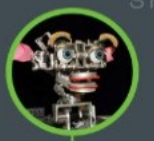

NL AI Coalitie
AI BREVET
Certified by
Van Haren
CERTIFY

/A.I. TIMELINE



1950
TURING TEST
Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

1955
A.I. BORN
Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

1961
UNIMATE
First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

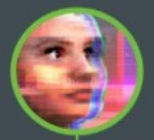
1964
ELIZA
Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

1966
SHAKEY
The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

A.I. WINTER
Many false starts and dead-ends leave A.I. out in the cold

1997
DEEP BLUE
Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

1998
KISMET
Cynthia Breazeal at MIT introduces KISmet, an emotionally intelligent robot insofar as it detects and responds to people's feelings



1999
AIBO
Sony launches first consumer robot pet dog AiBO (AI robot) with skills and personality that develop over time

2002
ROOMBA
First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes

2011
SIRI
Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S

2011
WATSON
IBM's question answering computer Watson wins first place on popular $1M prize television quiz show *Jeopardy*

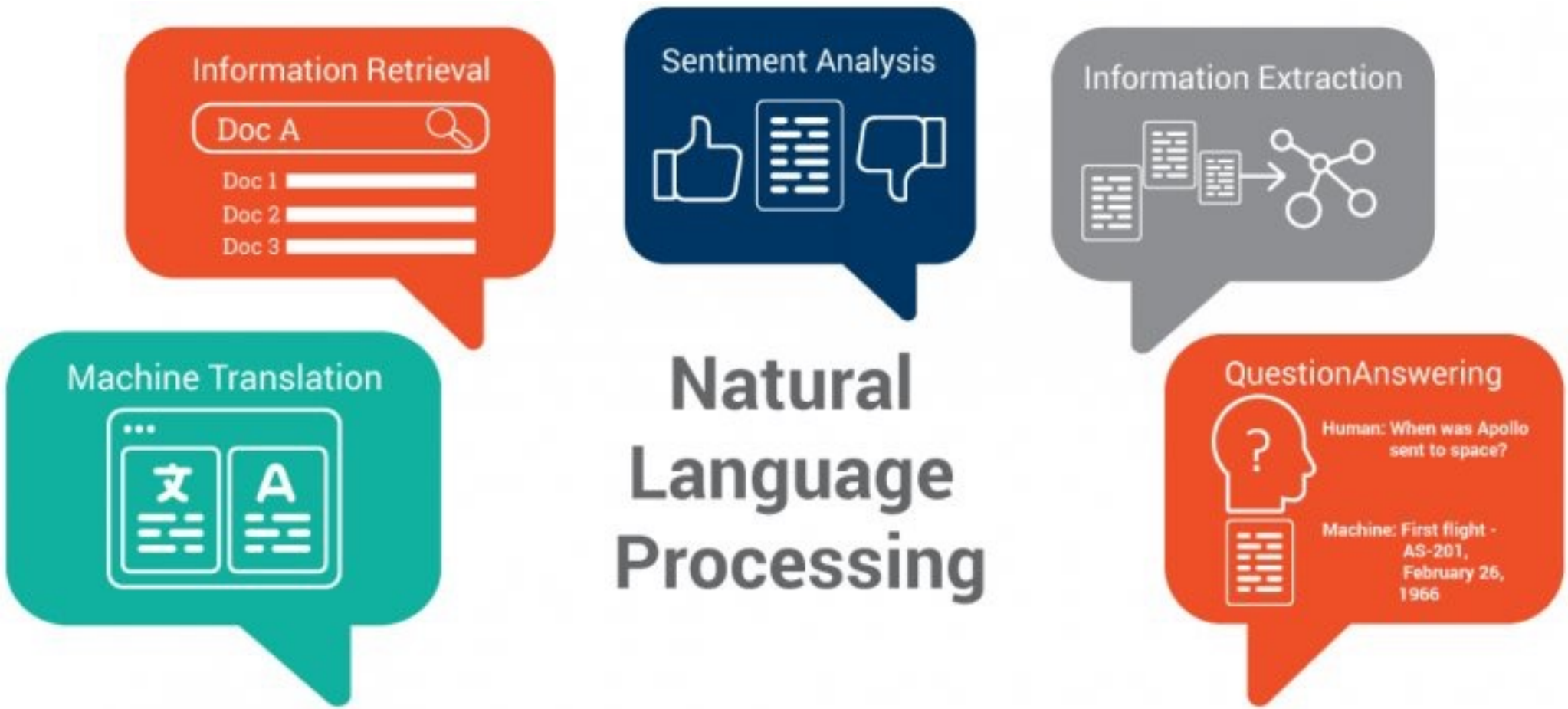
2014
EUGENE
Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human

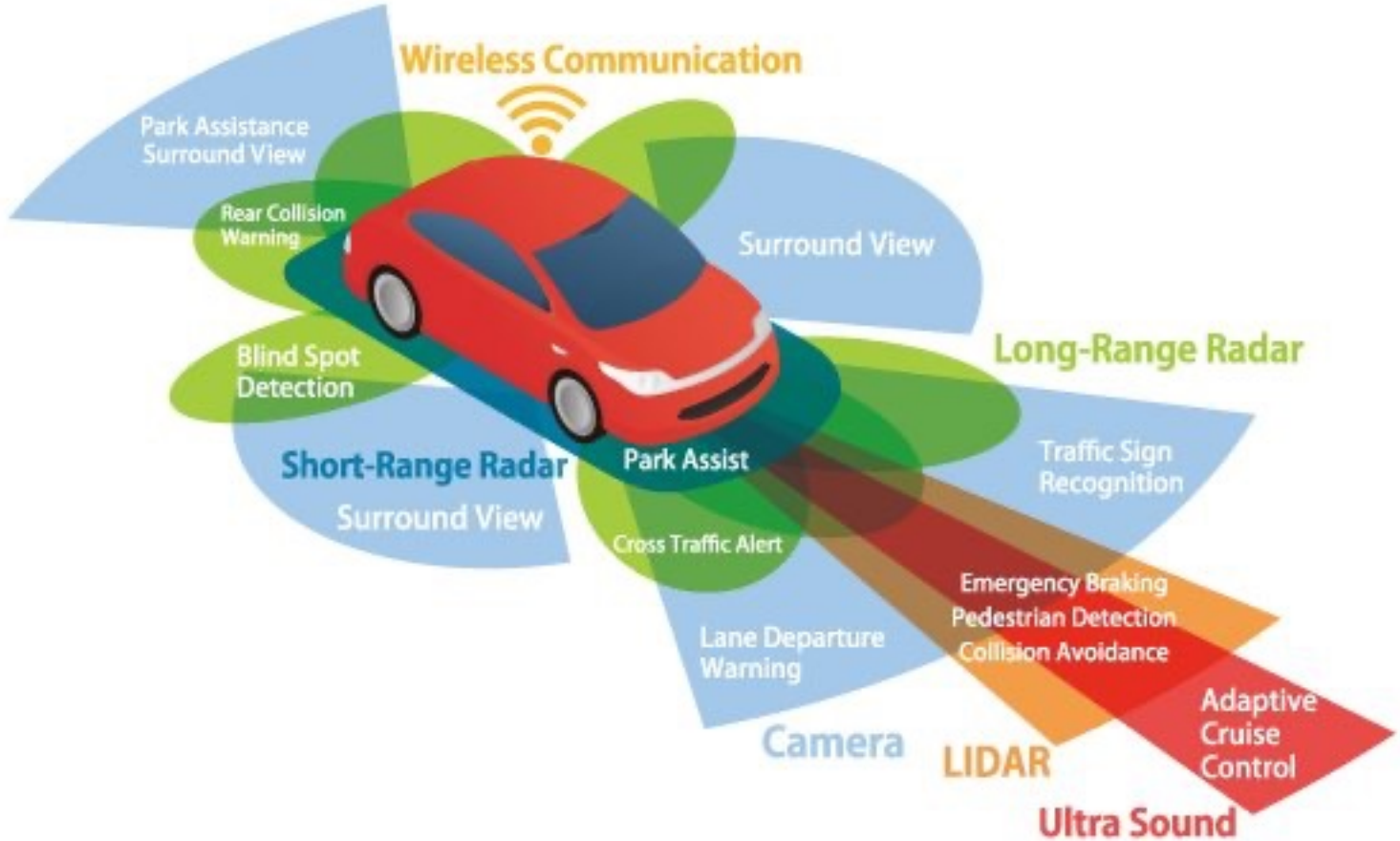
2014
ALEXA
Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks

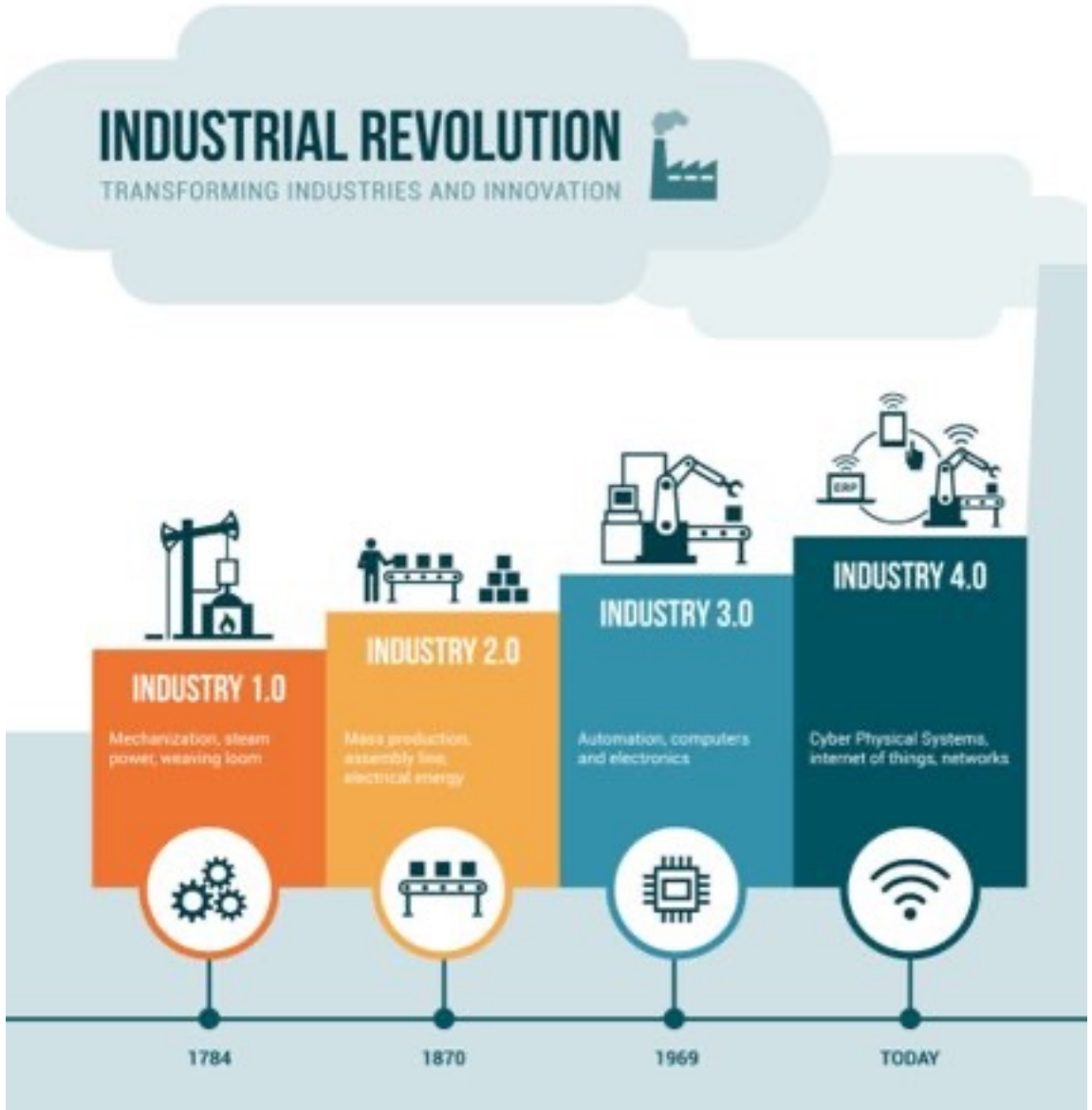
2016
TAY
Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments

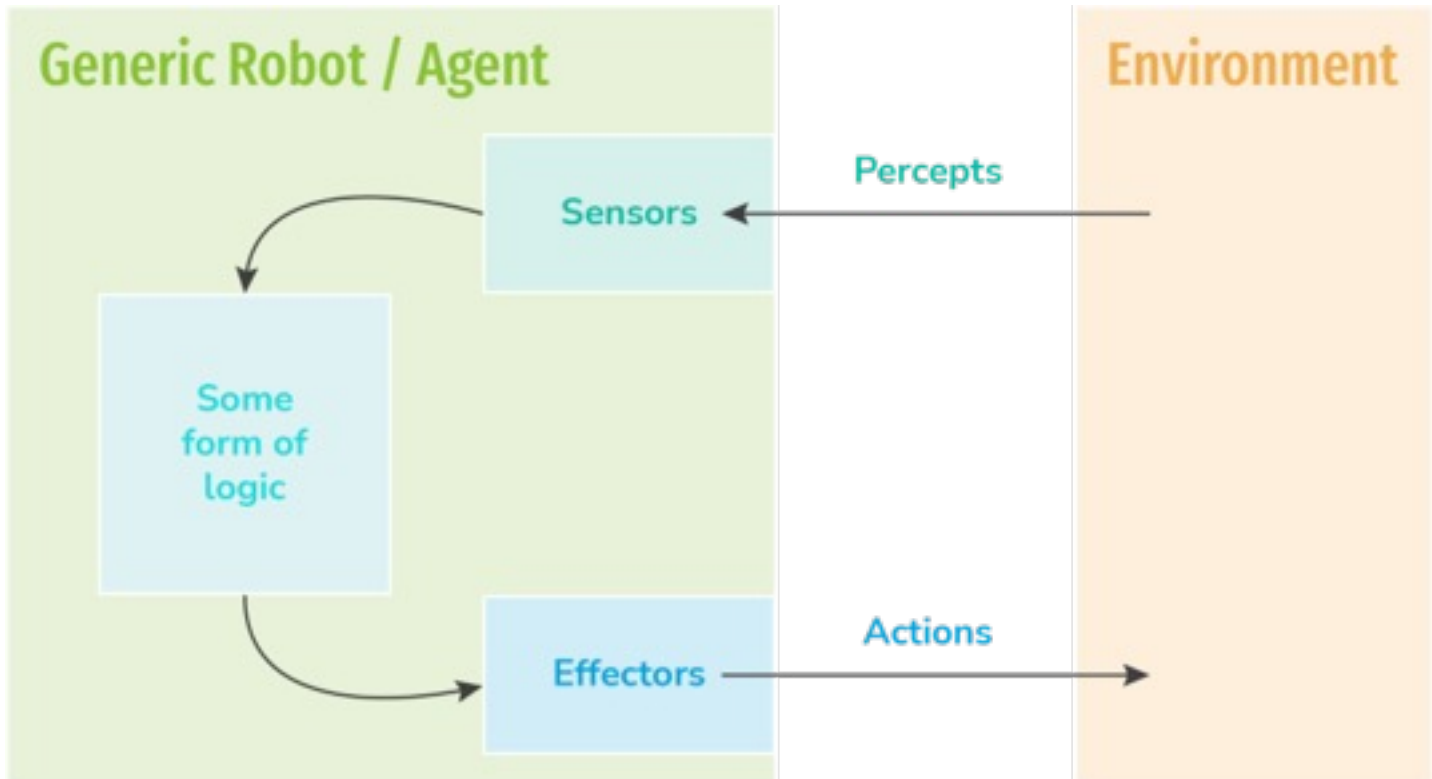
2017
ALPHAGO
Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number (2^{170}) of possible positions

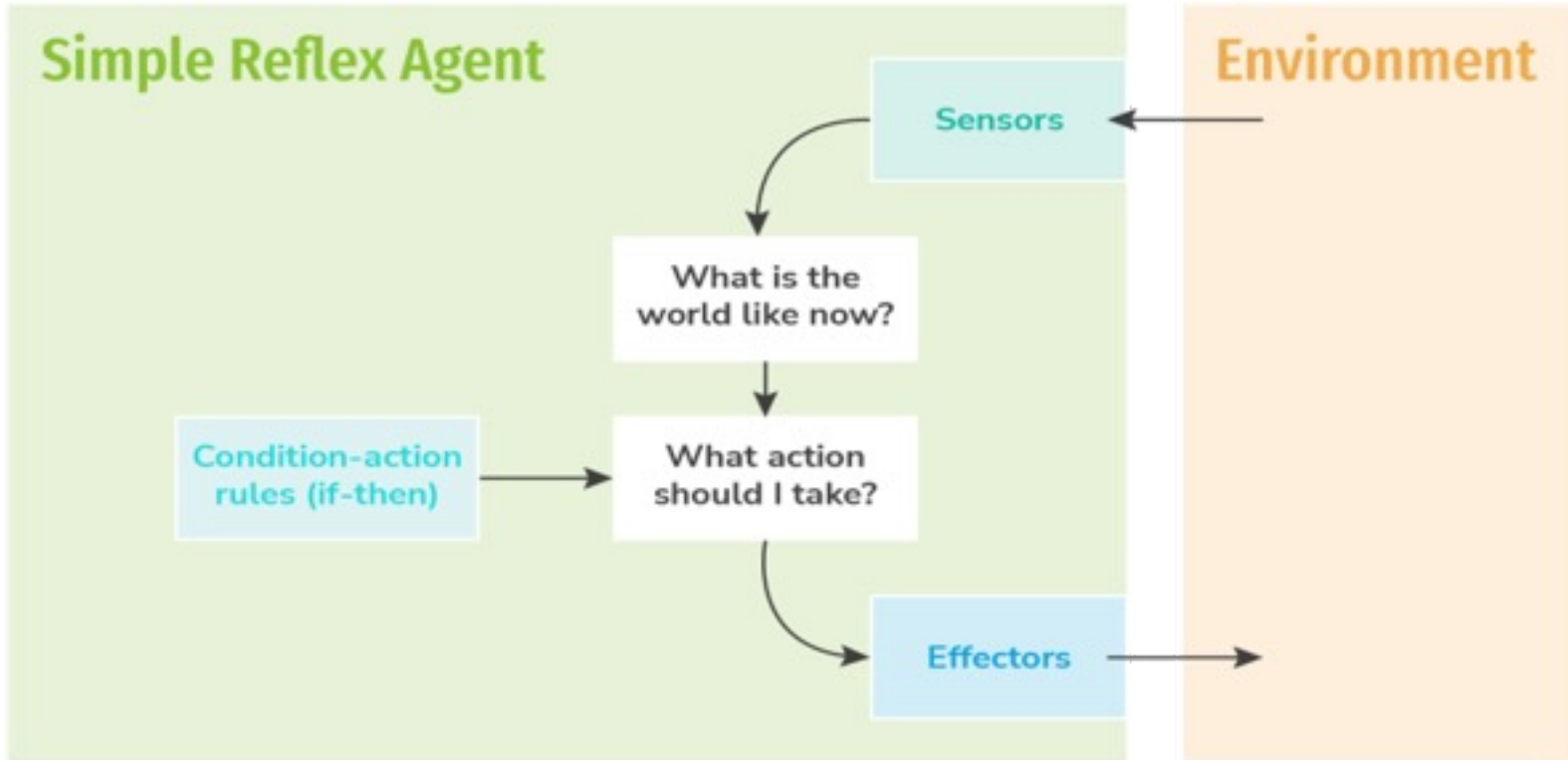

Purpose
Identity
Values
Capabilities
Behaviours
Environment

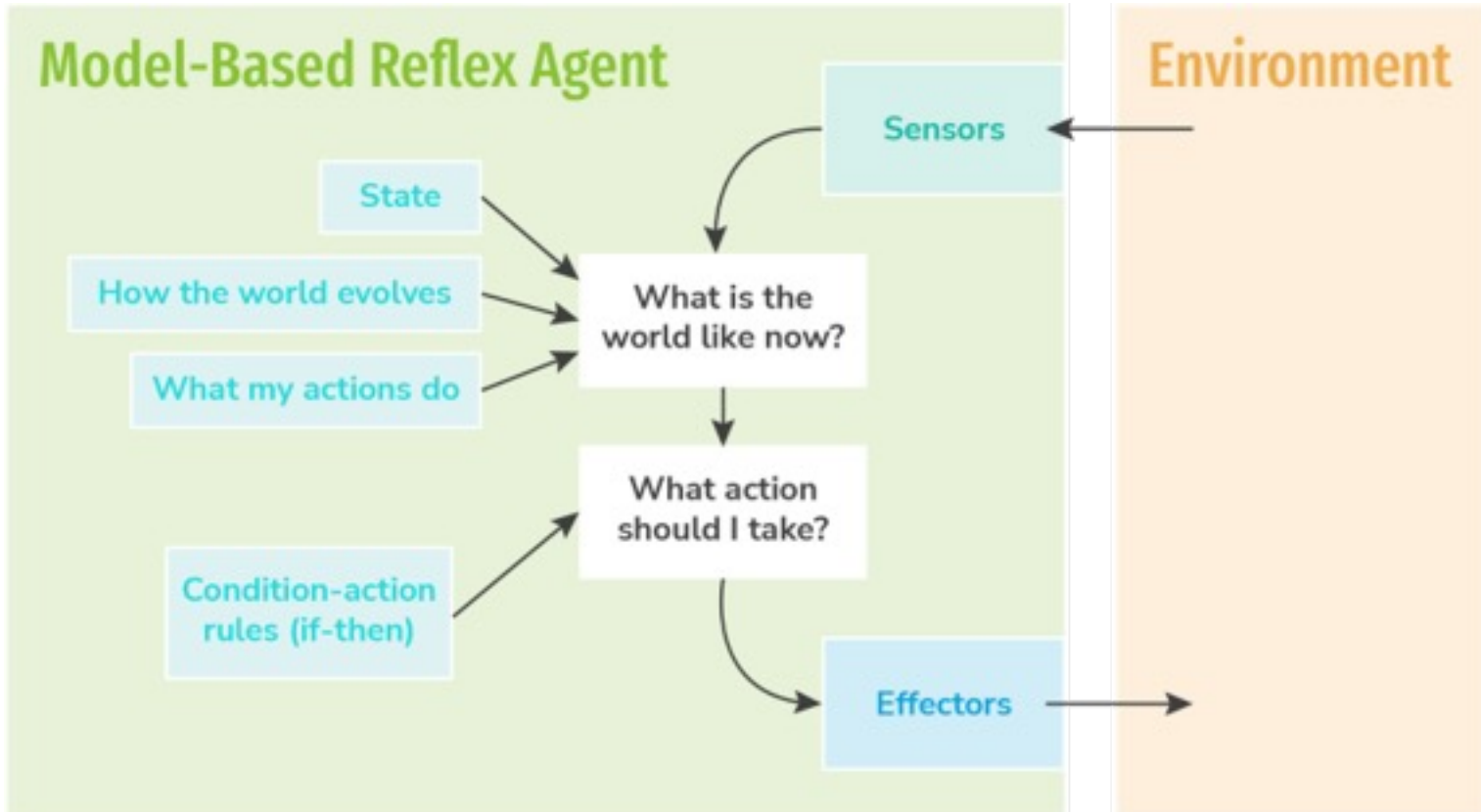

Information Retrieval
Doc A
Doc 1
Doc 2
Doc 3
Sentiment Analysis
Information Extraction
Machine Translation
Natural Language Processing
QuestionAnswering
Human: When was Apollo sent to space?
Machine: First flight - AS-201, February 26, 1966

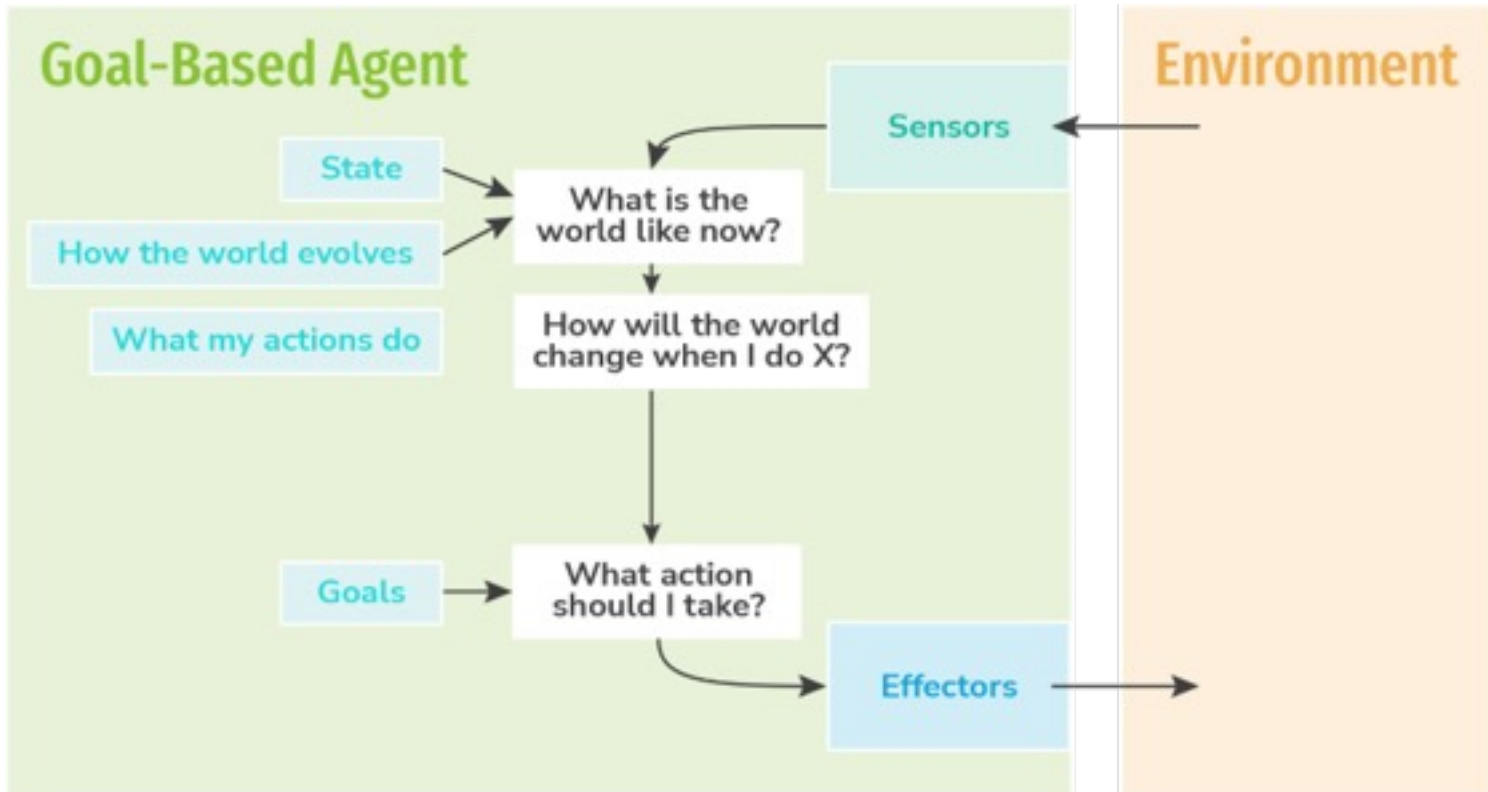

Wireless Communication
Park Assistance
Surround View
Rear Collision
Warning
Surround View
Long-Range Radar
Blind Spot
Detection
Traffic Sign
Recognition
Short-Range Radar
Park Assist
Surround View
Cross Traffic Alert
Emergency Braking
Pedestrian Detection
Collision Avoidance
Lane Departure
Warning
Adaptive
Cruise
Control
Camera
LIDAR
Ultra Sound

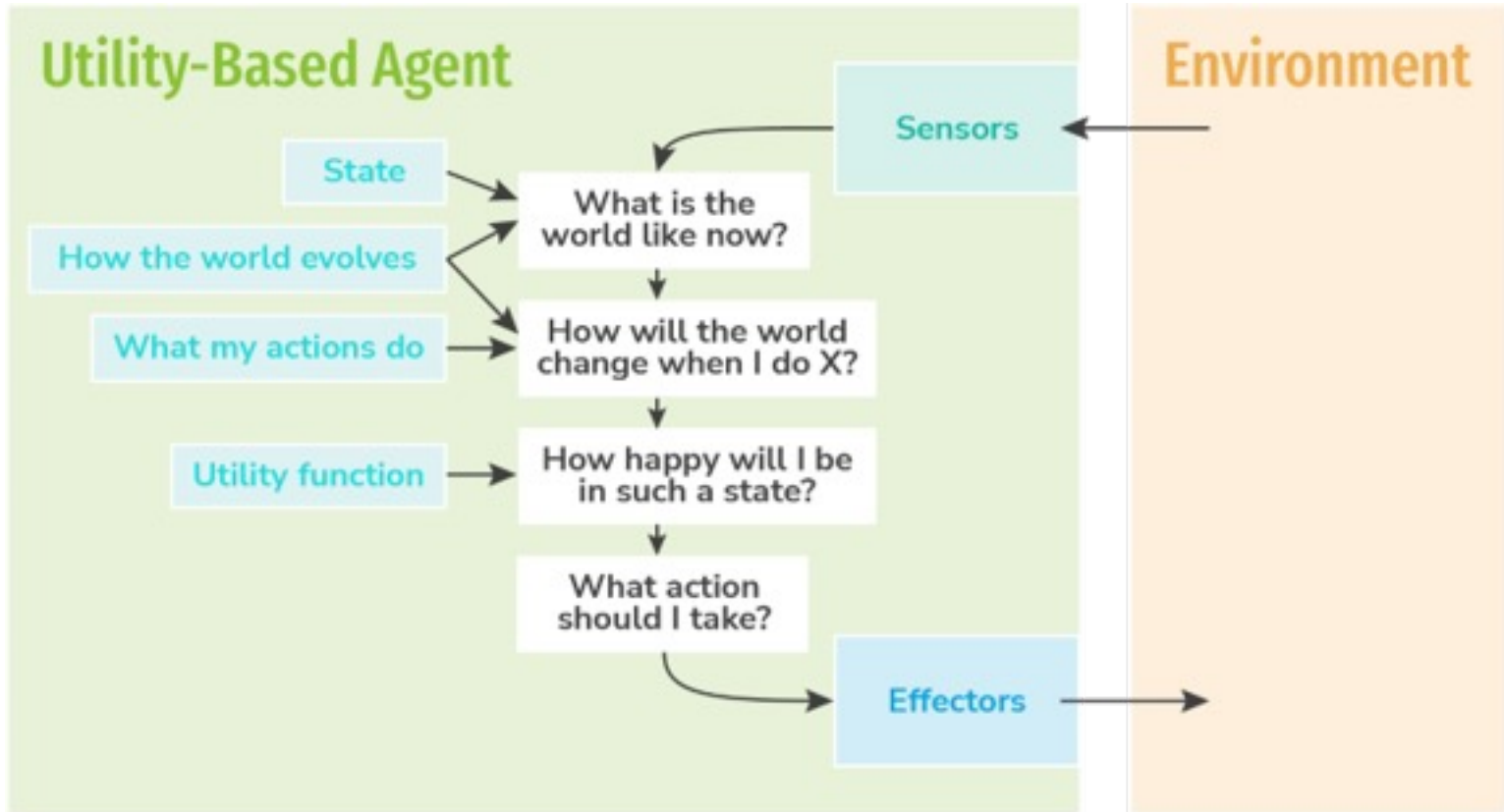

INDUSTRIAL REVOLUTION
TRANSFORMING INDUSTRIES AND INNOVATION
INDUSTRY 1.0
Mechanization, steam power, weaving loom
INDUSTRY 2.0
Mass production, assembly line, electrical energy
INDUSTRY 3.0
Automation, computers and electronics
INDUSTRY 4.0
Cyber Physical Systems, internet of things, networks
1784
1870
1969
TODAY

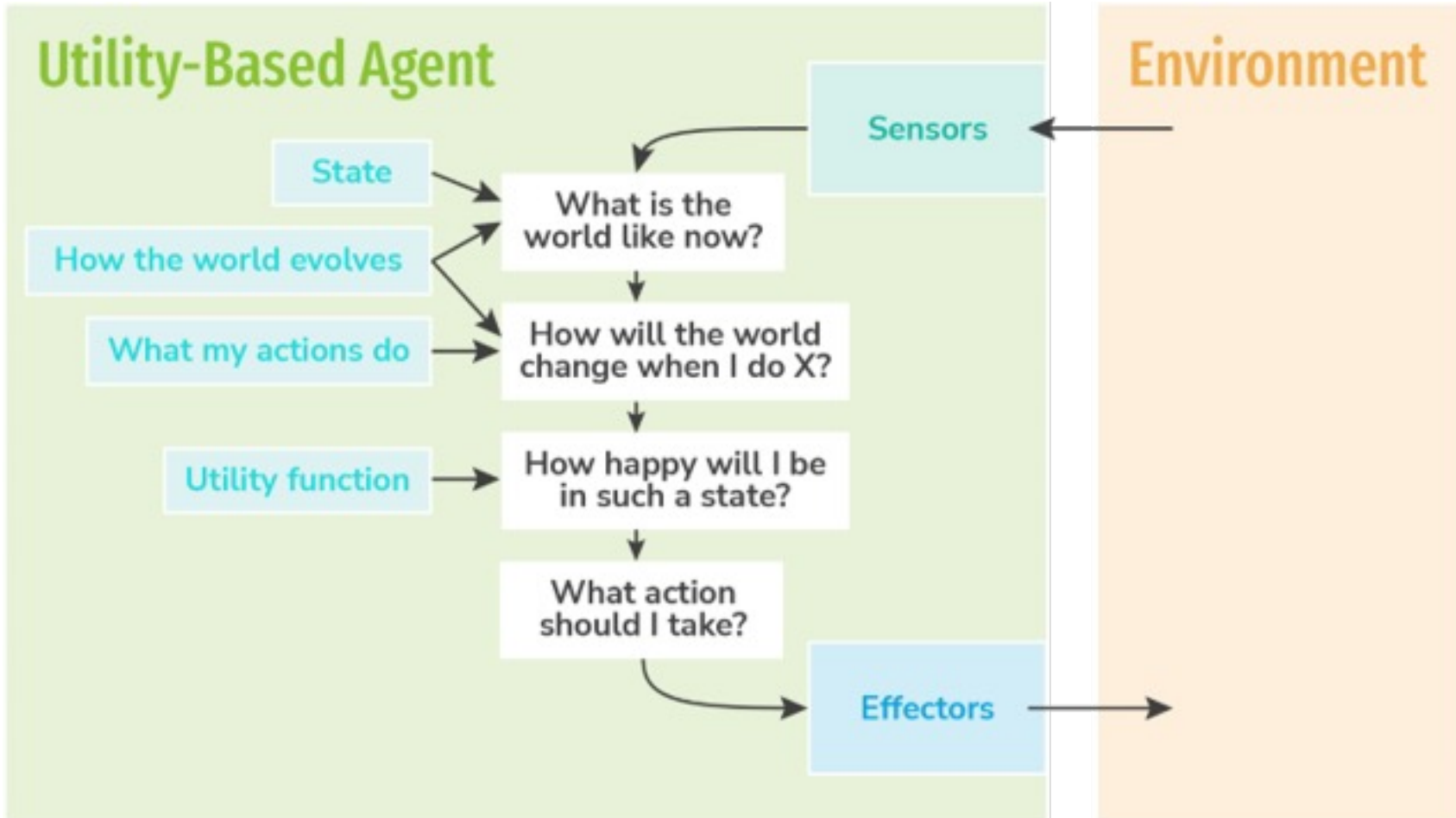

Generic Robot / Agent
Environment
Percepts
Sensors
Some form of logic
Actions
Effectors

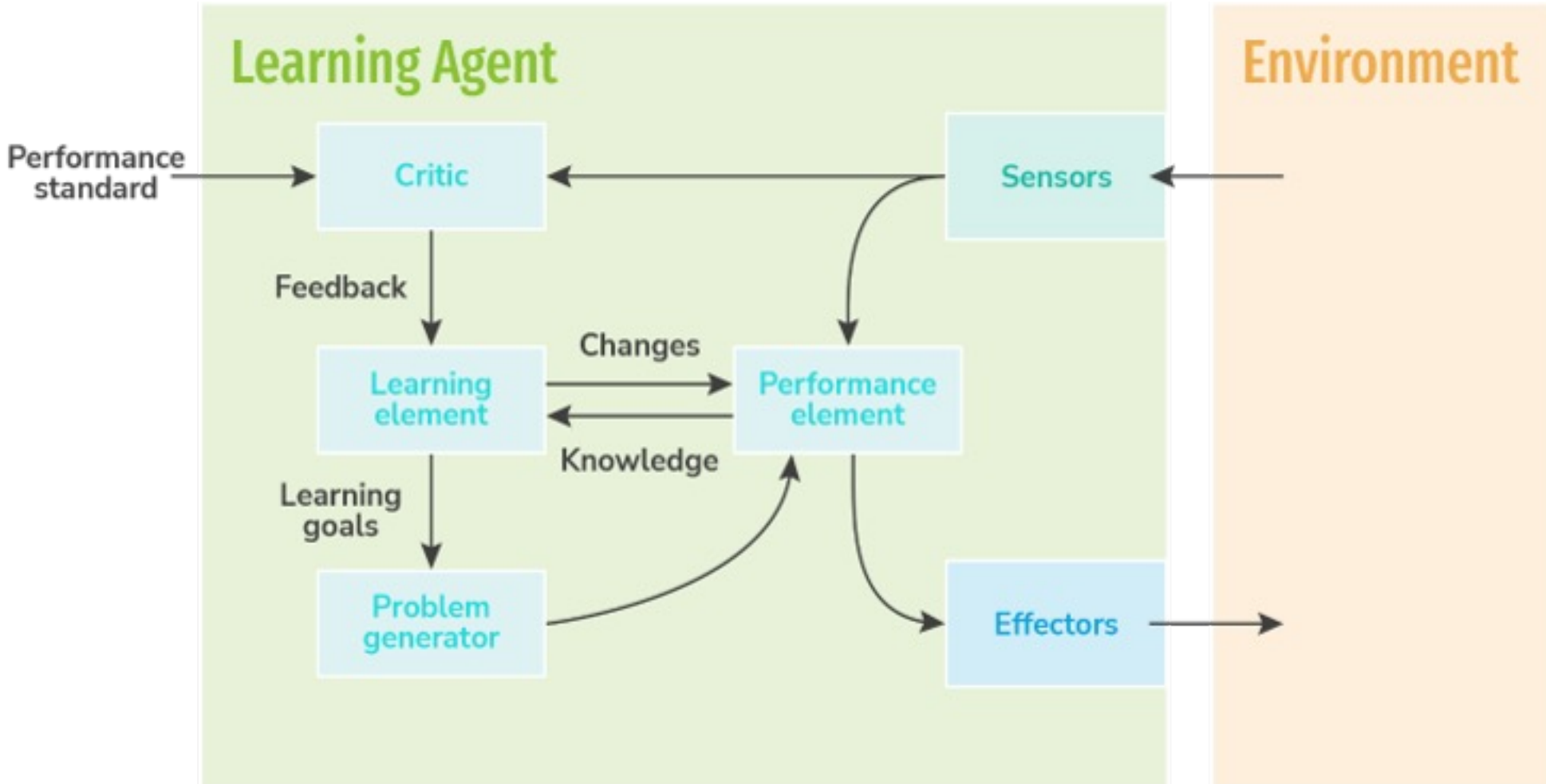

Simple Reflex Agent
Environment
Sensors
What is the world like now?
Condition-action rules (if-then)
What action should I take?
Effectors

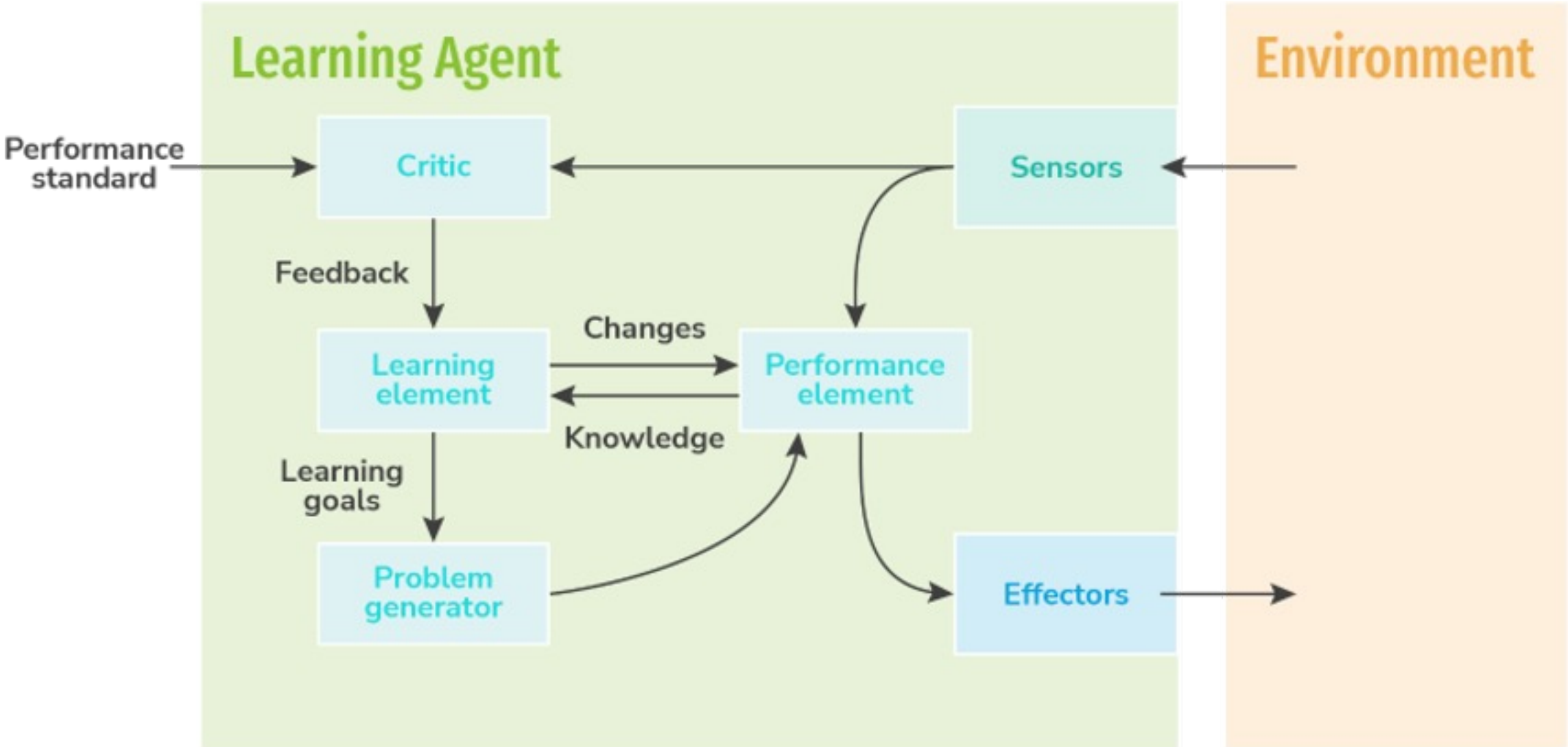

Model-Based Reflex Agent
Environment
Sensors
State
How the world evolves
What my actions do
What is the world like now?
What action should I take?
Condition-action rules (if-then)
Effectors

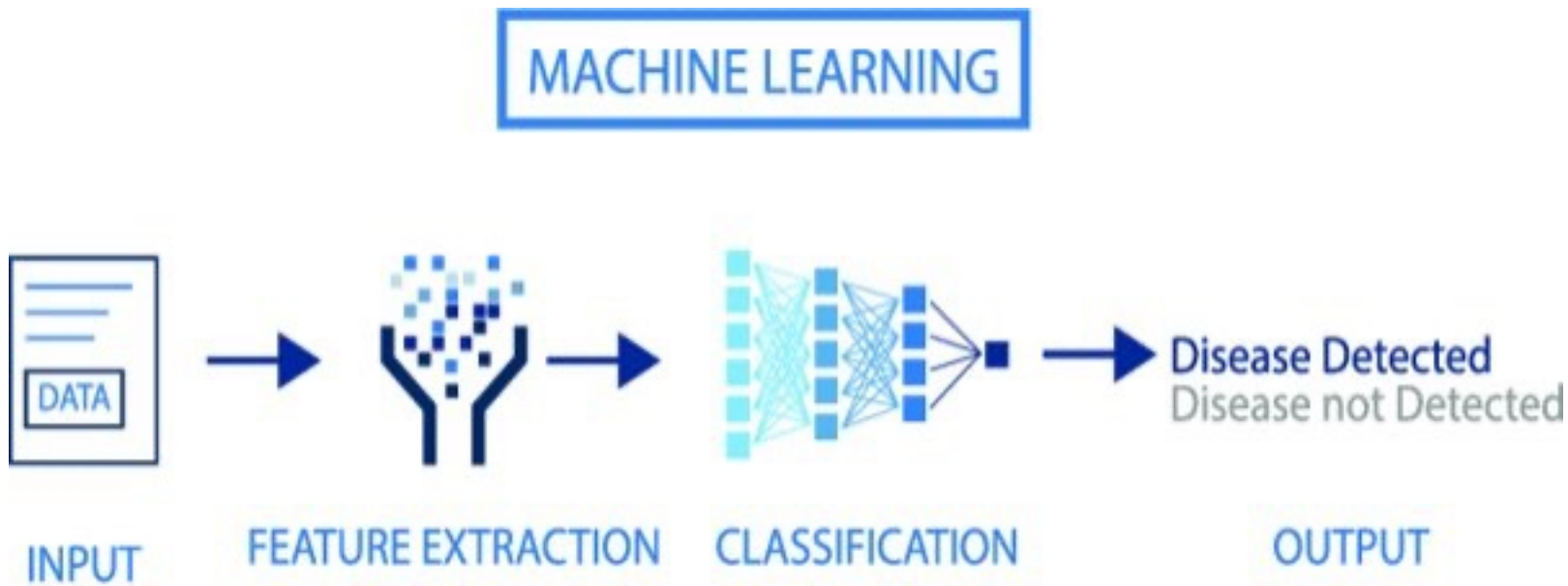

Goal-Based Agent
Environment
Sensors
State
How the world evolves
What my actions do
What is the world like now?
How will the world change when I do X?
Goals
What action should I take?
Effectors

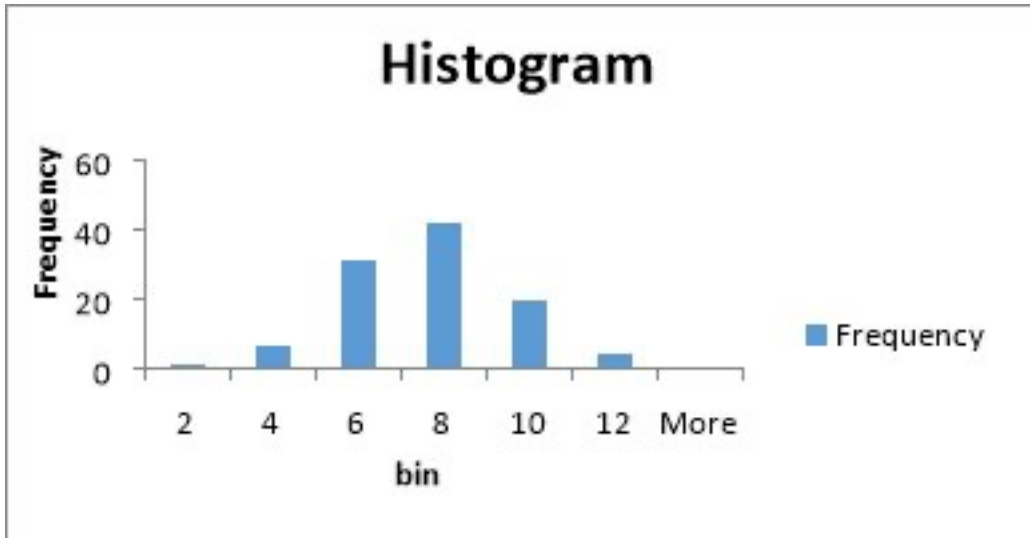

Utility-Based Agent
Environment
Sensors
State
How the world evolves
What my actions do
What is the world like now?
How will the world change when I do X?
Utility function
How happy will I be in such a state?
What action should I take?
Effectors

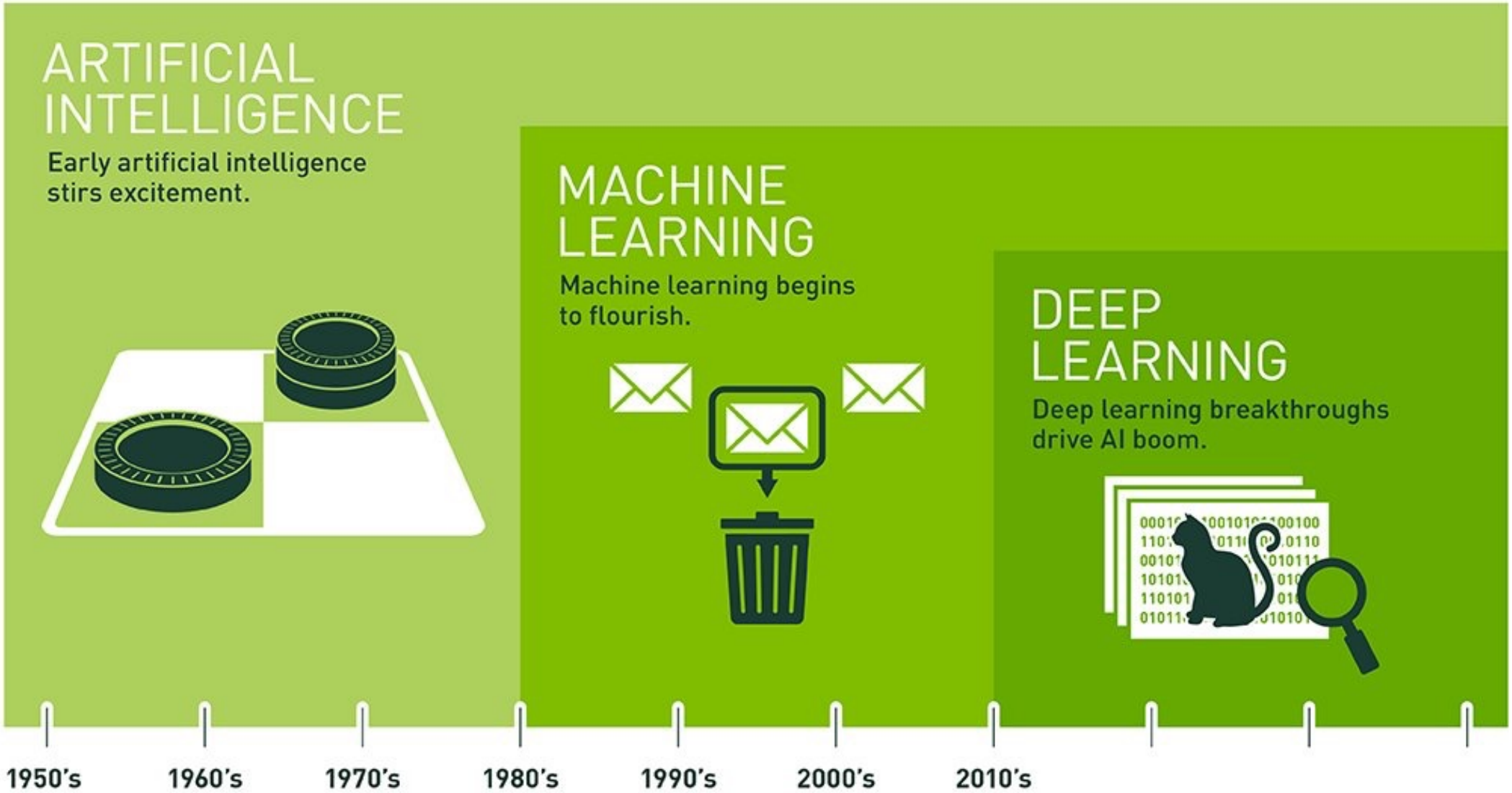

Utility-Based Agent
Environment
Sensors
State
How the world evolves
What my actions do
Utility function
What is the world like now?
How will the world change when I do X?
How happy will I be in such a state?
What action should I take?
Effectors


Learning Agent
Environment
Performance standard
Critic
Sensors
Feedback
Changes
Learning element
Performance element
Knowledge
Learning goals
Problem generator
Effectors


Learning Agent
Environment
Performance standard
Critic
Sensors
Feedback
Changes
Learning element
Performance element
Knowledge
Learning goals
Problem generator
Effectors


MACHINE LEARNING
DATA
Disease Detected
Disease not Detected
INPUT
FEATURE EXTRACTION
CLASSIFICATION
OUTPUT


Histogram
Frequency
60
40
20
0
2
4
6
8
10
12
More
bin
Frequency



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Machine Learning

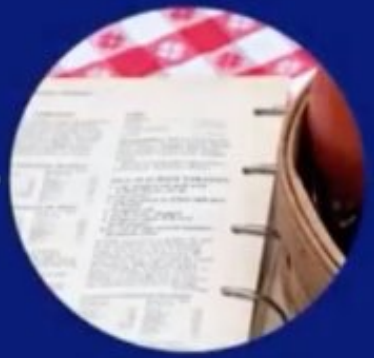
Data

Ingredients

Algorithms

Appliances

Models



Recipes

Predictions

Dishes

(2) Data

What ingredients shall we use?

(3) Algorithms

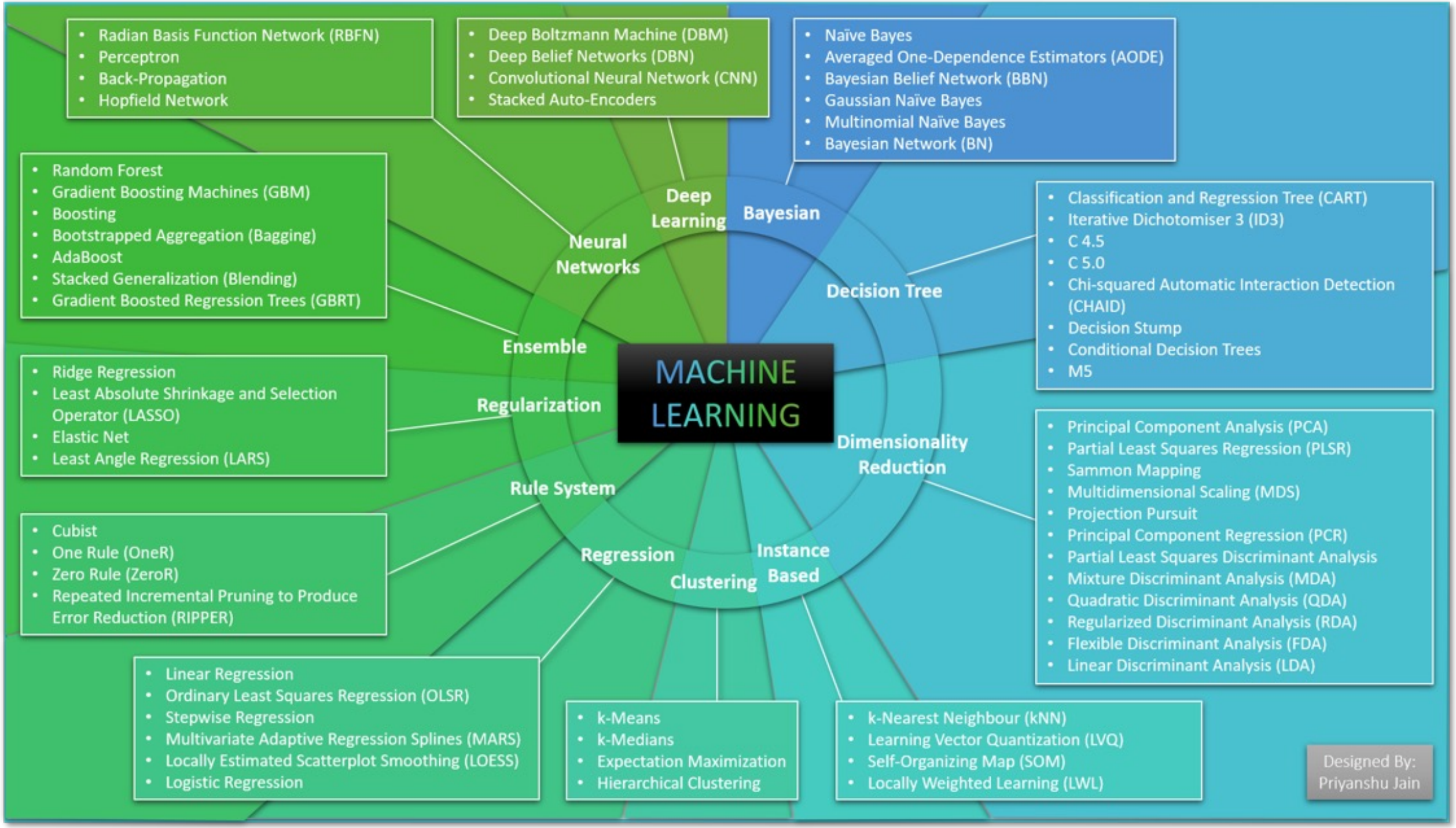
What can we do with our ingredients?

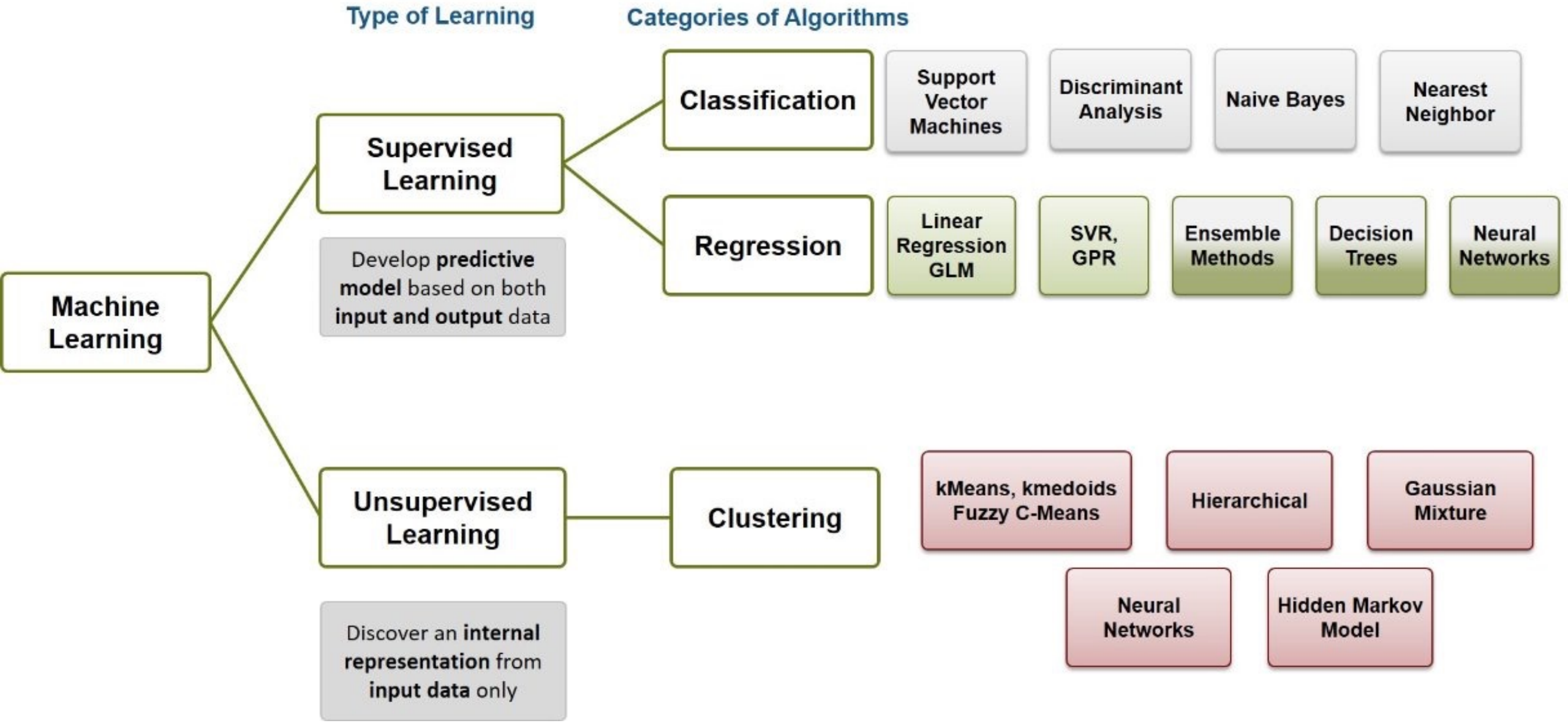
(4) Models

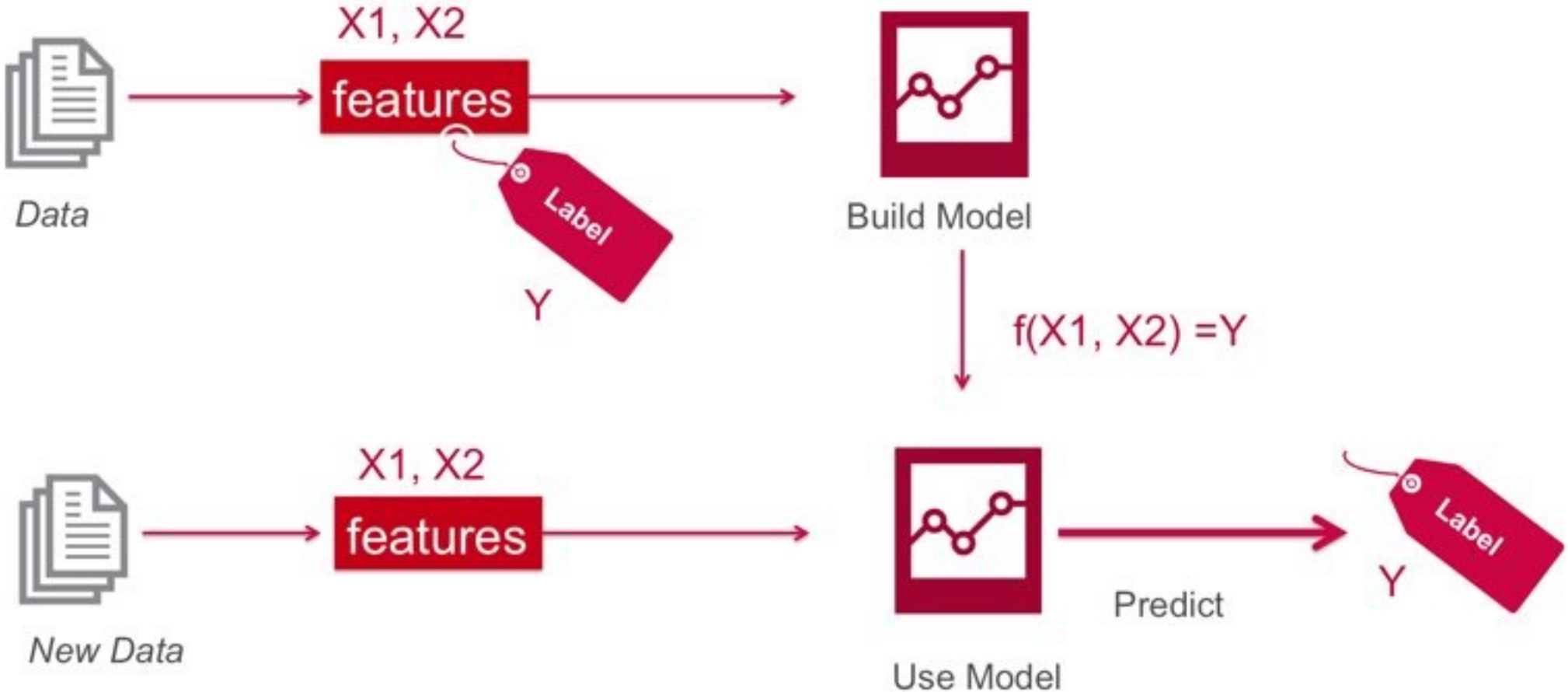
Shall we serve this new recipe?

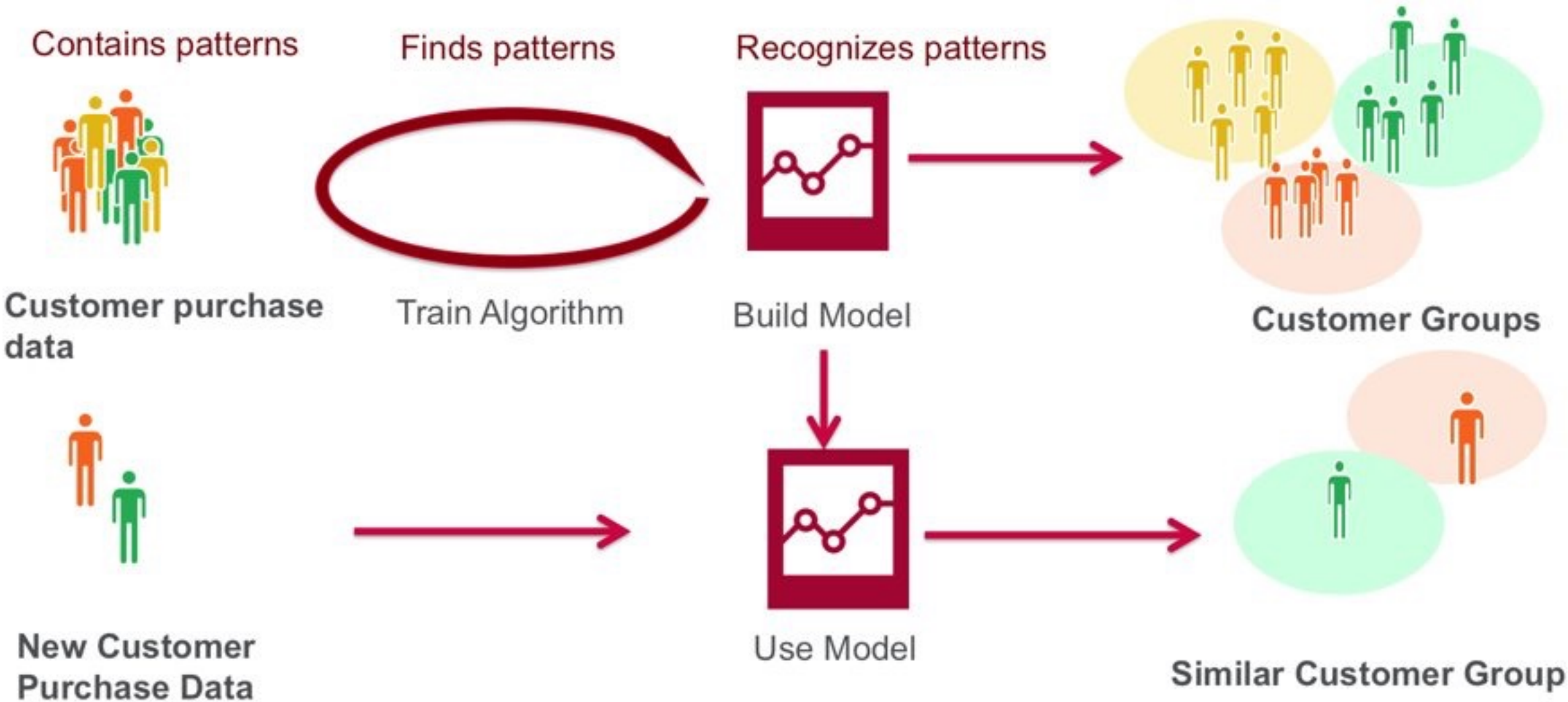
(1) Predictions

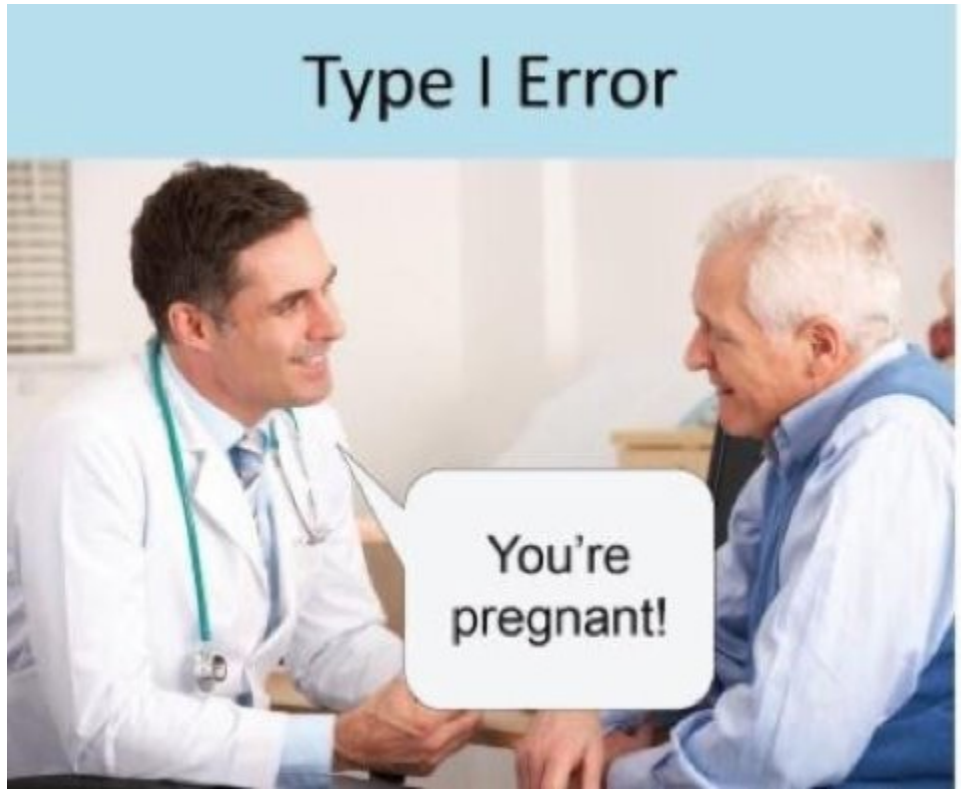
What kinds of dishes are worth serving?


MACHINE LEARNING
Deep Learning
Neural Networks
Bayesian
Decision Tree
Ensemble
Regularization
Dimensionality Reduction
Rule System
Regression
Clustering
Instance Based
Radian Basis Function Network (RBFN)
Perceptron
Back-Propagation
Hopfield Network
Deep Boltzmann Machine (DBM)
Deep Belief Networks (DBN)
Convolutional Neural Network (CNN)
Stacked Auto-Encoders
Naïve Bayes
Averaged One-Dependence Estimators (AODE)
Bayesian Belief Network (BBN)
Gaussian Naïve Bayes
Multinomial Naïve Bayes
Bayesian Network (BN)
Random Forest
Gradient Boosting Machines (GBM)
Boosting
Bootstrapped Aggregation (Bagging)
AdaBoost
Stacked Generalization (Blending)
Gradient Boosted Regression Trees (GBRT)
Classification and Regression Tree (CART)
Iterative Dichotomiser 3 (ID3)
C 4.5
C 5.0
Chi-squared Automatic Interaction Detection (CHAID)
Decision Stump
Conditional Decision Trees
M5
Ridge Regression
Least Absolute Shrinkage and Selection Operator (LASSO)
Elastic Net
Least Angle Regression (LARS)
Principal Component Analysis (PCA)
Partial Least Squares Regression (PLSR)
Sammon Mapping
Multidimensional Scaling (MDS)
Projection Pursuit
Principal Component Regression (PCR)
Partial Least Squares Discriminant Analysis
Mixture Discriminant Analysis (MDA)
Quadratic Discriminant Analysis (QDA)
Regularized Discriminant Analysis (RDA)
Flexible Discriminant Analysis (FDA)
Linear Discriminant Analysis (LDA)
Cubist
One Rule (OneR)
Zero Rule (ZeroR)
Repeated Incremental Pruning to Produce Error Reduction (RIPPER)
Linear Regression
Ordinary Least Squares Regression (OLSR)
Stepwise Regression
Multivariate Adaptive Regression Splines (MARS)
Locally Estimated Scatterplot Smoothing (LOESS)
Logistic Regression
k-Means
k-Medians
Expectation Maximization
Hierarchical Clustering
k-Nearest Neighbour (kNN)
Learning Vector Quantization (LVQ)
Self-Organizing Map (SOM)
Locally Weighted Learning (LWL)
Designed By:
Priyanshu Jain

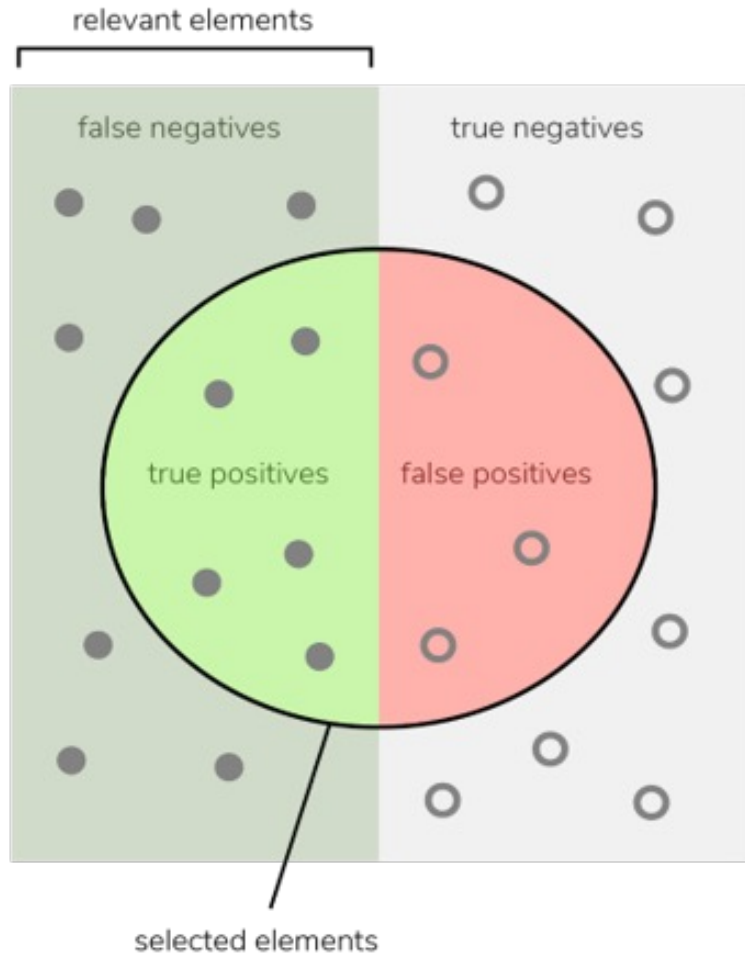

Type of Learning
Categories of Algorithms
Machine Learning
Supervised Learning
Develop predictive model based on both input and output data
Classification
Support Vector Machines
Discriminant Analysis
Naive Bayes
Nearest Neighbor
Regression
Linear Regression GLM
SVR, GPR
Ensemble Methods
Decision Trees
Neural Networks
Unsupervised Learning
Discover an internal representation from input data only
Clustering
kMeans, kmedoids Fuzzy C-Means
Hierarchical
Gaussian Mixture
Neural Networks
Hidden Markov Model


X1, X2
features
Label
Y
Data
Build Model
f(X1, X2) =Y
X1, X2
features
New Data
Use Model
Predict
Label
Y


Contains patterns
Finds patterns
Recognizes patterns
Customer purchase data
Train Algorithm
Build Model
Customer Groups
New Customer Purchase Data
Use Model
Similar Customer Group


Type I Error
You're pregnant!


Type II Error
You're not pregnant!

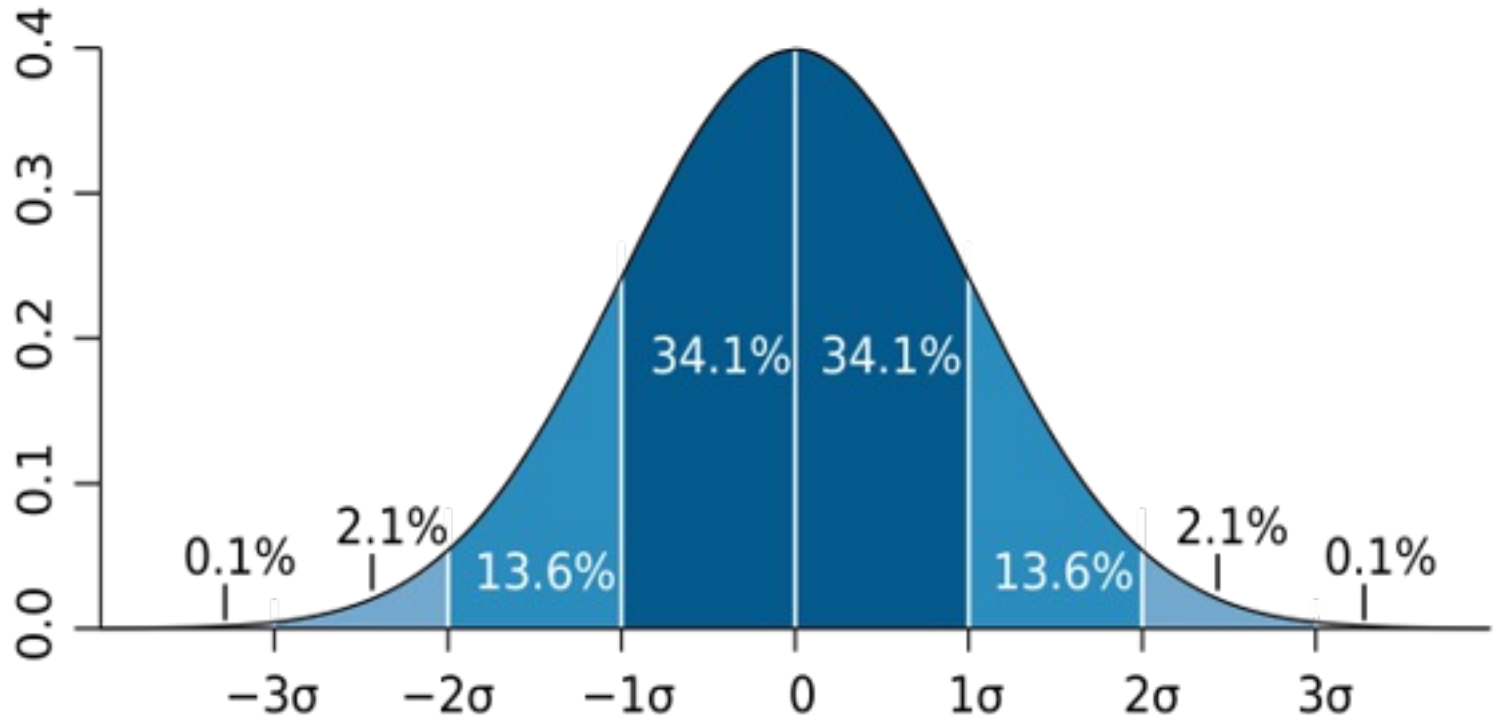


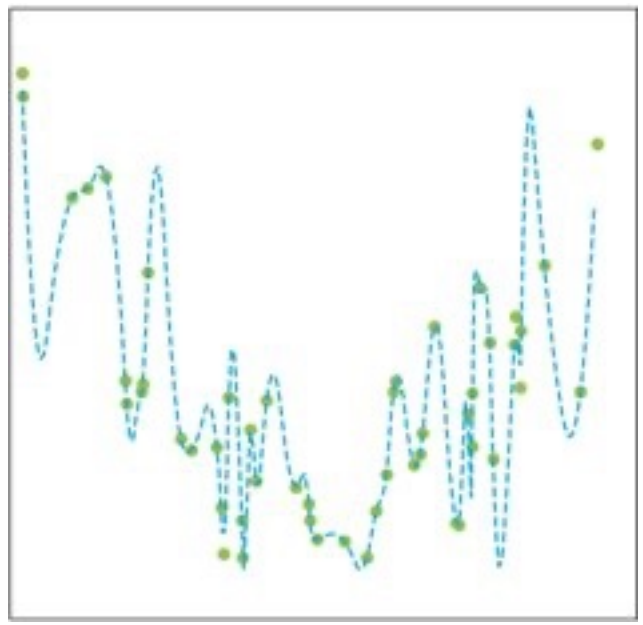
How many selected items are relevant?

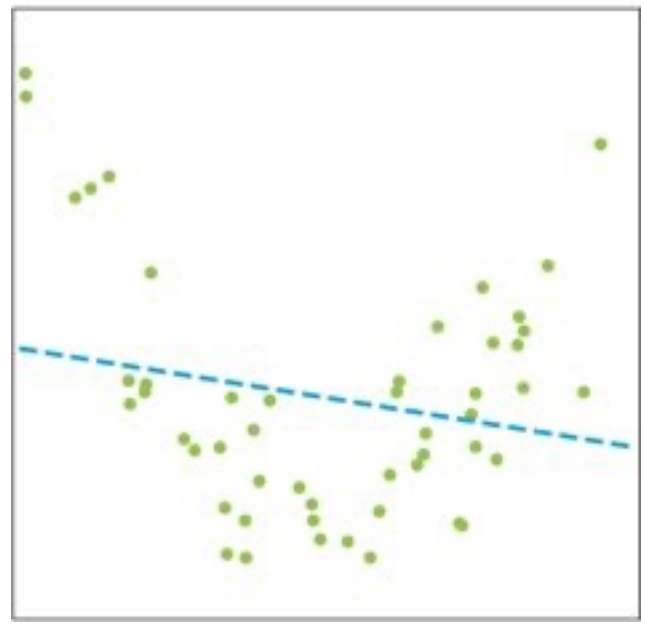
Precision = $\frac{\text{true positives}}{\text{selected elements}}$

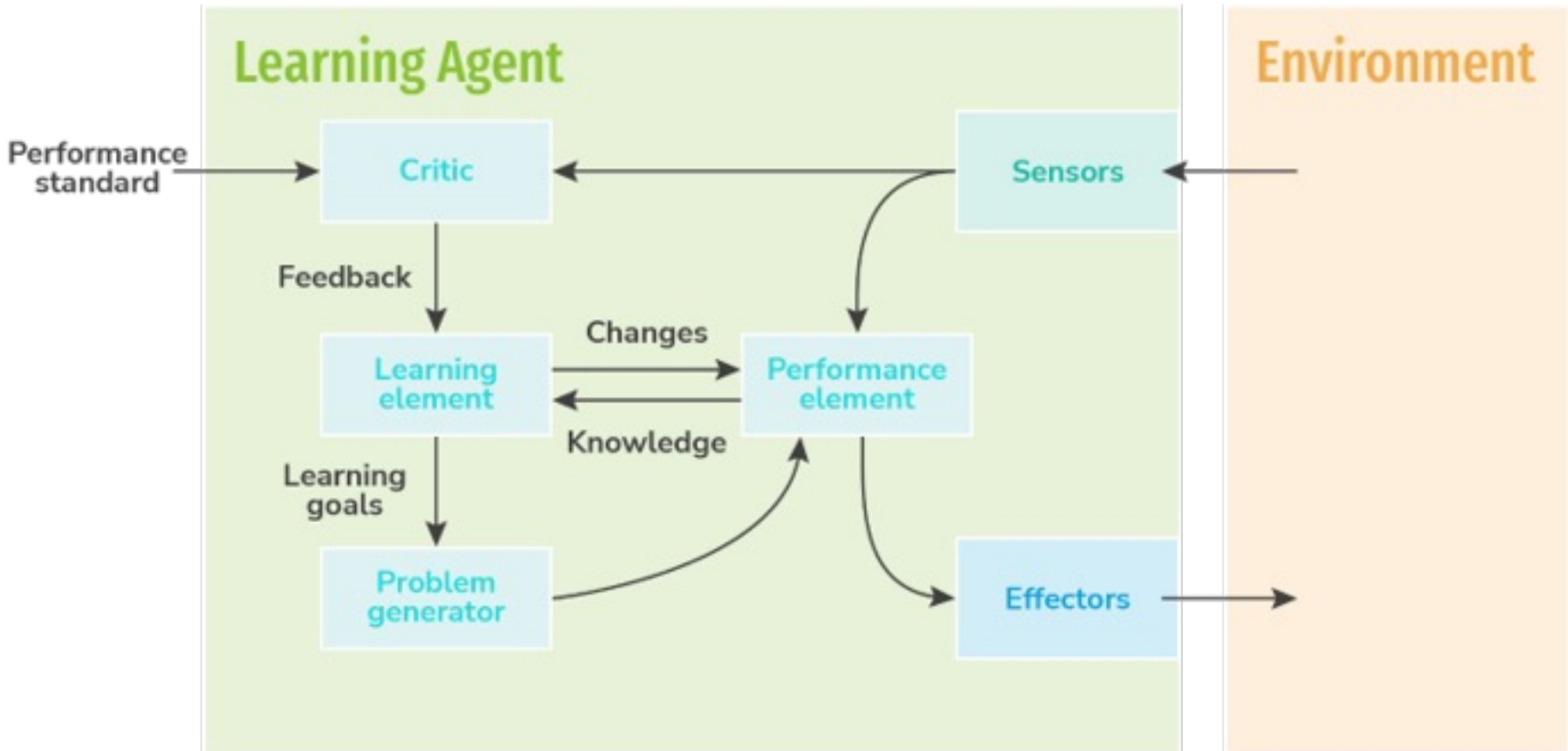
How many relevant items are selected?

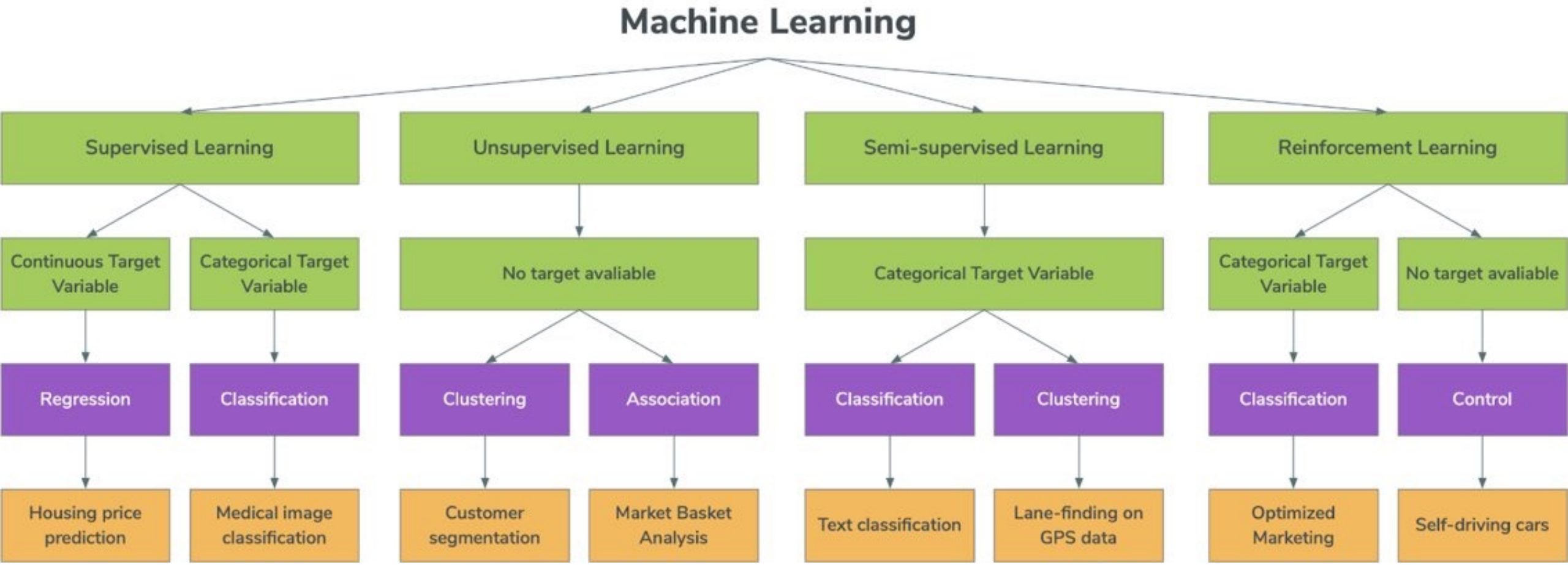
Recall = $\frac{\text{true positives}}{\text{relevant elements}}$

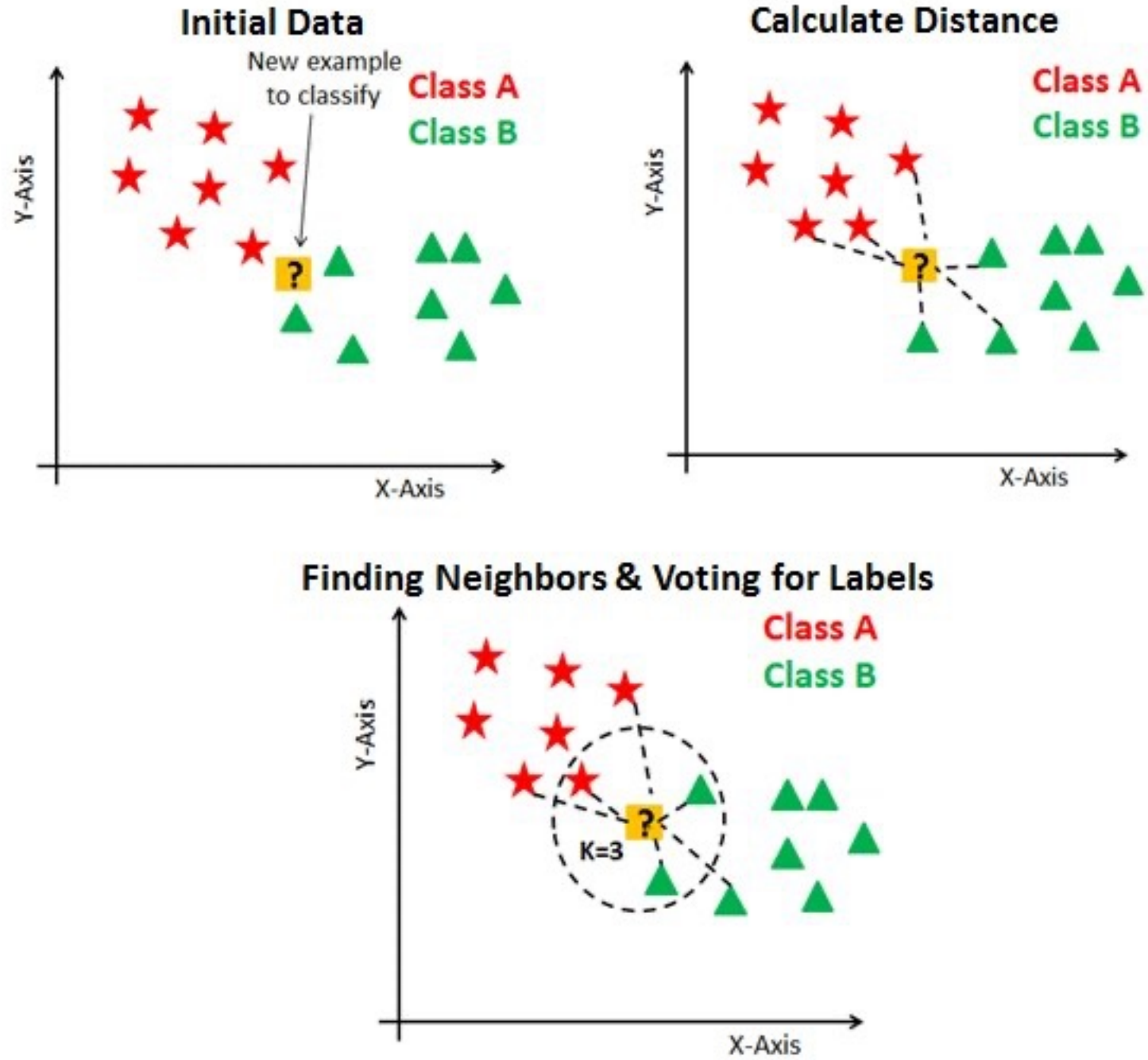

0.0
0.1
0.2
0.3
0.4
0.1%
2.1%
13.6%
34.1%
34.1%
13.6%
2.1%
0.1%
−3σ
−2σ
−1σ
0
1σ
2σ
3σ

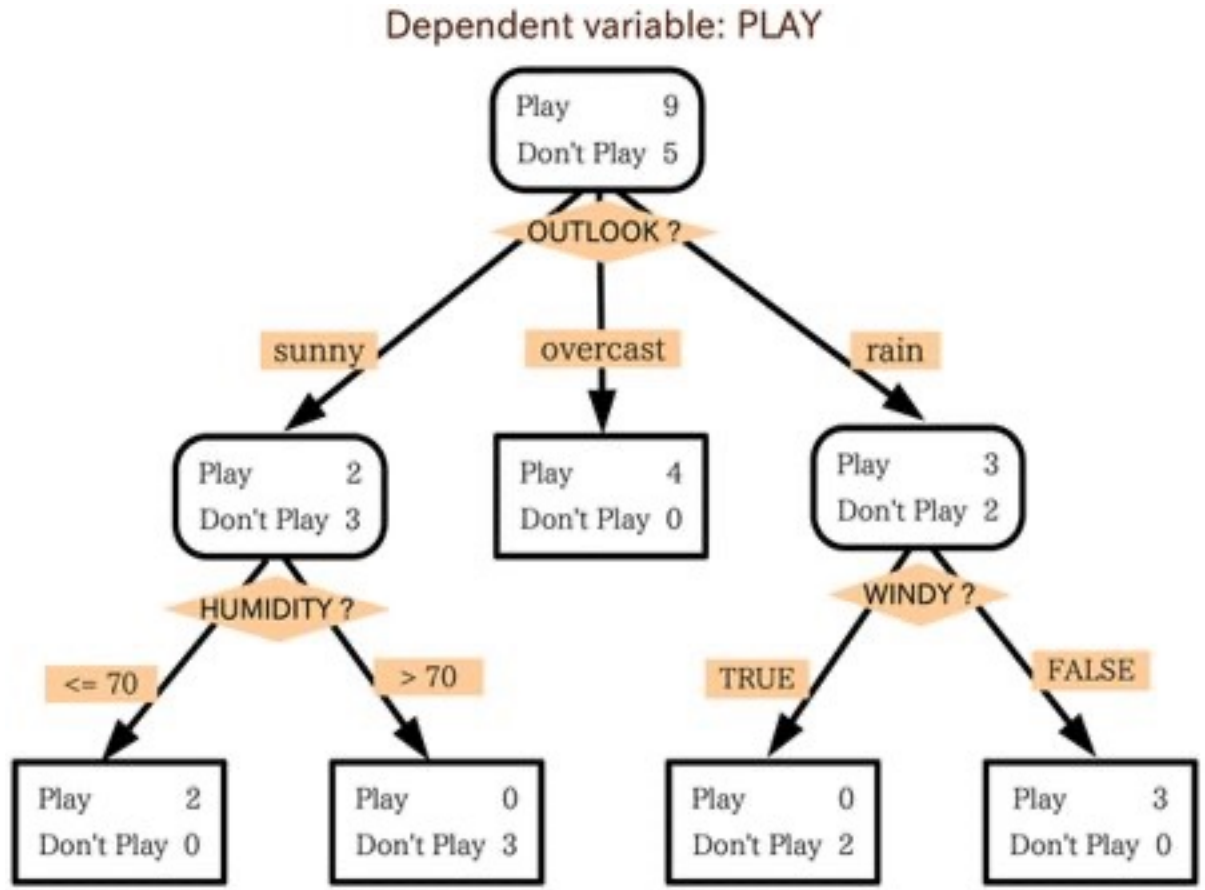


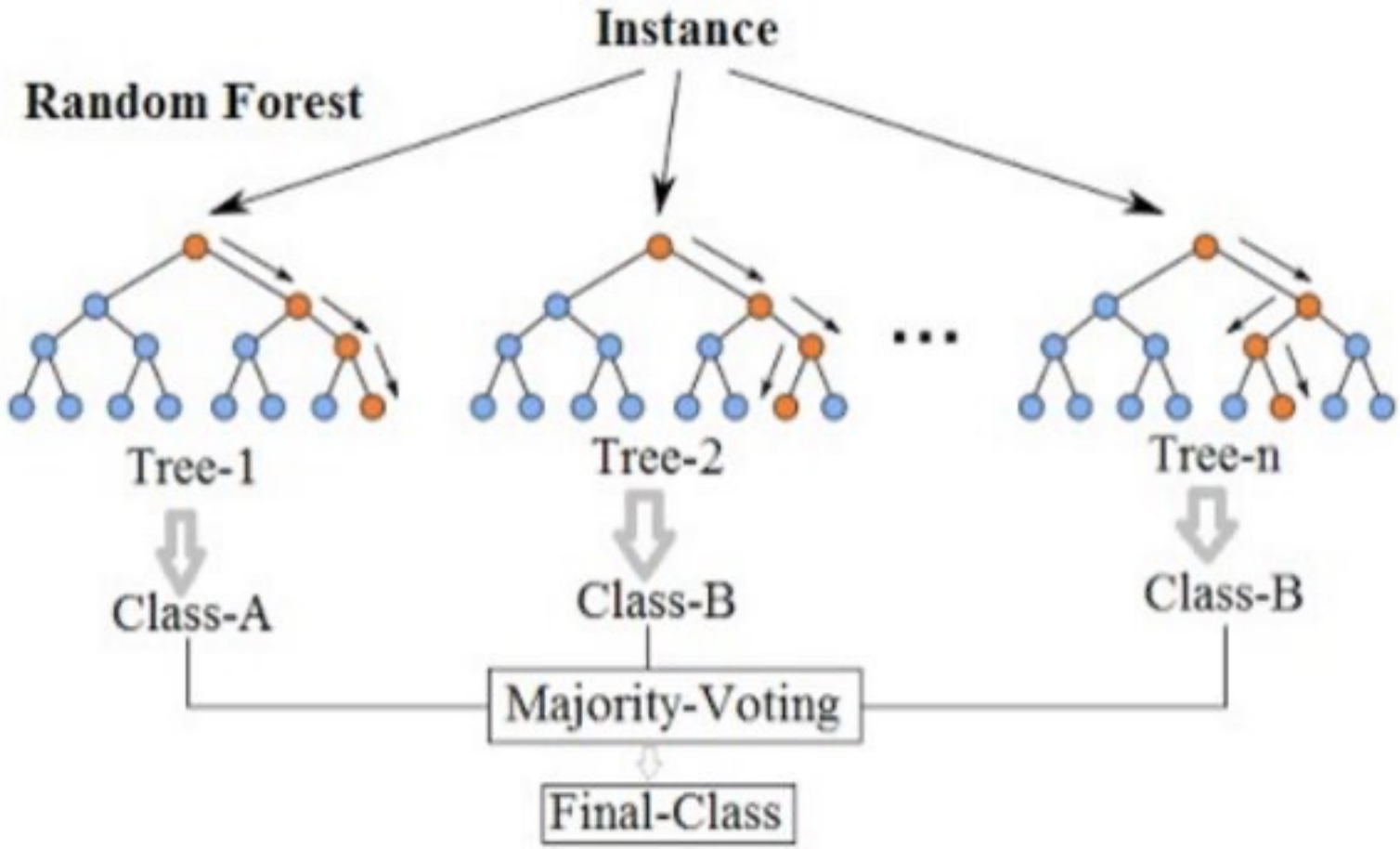



Learning Agent
Environment
Performance standard
Critic
Sensors
Feedback
Changes
Learning element
Performance element
Knowledge
Learning goals
Problem generator
Effectors

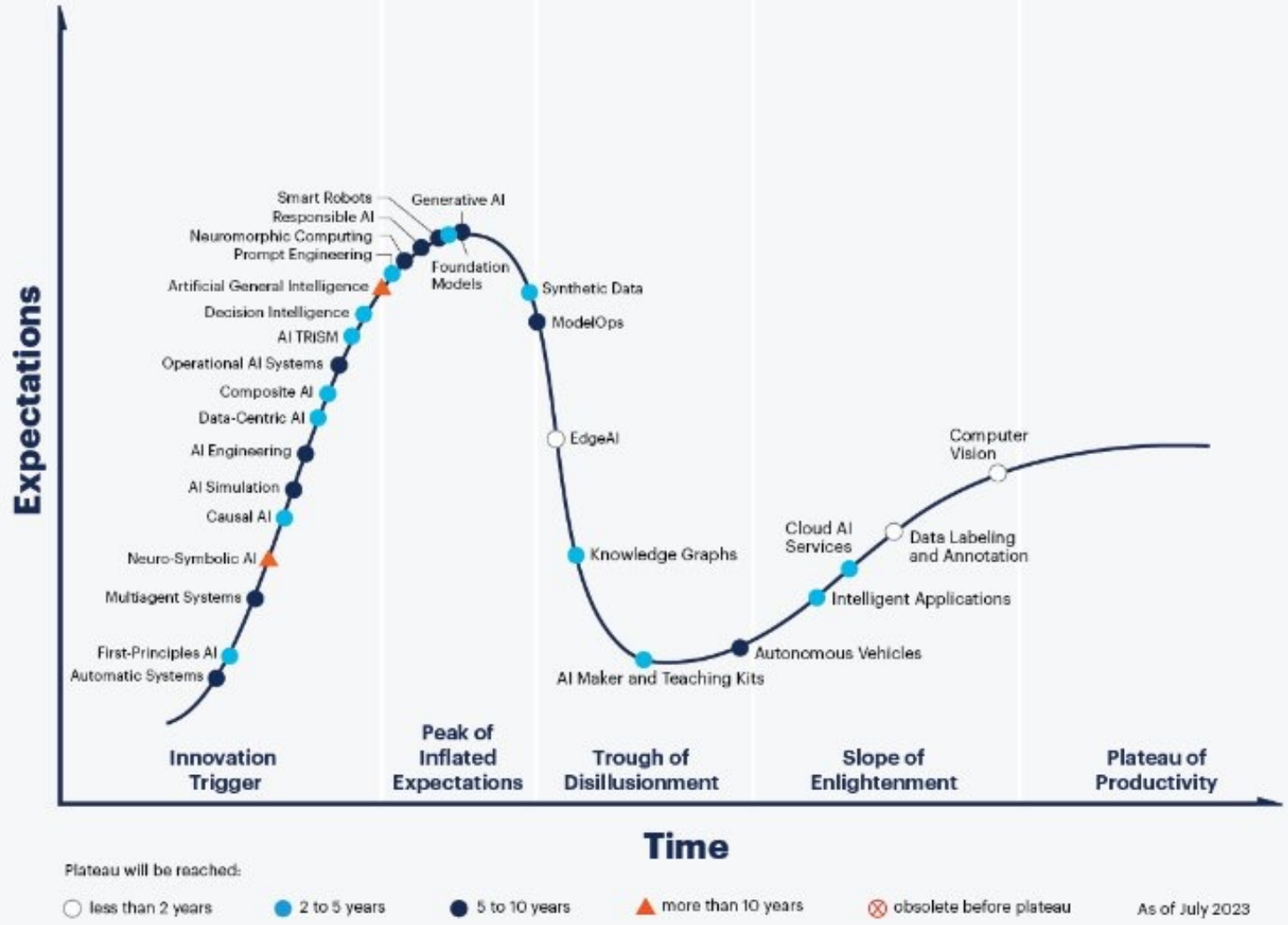

Machine Learning
Supervised Learning
Unsupervised Learning
Semi-supervised Learning
Reinforcement Learning
Continuous Target Variable
Categorical Target Variable
No target avaliable
Categorical Target Variable
Categorical Target Variable
No target avaliable
Regression
Classification
Clustering
Association
Classification
Clustering
Classification
Control
Housing price prediction
Medical image classification
Customer segmentation
Market Basket Analysis
Text classification
Lane-finding on GPS data
Optimized Marketing
Self-driving cars


Initial Data
New example
to classify
Class A
Class B
Y-Axis
X-Axis
?
Calculate Distance
Class A
Class B
Y-Axis
X-Axis
?
Finding Neighbors & Voting for Labels
Class A
Class B
Y-Axis
X-Axis
?
K=3


Dependent variable: PLAY
Play 9
Don't Play 5
OUTLOOK ?
sunny
overcast
rain
Play 2
Don't Play 3
Play 4
Don't Play 0
Play 3
Don't Play 2
HUMIDITY ?
WINDY ?
<= 70
> 70
TRUE
FALSE
Play 2
Don't Play 0
Play 0
Don't Play 3
Play 0
Don't Play 2
Play 3
Don't Play 0


Instance
Random Forest
Tree-1
Tree-2
Tree-n
Class-A
Class-B
Class-B
Majority-Voting
Final-Class

Hype Cycle for Artificial Intelligence, 2023

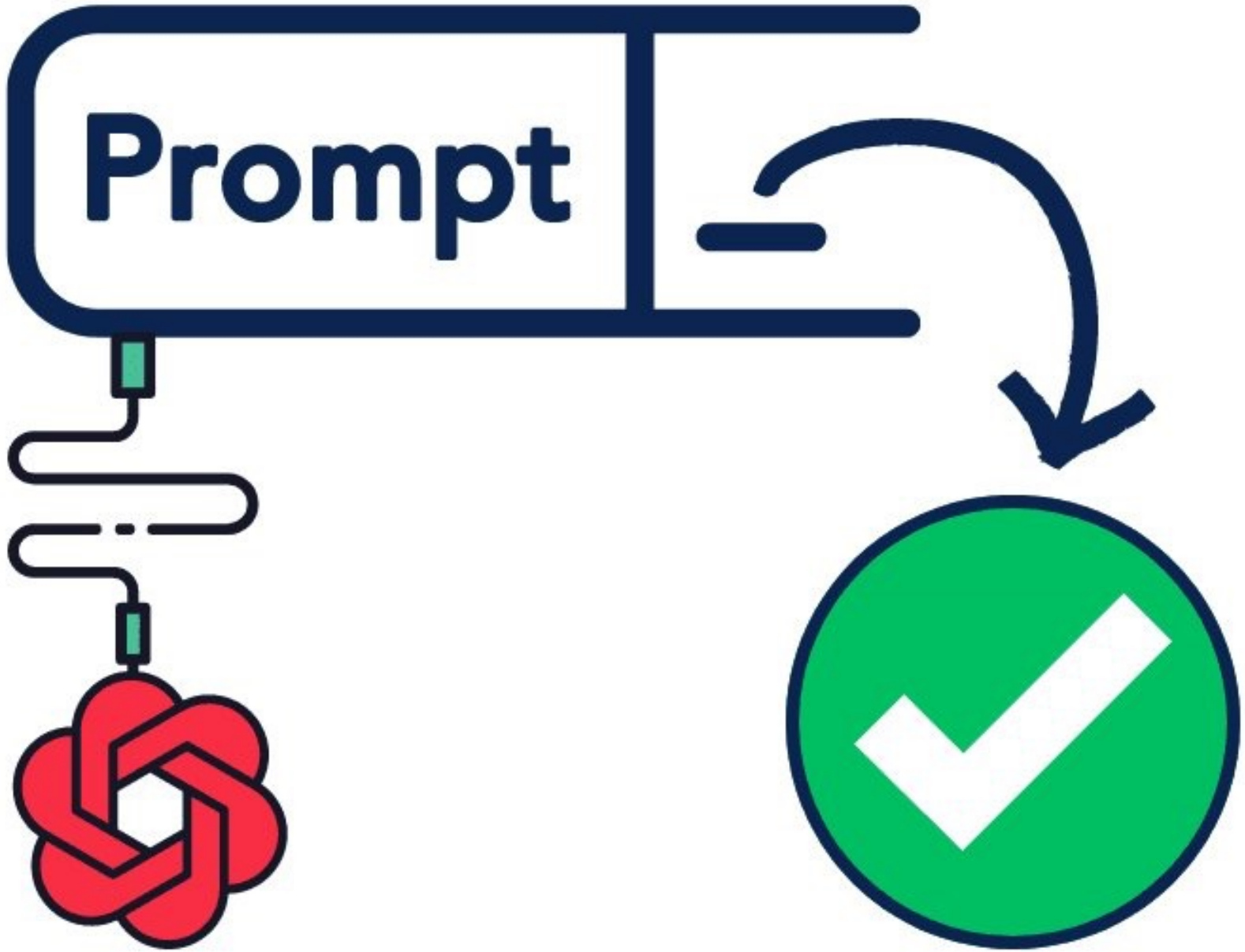


gartner.com

Source: Gartner

Gartner


Business Understanding
Data Understanding
Data Preparation
Modeling
Evaluation
Deployment
Data


Prompt


Human agency and Oversight
Technical robustness and Safety
Privacy and Data Governance
Transparency
Diversity, Non-Discrimination and Fairness
Societal and Environmental wellbeing
Accountability
To be continuously evaluated and addressed throughout the AI system's life cycle


PAL-PAV
PAL-PAV