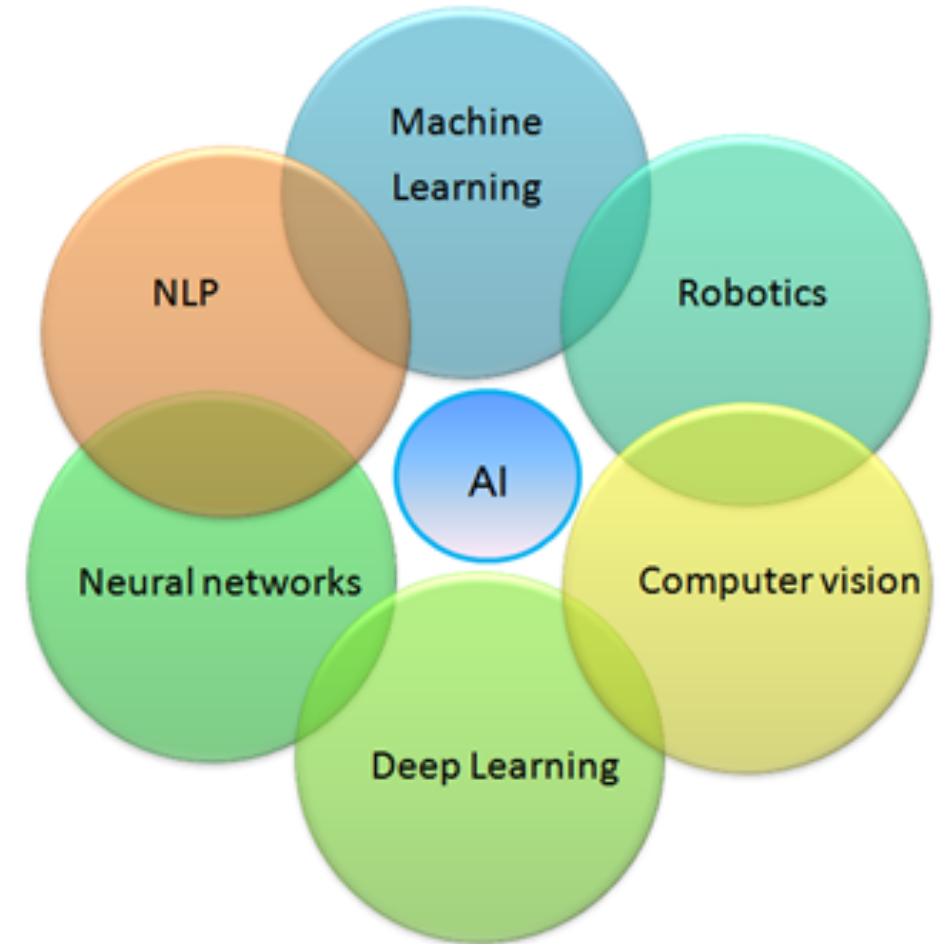
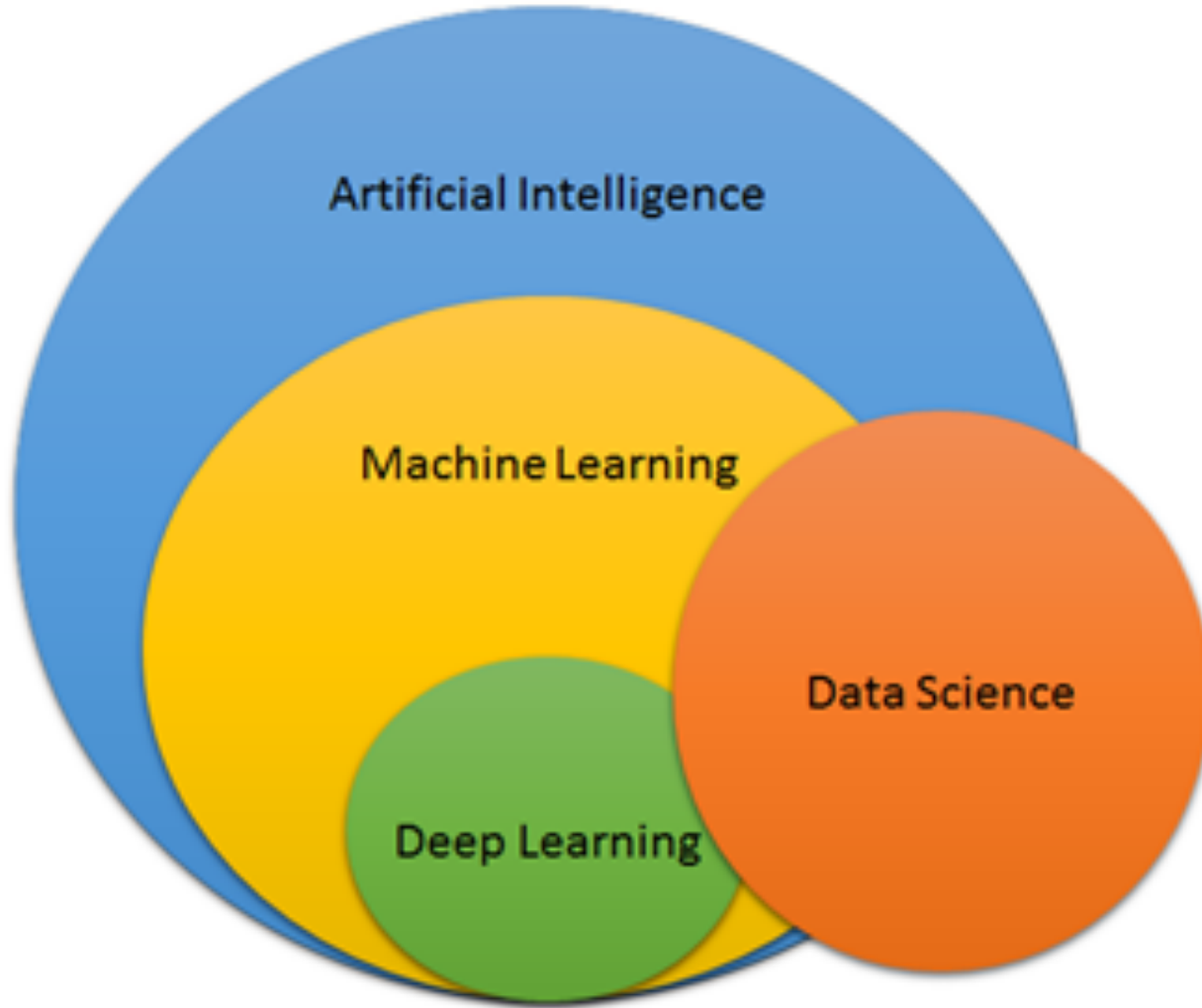
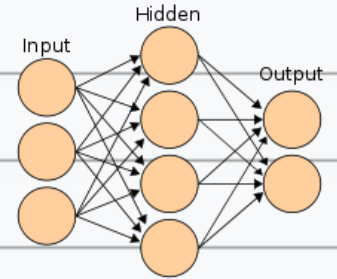


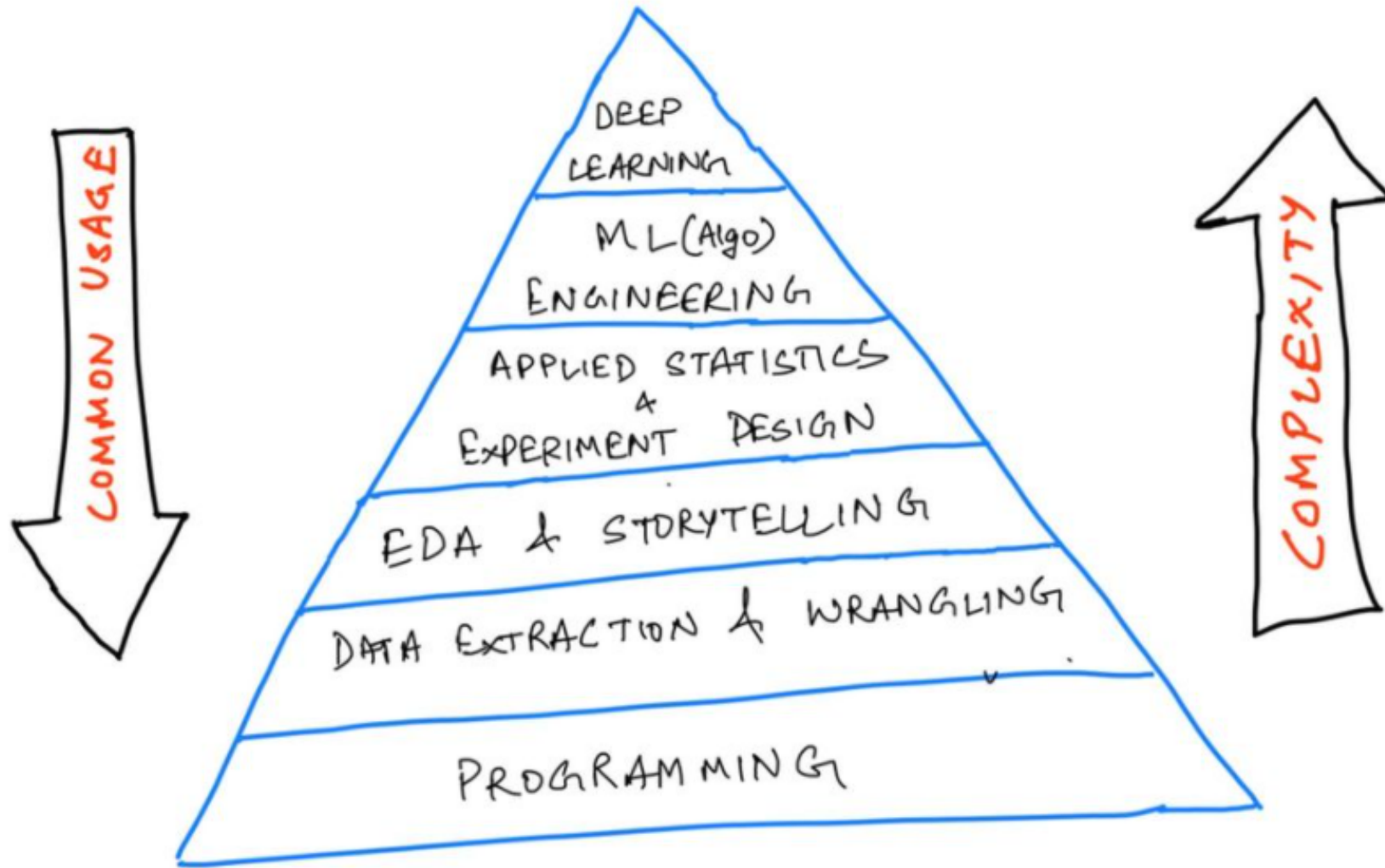
Roadmap to Data Science Using KAGGLE

ARTIFICIAL INTELLIGENCE & ITS DOMAINS



Decade ♦	Summary ♦
<1950s	Statistical methods are discovered and refined.
1950s	Pioneering machine learning research is conducted using simple algorithms.
1960s	Bayesian methods are introduced for probabilistic inference in machine learning. ^[1]
1970s	'AI Winter' caused by pessimism about machine learning effectiveness.
1980s	Rediscovery of backpropagation causes a resurgence in machine learning research.
1990s	Work on machine learning shifts from a knowledge-driven approach to a data-driven approach. Scientists begin creating programs for computers to analyze large amounts of data and draw conclusions – or "learn" – from the results. ^[2] Support vector machines (SVMs) and ^[3] recurrent neural networks (RNNs) become popular. The fields of ^[4] computational complexity via neural networks and super-Turing computation started.
2000s	Support Vector Clustering ^[5] and other Kernel methods ^[6] and unsupervised machine learning methods become widespread. ^[7]
2010s	Deep learning becomes feasible, which leads to machine learning becoming integral to many widely used software services and applications.

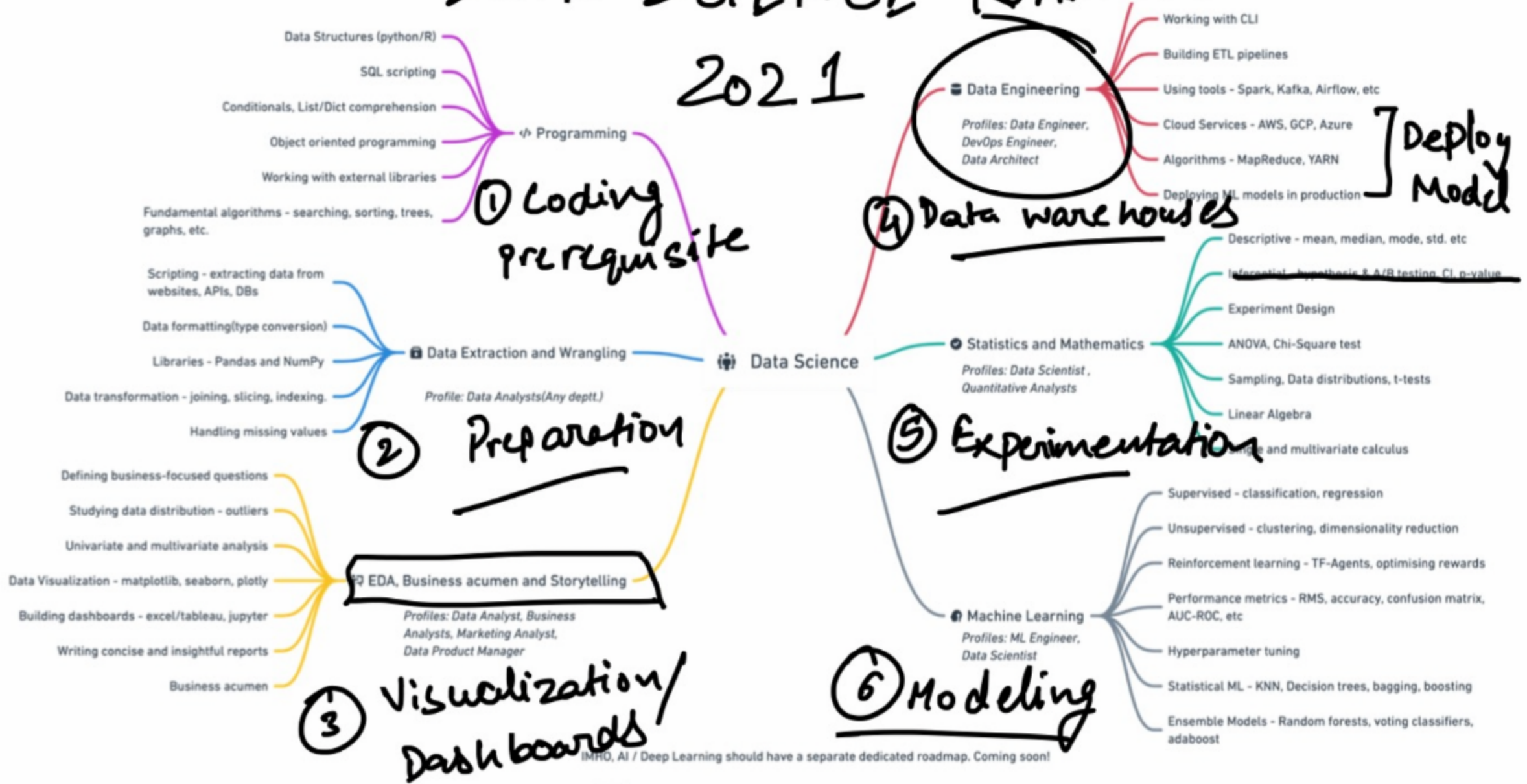




Data science tasks in the order of complexity

DATA SCIENCE ROADMAP

2021



IMHO, AI / Deep Learning should have a separate dedicated roadmap. Coming soon!

The concept of learning in a ML system

- Learning = Improving with experience at some task
 - Improve over task T,
 - With respect to performance measure, P
 - Based on experience, E

Learning

- “Learning denotes changes in a system that ... enable a system to do the same task ... more efficiently the next time.” - **Herbert Simon**
- “Learning is constructing or modifying representations of what is being experienced.” - **Ryszard Michalski**
- “Learning is making useful changes in our minds.” - **Marvin Minsky**

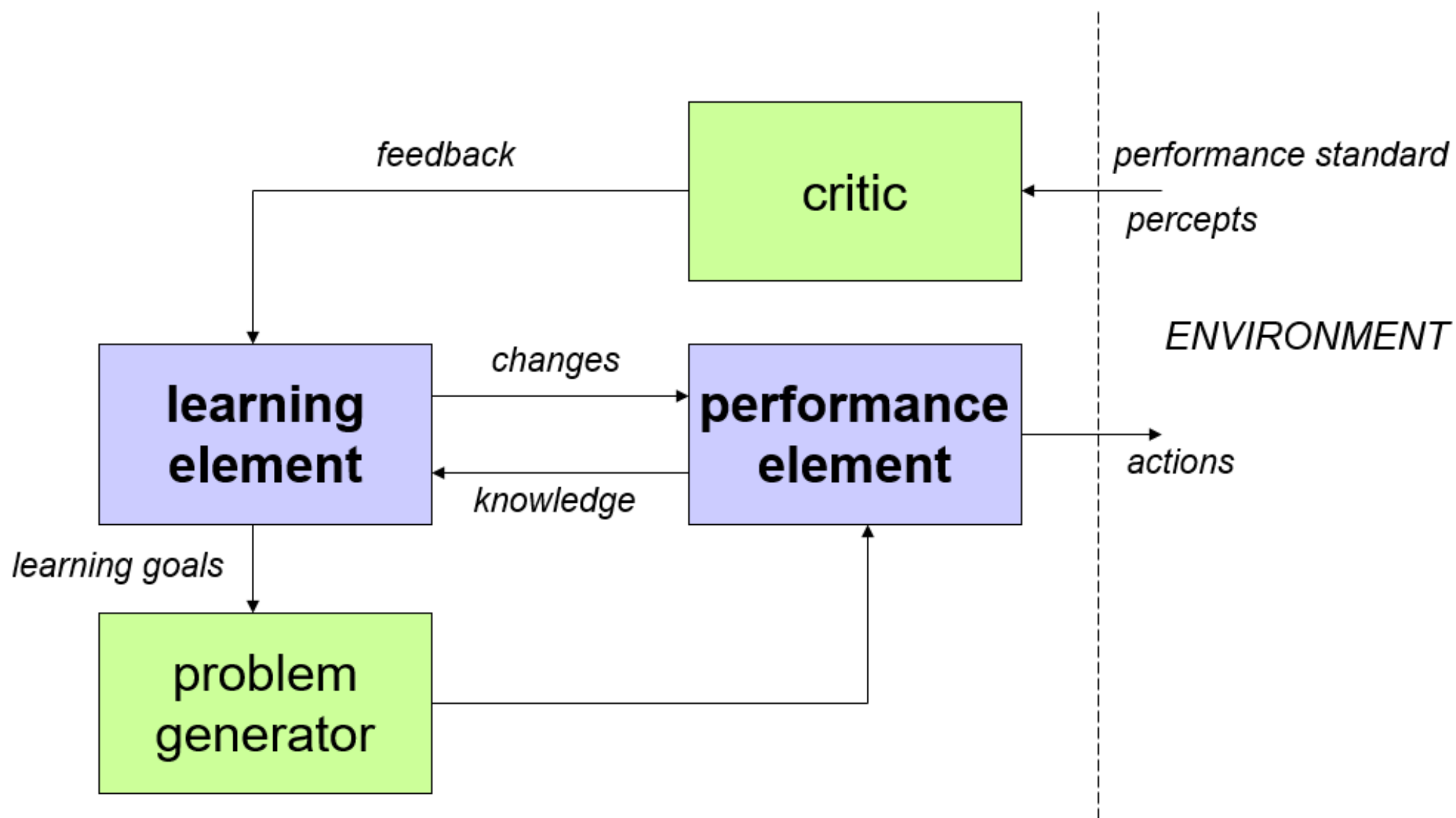
“Machine learning refers to a system capable of the autonomous acquisition and integration of knowledge.”

Learning Element

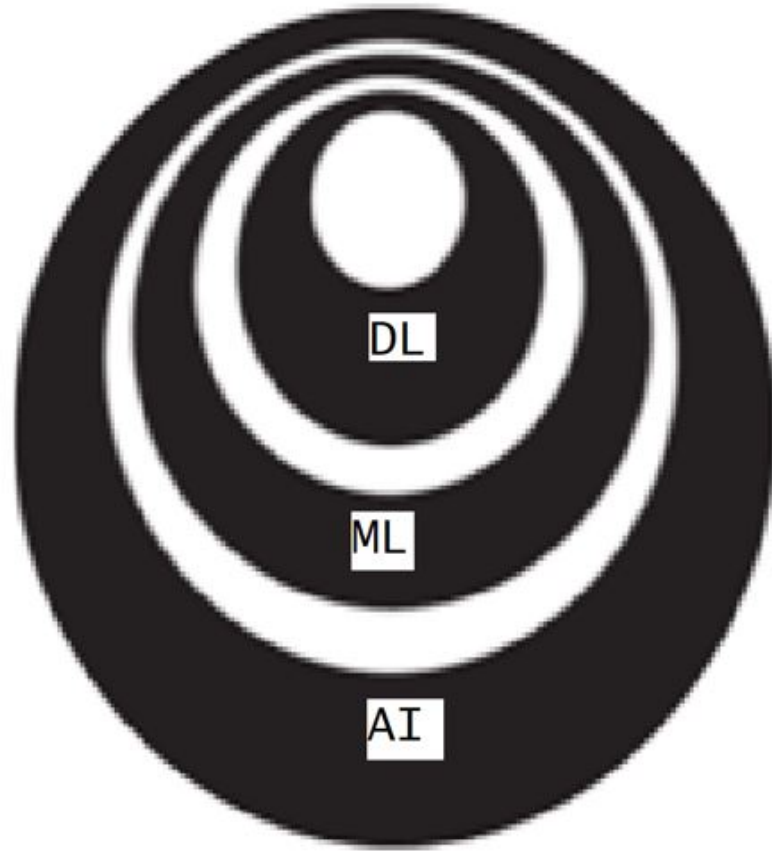
Design affected by:

- *performance element* used
 - e.g., utility-based agent, reactive agent, logical agent
- *functional component* to be learned
 - e.g., classifier, evaluation function, perception-action function,
- *representation* of functional component
 - e.g., weighted linear function, logical theory, HMM
- *feedback* available
 - e.g., correct action, reward, relative preferences

Architecture of a Learning System



Introduction to AI



2000 - Igor Aizenberg

Learning based on
Deep Neural
Network

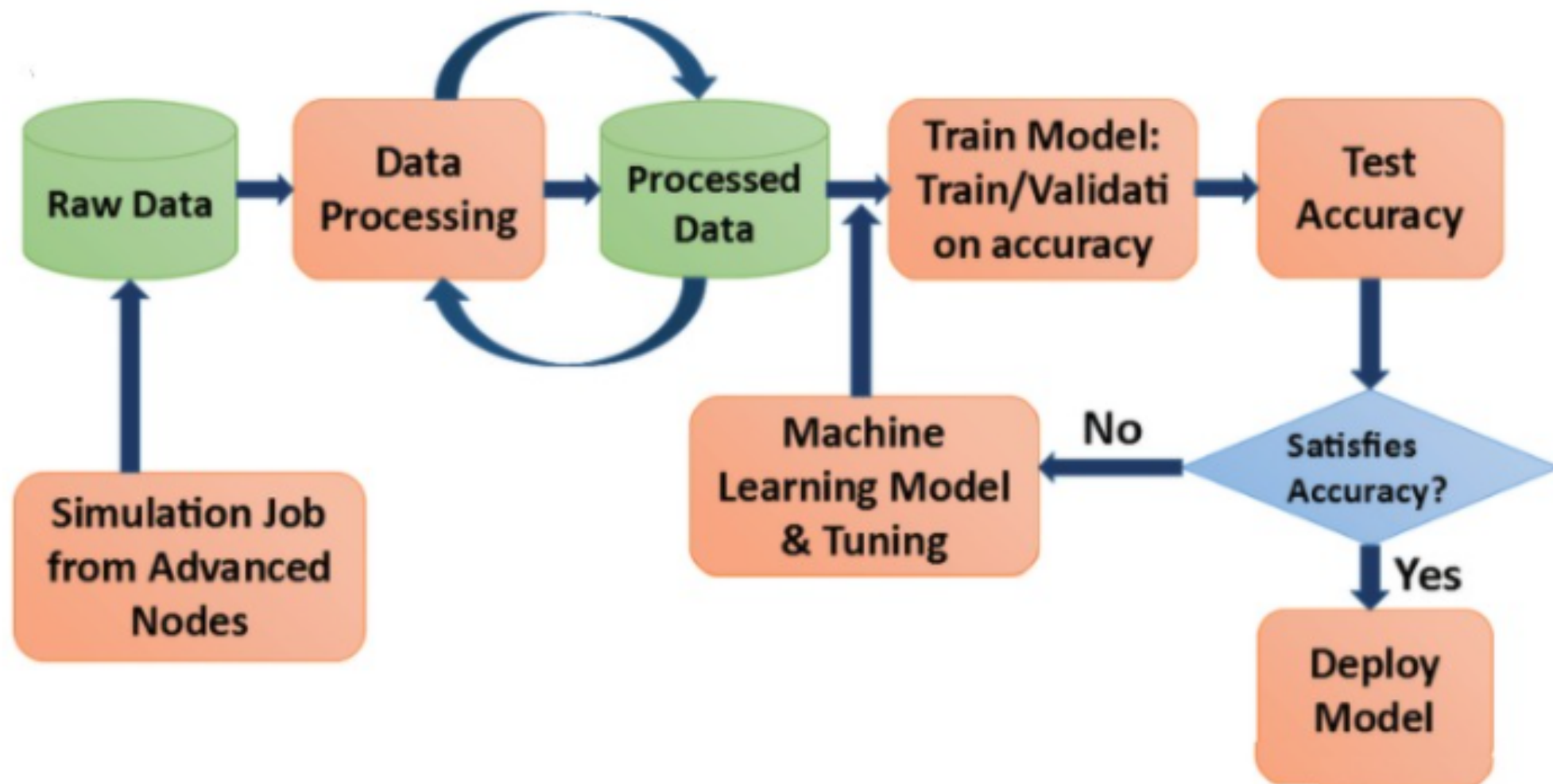
1959 - Arther Samuel

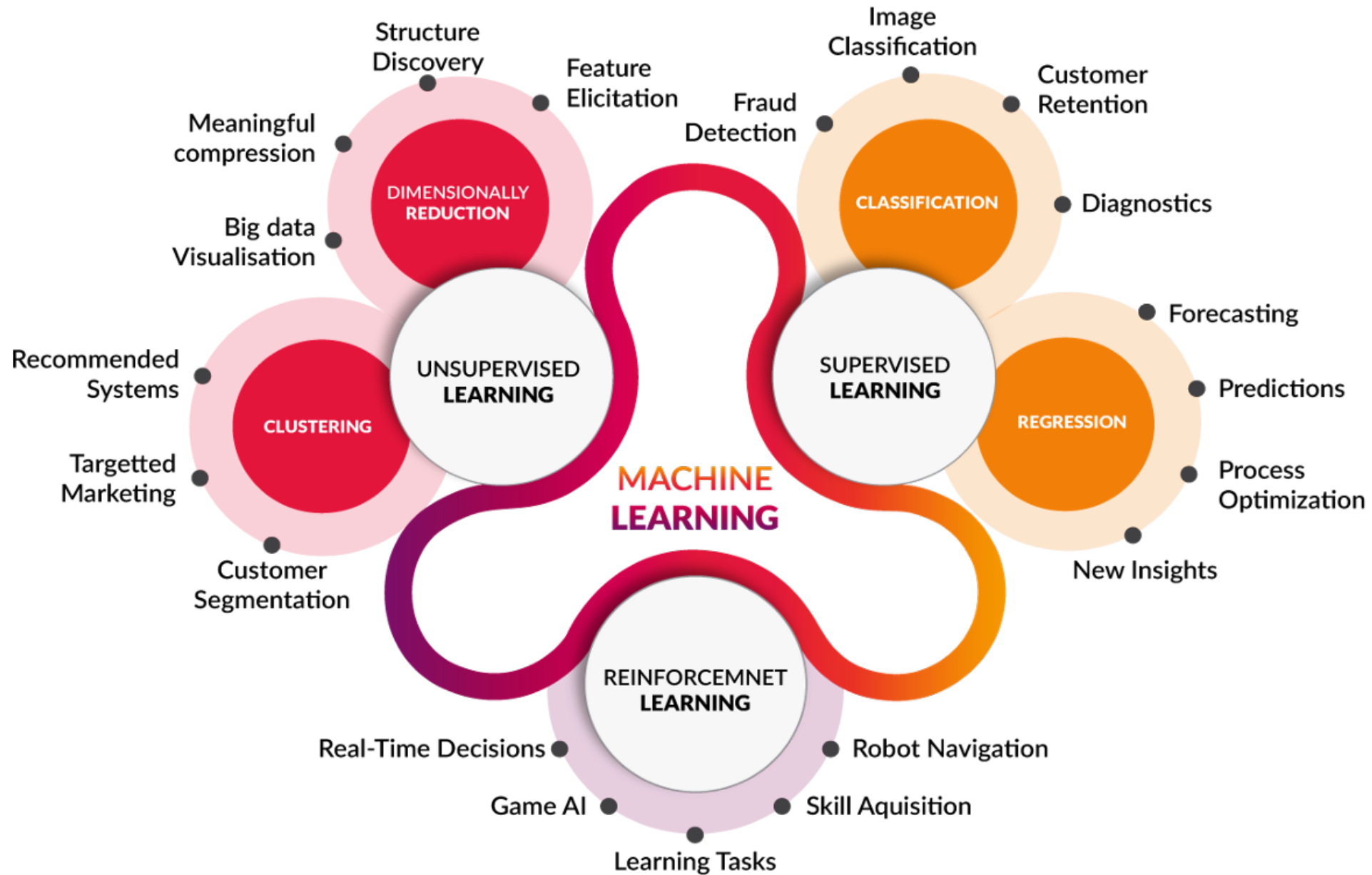
Ability to learn
without being explicitly
programmed

1956 - John MacCarthy

Engineering of
making Intelligent
Machines and Programs





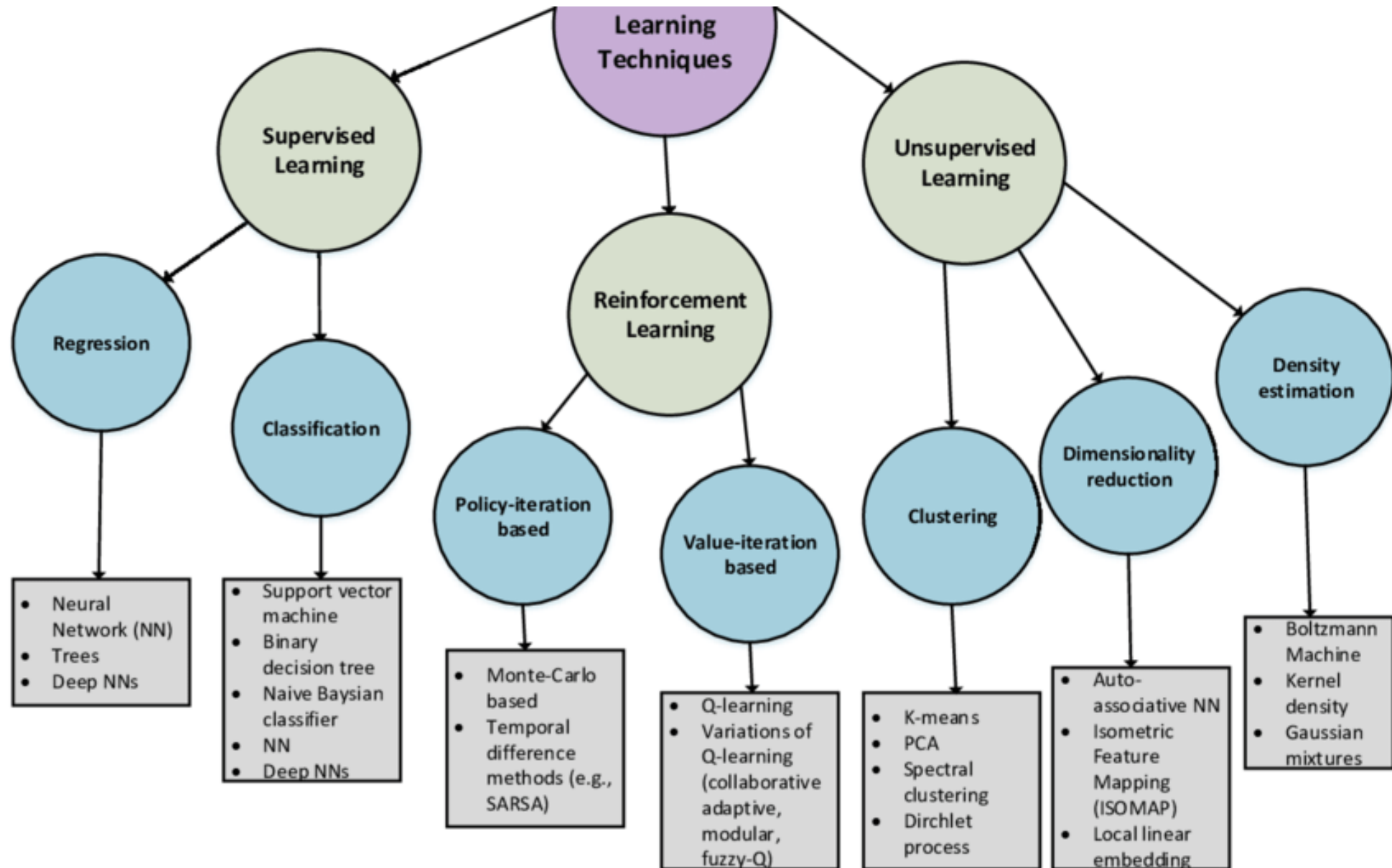


MACHINE LEARNING VS DEEP LEARNING



DEEP LEARNING





Machine Learning Algorithms *(sample)*

	<u>Unsupervised</u>	<u>Supervised</u>
<u>Continuous</u>	<ul style="list-style-type: none">• Clustering & Dimensionality Reduction<ul style="list-style-type: none">○ SVD○ PCA○ K-means	<ul style="list-style-type: none">• Regression<ul style="list-style-type: none">○ Linear○ Polynomial• Decision Trees• Random Forests
<u>Categorical</u>	<ul style="list-style-type: none">• Association Analysis<ul style="list-style-type: none">○ Apriori○ FP-Growth• Hidden Markov Model	<ul style="list-style-type: none">• Classification<ul style="list-style-type: none">○ KNN○ Trees○ Logistic Regression○ Naive-Bayes○ SVM

1. Supervised learning

empirical learning (knowledge-free)

analytical learning (knowledge-guided)

2. Unsupervised learning

3. *Semi-Supervised*

3. Reinforcement learning

Performance evaluation

Computational learning theory

Types of Machine Learning – At a Glance

Supervised Learning

- Makes machine Learn explicitly
- Data with clearly defined output is given
- Direct feedback is given
- Predicts outcome/future
- Resolves classification and regression problems



Unsupervised Learning

- Machine understands the data (Identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific

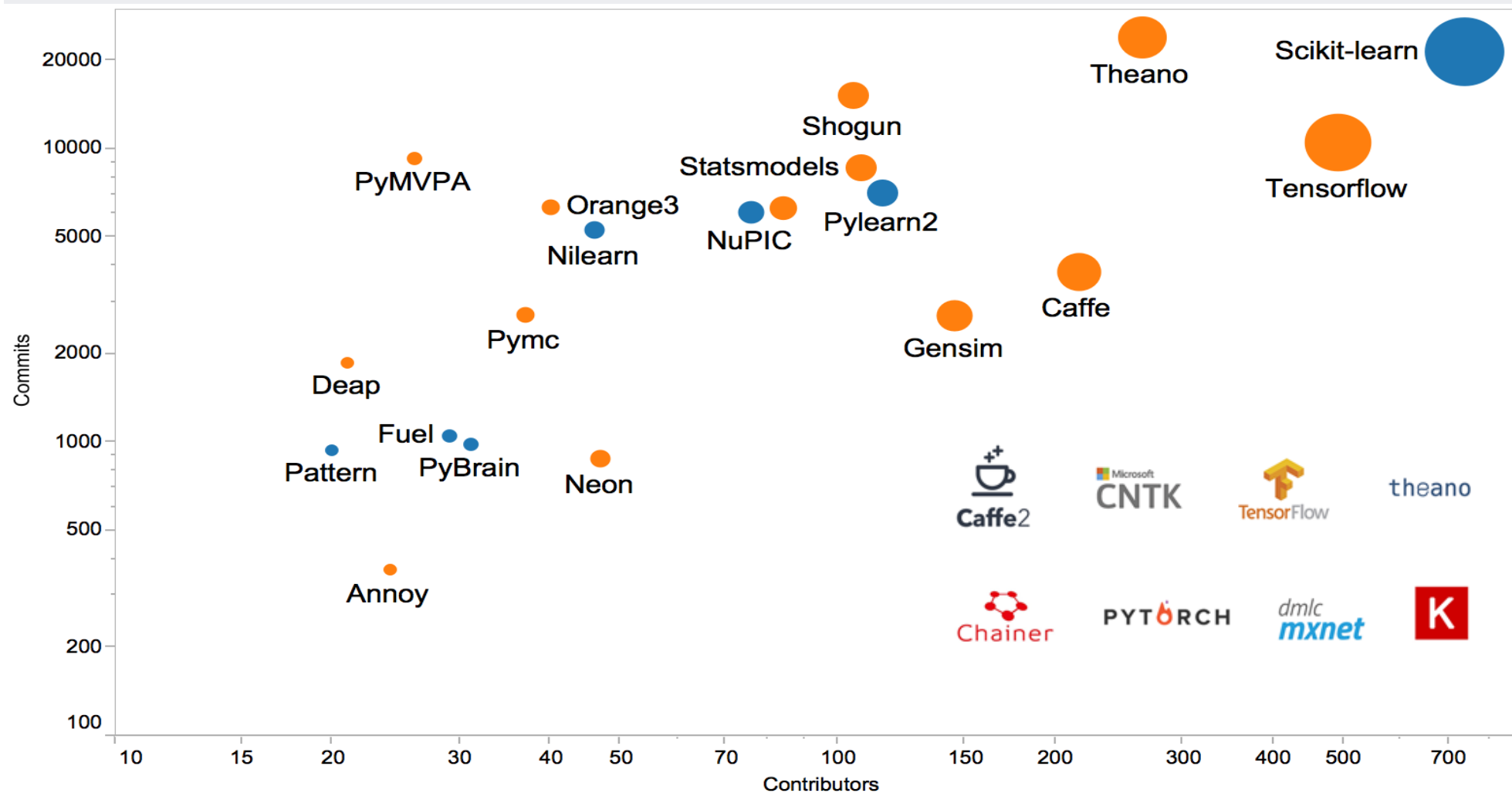


Reinforcement Learning

- An approach to AI
- Reward based learning
- Learning form +ve & +ve reinforcement
- Machine Learns how to act in a certain environment
- To maximize rewards



Top 20 Python Machine Learning Open Source Projects, 2016



New Entry in Top 20

N
Y






Contributors

20
200
400

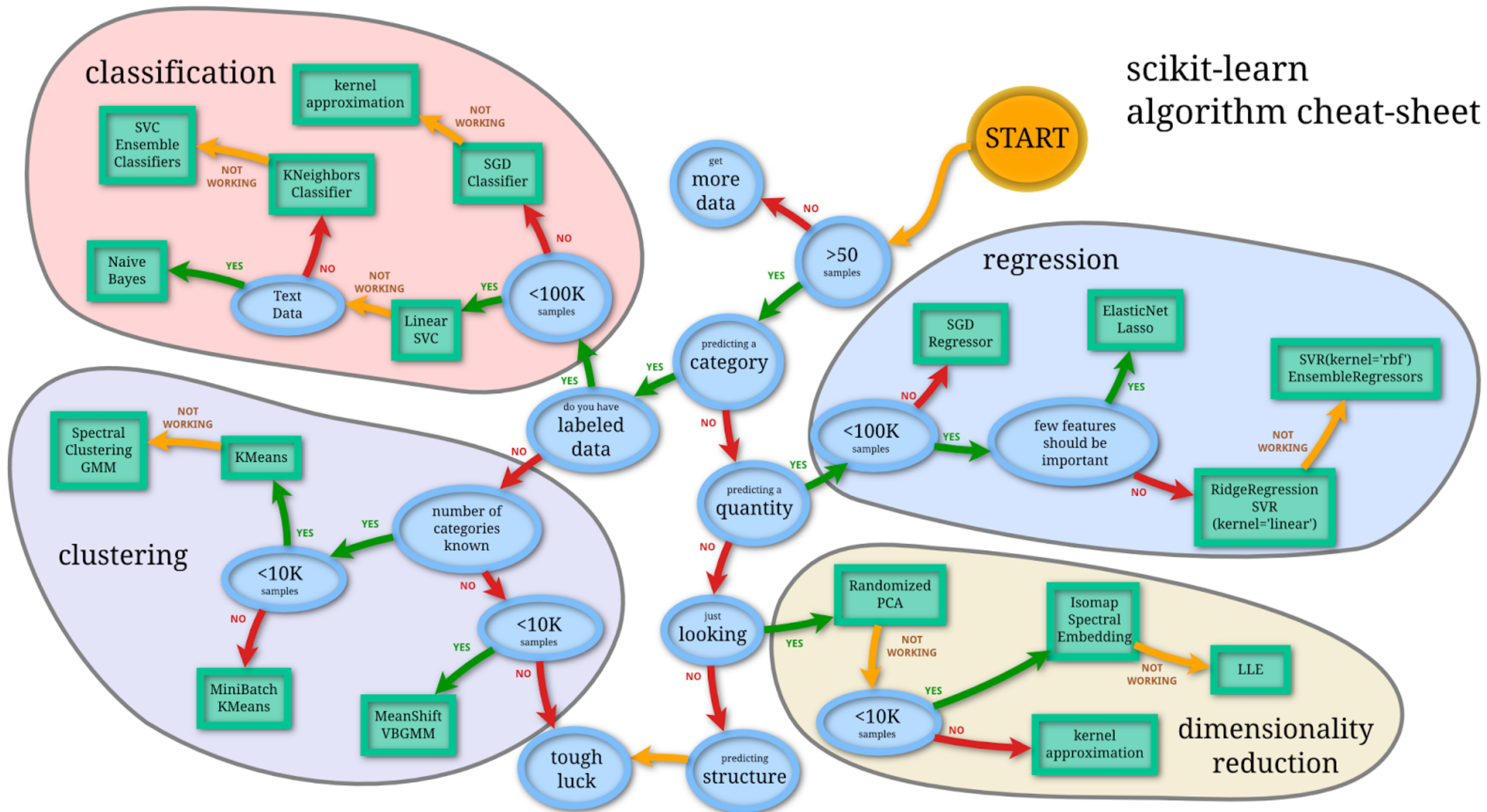
600
≥ 700



Artificial Intelligence and Machine Learning SkillsFuture Courses and Training

 Vision	 Speech	 Language	 Knowledge	 Search
Computer Vision	Bing Speech	Bing Spell Check	Academic Knowledge	Bing Web Search
Content Moderator	Speaker Recognition	Language Understanding	Knowledge Exploration	Bing Image Search
Face	Custom Speech	Linguistic Analysis	Entity Linking	Bing Video Search
Emotion		Text Analytics	QnA Maker	Bing News Search
Video		Translator	Recommendations	Bing Autosuggest
		Web Language Model		

scikit-learn algorithm cheat-sheet



Dlib C++ Library

Machine Learning Guide

