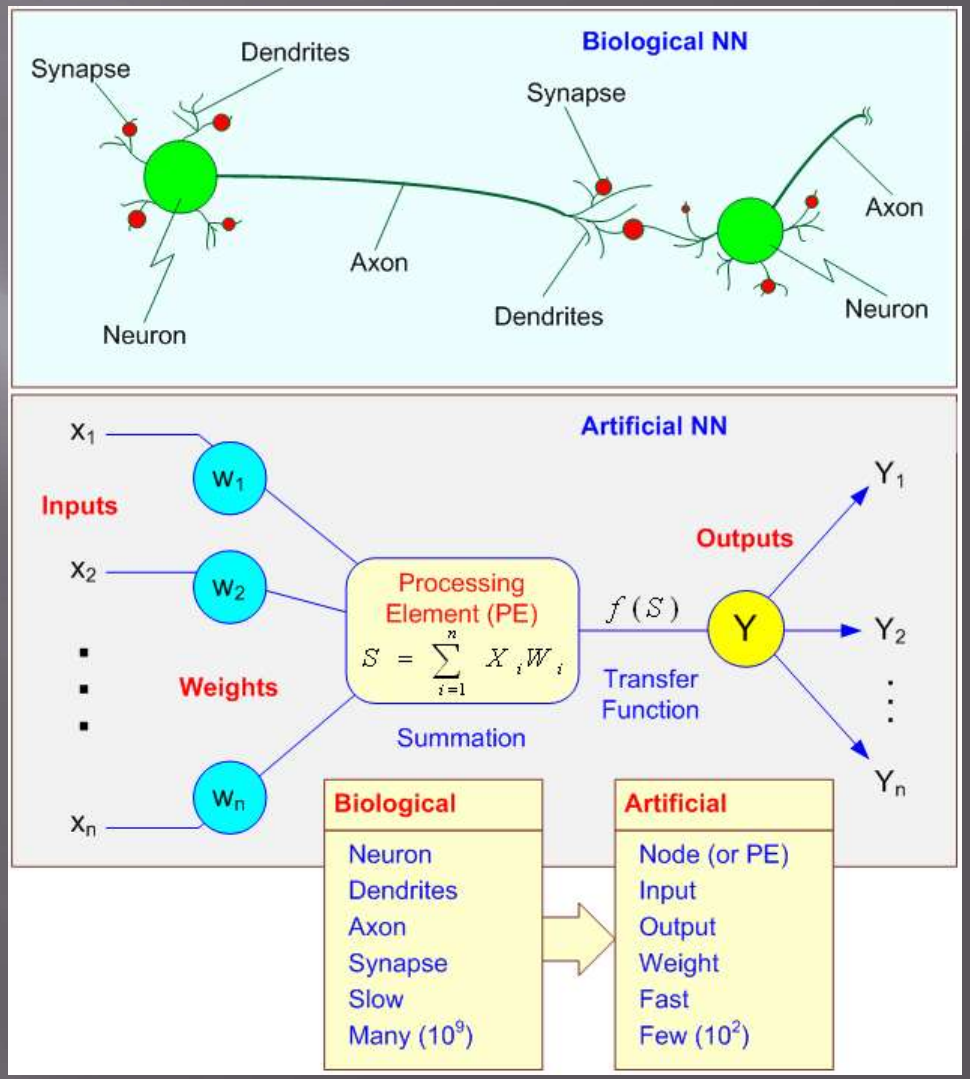
Paradigm Shift in Machine Learning





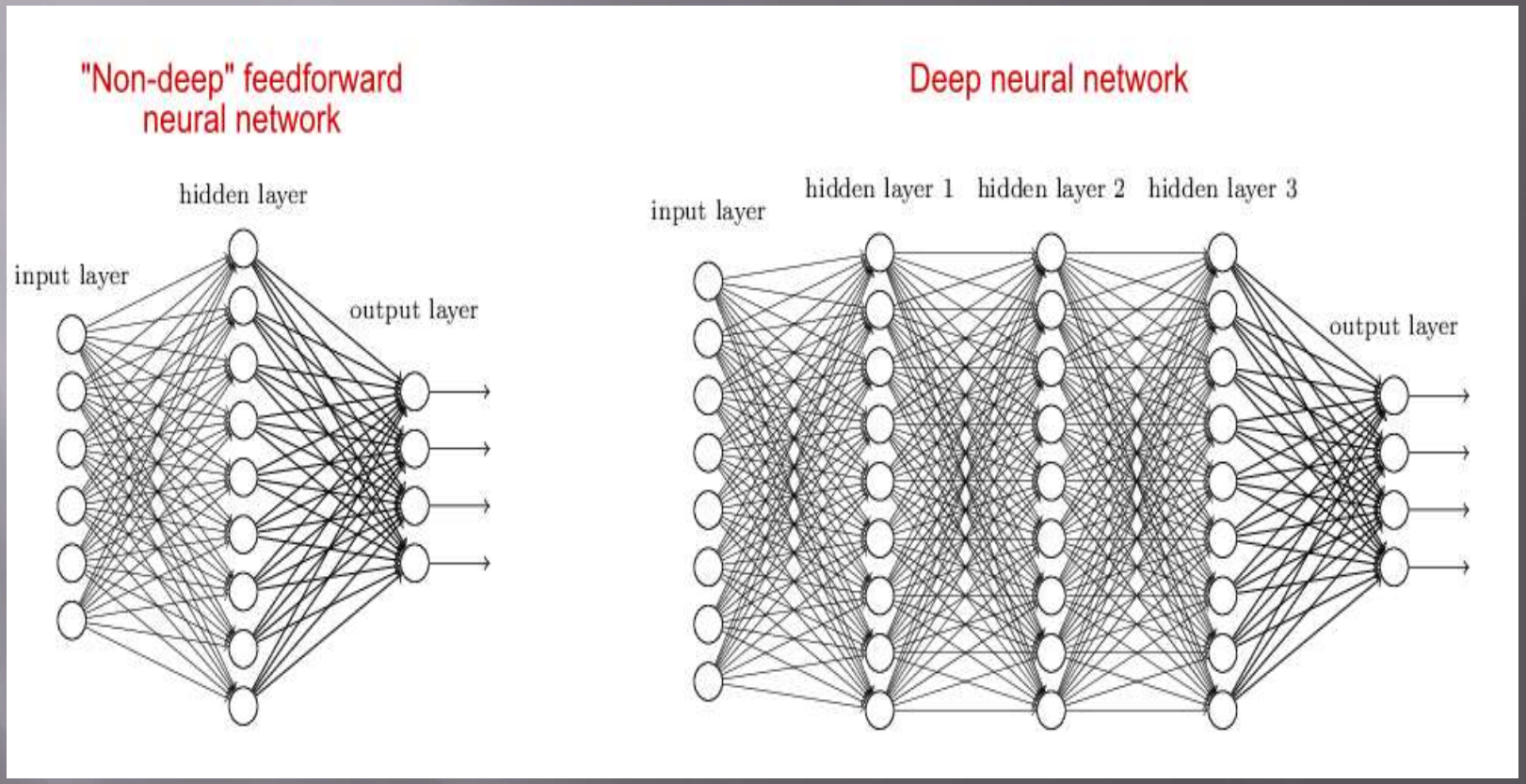
Deep Learning

- Deep learning refers to artificial neural networks that are composed of many layers.
- Deep learning is just another name for artificial neural networks (ANN)



Shallow Network vs. Deep Network

20 Years



# of Hidden Layer <= 1 (i.e., shallow network)

# of Hidden Layer >= 2 (i.e., deep network)