



MACHINE LEARNING III

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- Reference Books/links
- What is machine learning?
- Types of machine learning
- Differences between Supervised, Unsupervised and Reinforcement Learning
- Use cases to identify the correct type of machine learning to solve the problem

SCHEME OF RL

Program: Third Year B.Tech. in Computer Science and Engineering (Data Science)								Semester: VI		
Course: Machine Learning – III (Reinforcement Learning)								Course Code: DJ19DSC601		
Course: Machine Learning – III Laboratory								Course Code: DJ19DSL601		
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	25
3	2	-	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	15	10	25	

SYLLABUS

Pre-requisite: Machine Learning-I, Machine Learning-II and Artificial Intelligence.

Course Objectives: To make students learn to build programs that act in a stochastic environment, based on past experience using various Reinforcement Learning methods.

Course Outcomes:

Students will be able to

1. Explain basic and advanced Reinforcement Learning techniques.
2. Identify suitable learning tasks to which Reinforcement learning and Deep Reinforcement Learning techniques can be applied.
3. Apply appropriate Reinforcement Learning method to solve a given problem.

UNIT WISE SYLLABUS

1. Introduction
2. Immediate RL, Bandit Problem
3. Full RL, Markov Decision Process (MDP)
4. Dynamic programming, Monte Carlo method
5. Temporal difference Learning, Eligibility traces
6. Deep RL, Function approximation

BOOKS RECOMMENDED

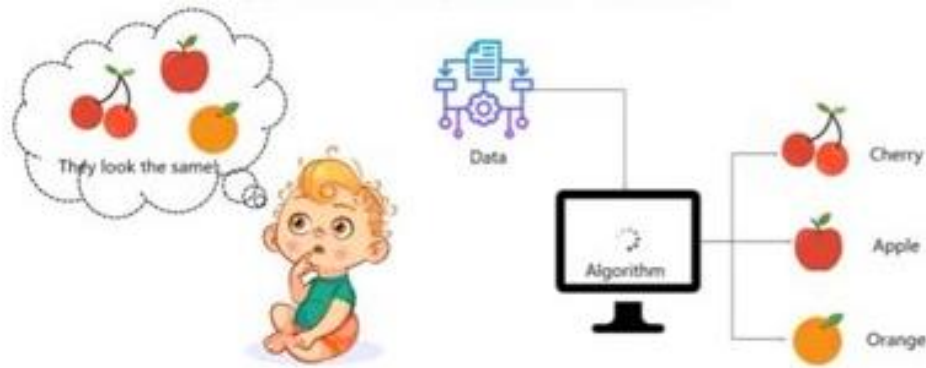
■ Textbooks

1. Richard S. Sutton and Andrew G. Barto, “Reinforcement Learning: An Introduction”, MIT Press, 2 nd Edition, 2018.
2. Laura Graesser Wah Loon Keng, “Foundations of Deep Reinforcement Learning,” Pearson Education, 1 st Edition, 2020.

■ Reference Books

1. Phil Winder, “Reinforcement Learning Industrial Applications of Intelligent Agents”, O’Reilly, 1 st Edition, 2020.
2. Csaba Szepesvari, “Algorithms for Reinforcement Learning,” Morgan & Claypool Publishers, 1 st Edition, 2019.
3. Enes Bilgin, “Mastering Reinforcement Learning with Python”, Packt publication, 1 st Edition, 2020.
4. Brandon Brown, Alexander Zai, “Deep Reinforcement Learning in Action”, Manning Publications, 1 st Edition, 2020.
5. Micheal Lanham, “Hands-On Reinforcement Learning for Games,” Packt Publishing, 1 st Edition, 2020
6. Abhishek Nandy, Manisha Biswas, “Reinforcement Learning: With Open AI, TensorFlow and Keras using Python,” Apress, 1st Edition, 2018.

MACHINE LEARNING



■ Machine learning is the science of getting computers to act by feeding them data and letting them learn a few tricks on their own without being explicitly programmed.

TYPES OF MACHINE LEARNING



Supervised Learning

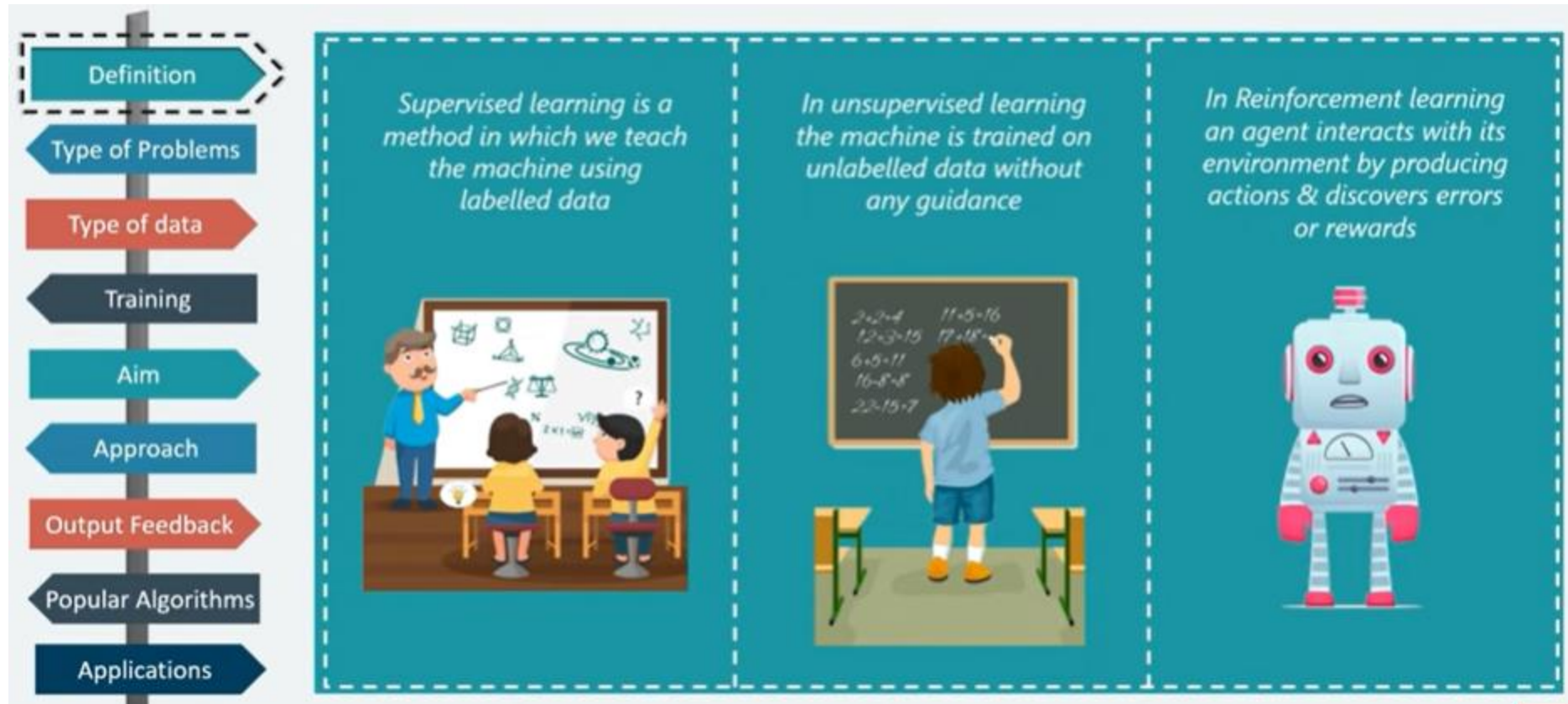


Unsupervised Learning

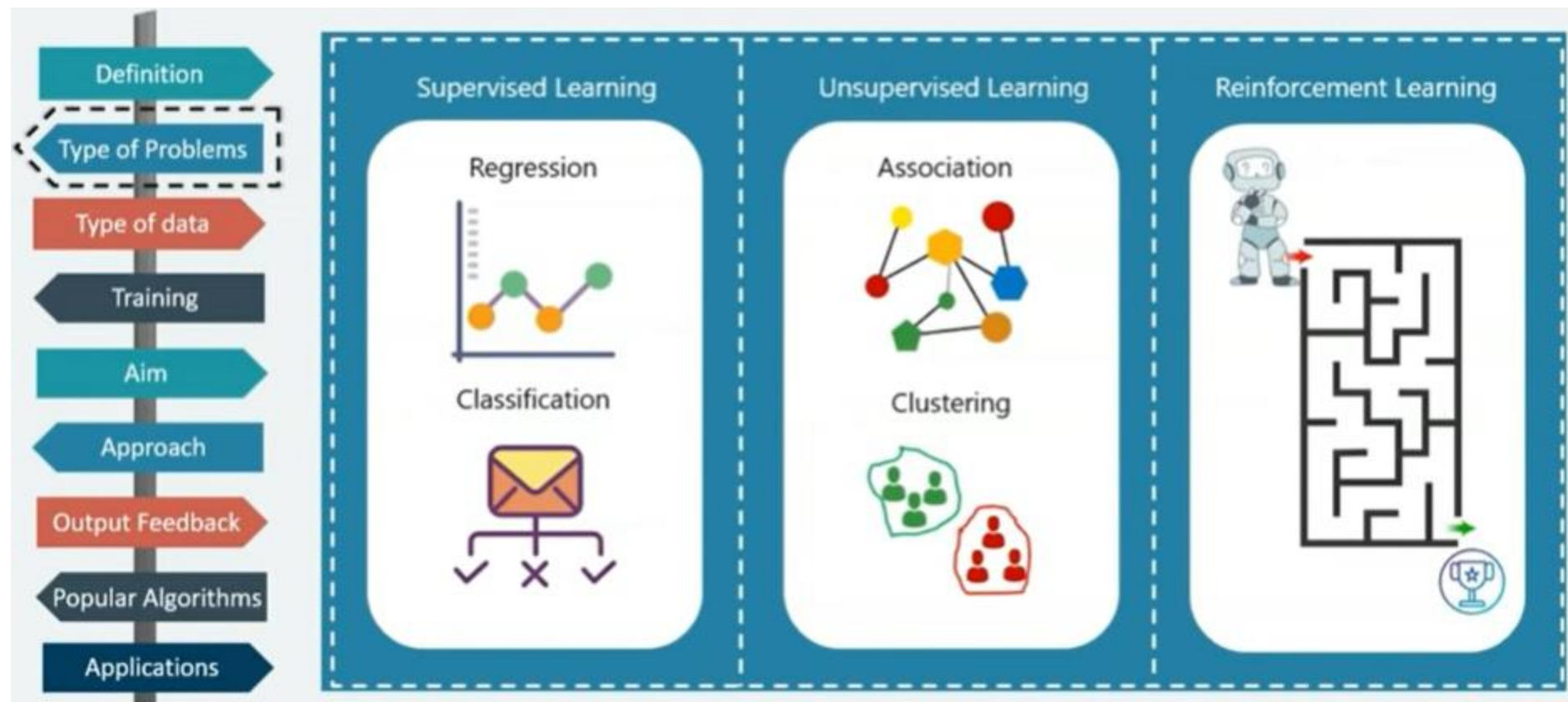


Reinforcement Learning

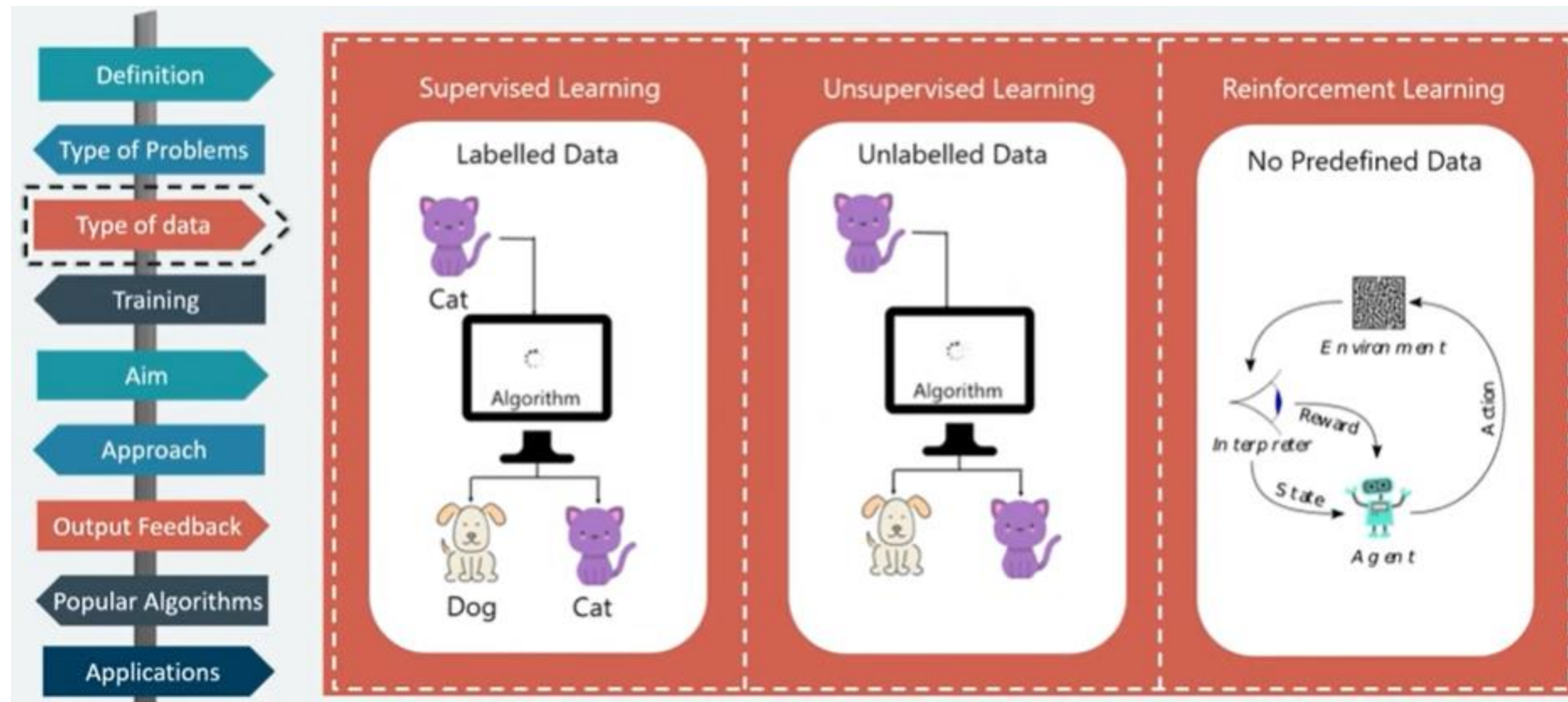
DIFFERENCE BETWEEN SUPERVISED, UNSUPERVISED AND REINFORCEMENT LEARNING



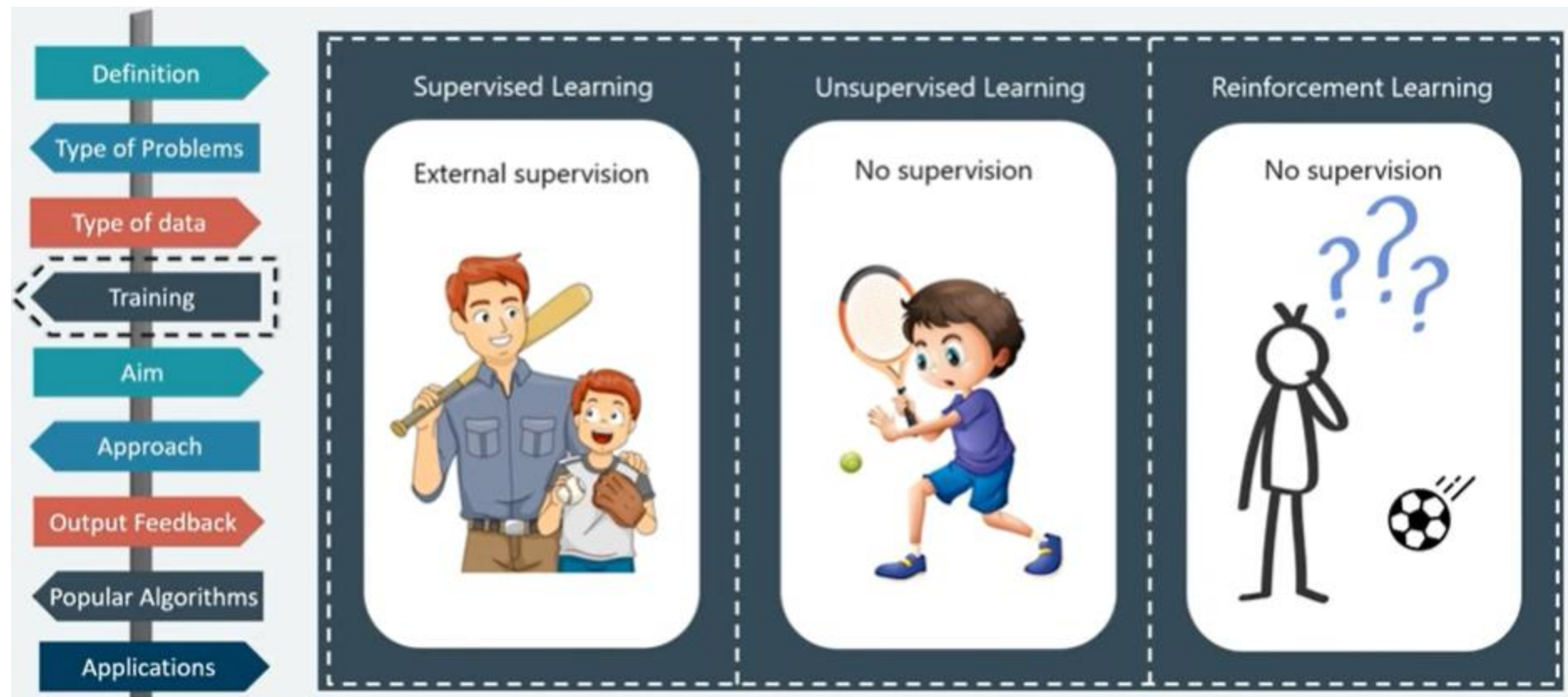
DIFFERENCE BETWEEN SUPERVISED, UNSUPERVISED AND REINFORCEMENT LEARNING



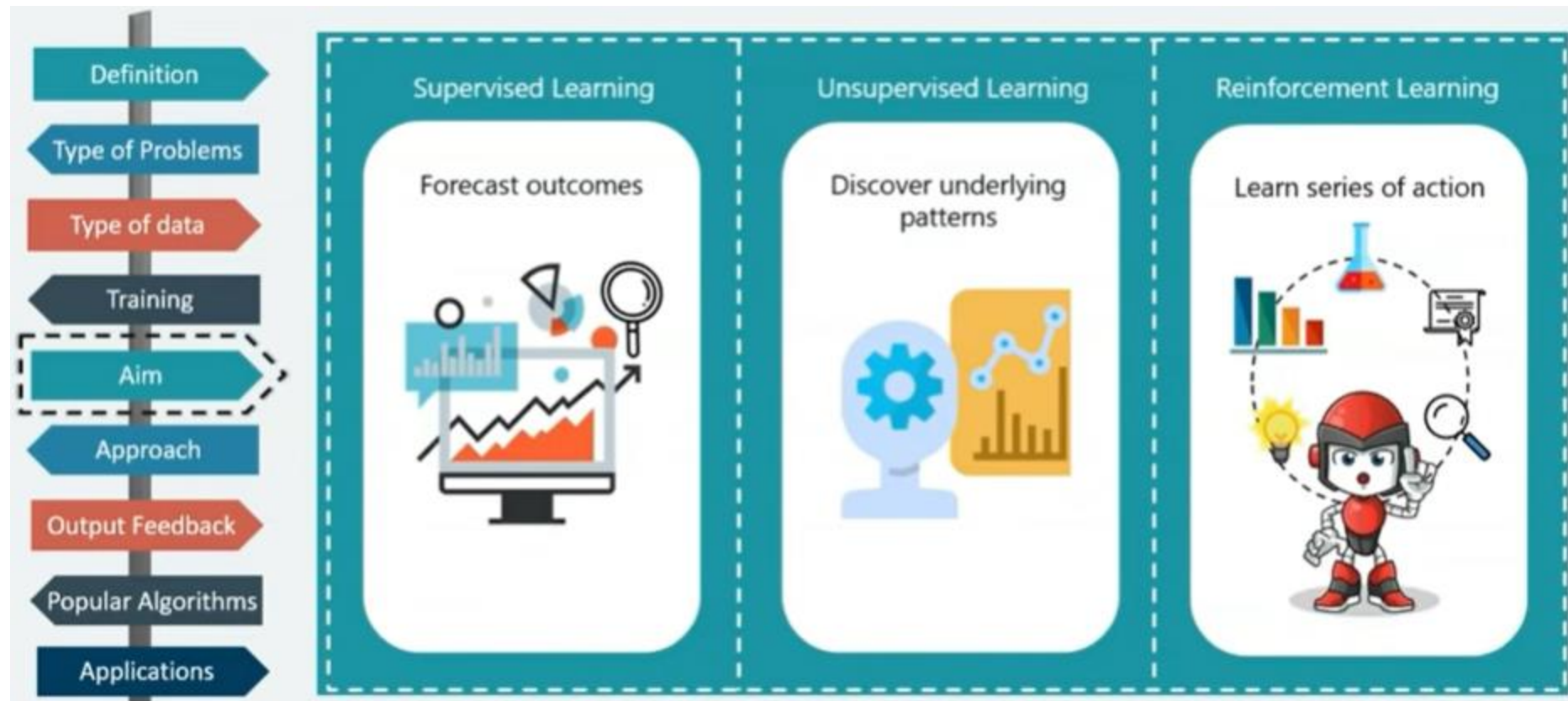
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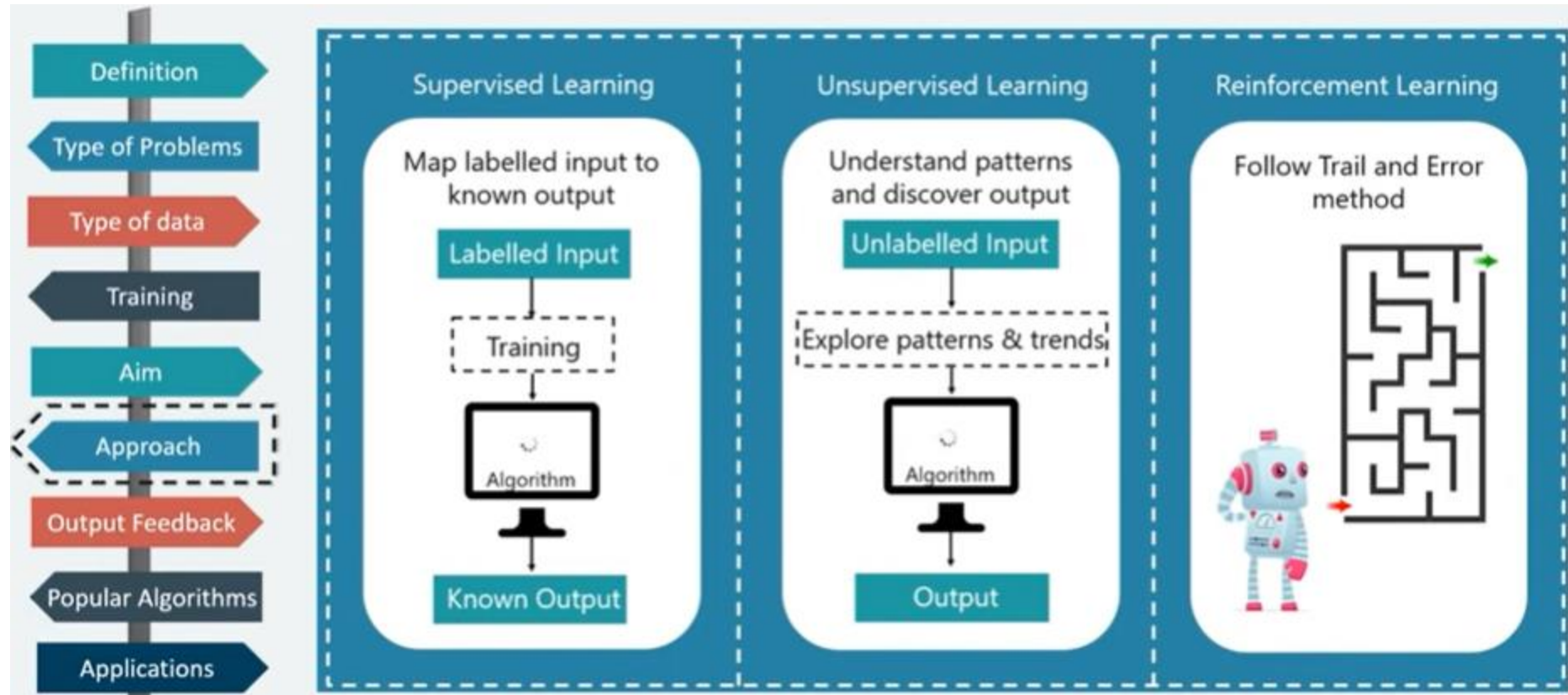
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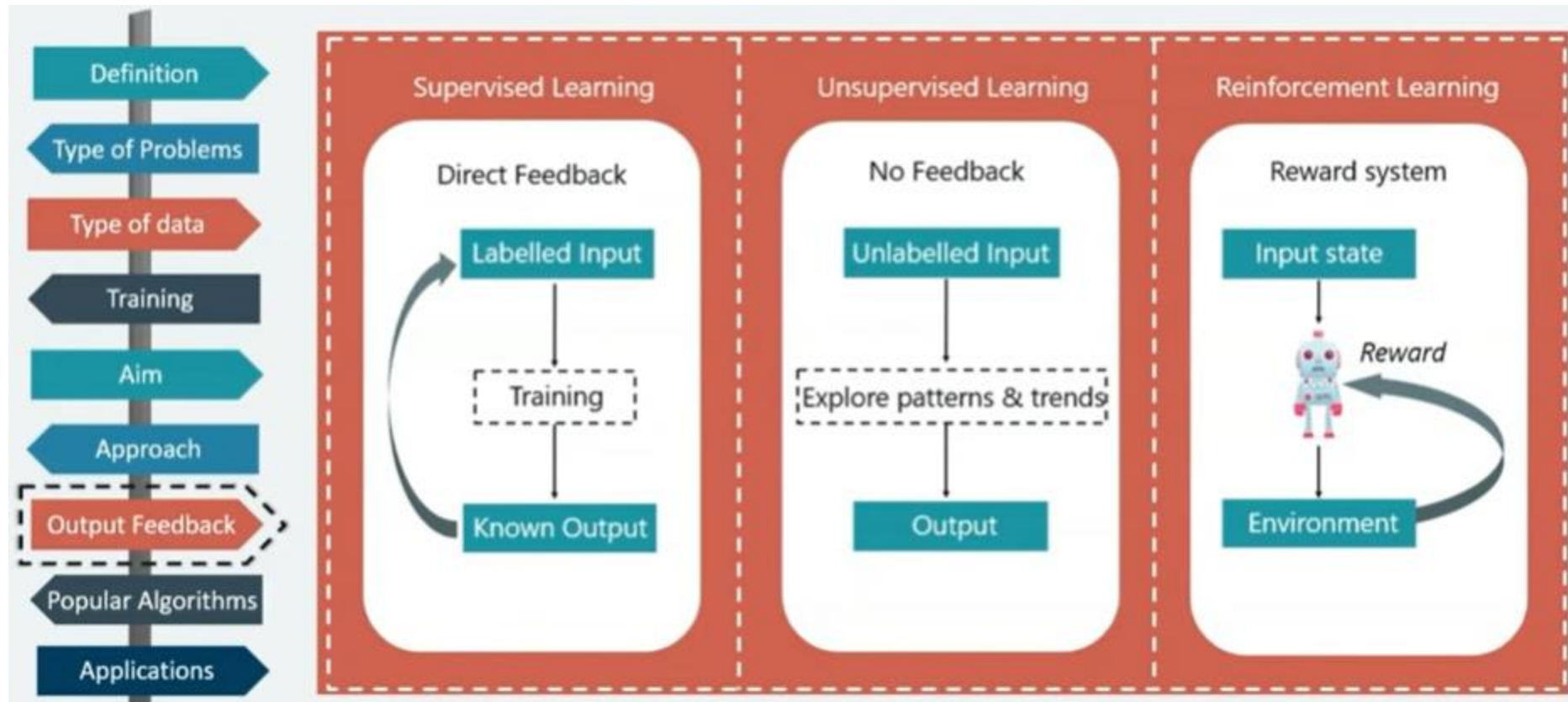
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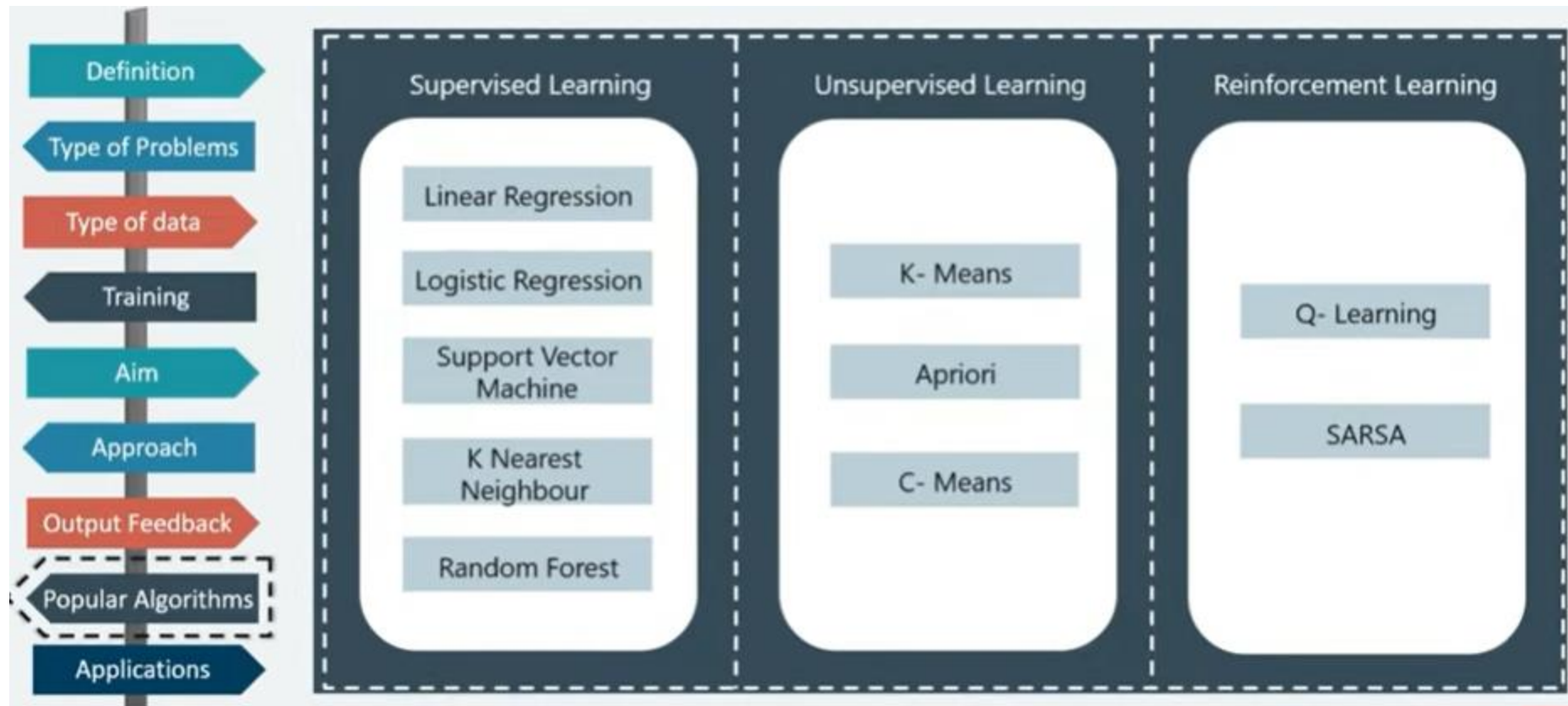
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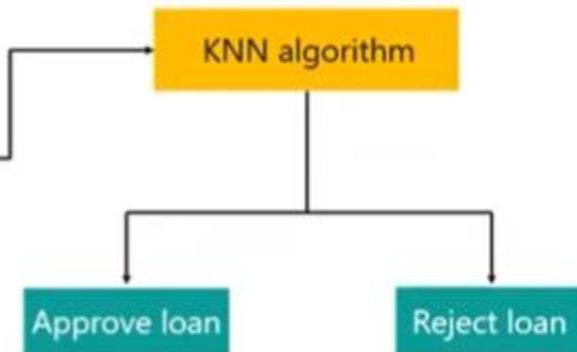
DIFFERENCE BETWEEN SUPERVISED, UNSUPERVISED AND REINFORCEMENT LEARNING



USE CASE I

Problem Statement: Study a bank credit dataset and make a decision about whether to approve the loan of an applicant based on his profile

\$ Account.Balance	: int	1 1 2 1 1 1 1 1 4 2 ...
\$ Duration.of.Credit..month.	: int	18 9 12 12 12 10 8 6 18 24 ..
\$ Payment.Status.of.Previous.Credit	: int	4 4 2 4 4 4 4 4 2 ...
\$ Purpose	: int	2 0 9 0 0 0 0 0 3 3 ...
\$ Credit.Amount	: int	1049 2799 841 2122 2171 2241
\$ Value.Savings.Stocks	: int	1 1 2 1 1 1 1 1 1 3 ...
\$ Length.of.current.employment	: int	2 3 4 3 3 2 4 2 1 1 ...
\$ Instalment.per.cent	: int	4 2 2 3 4 1 1 2 4 1 ...
\$ Sex...Marital.Status	: int	2 3 2 3 3 3 3 3 2 2 ...
\$ Guarantors	: int	1 1 1 1 1 1 1 1 1 1 ...
\$ Duration.in.Current.address	: int	4 2 4 2 4 3 4 4 4 4 ...
\$ Most.valuable.available.asset	: int	2 1 1 1 2 1 1 1 3 4 ...
\$ Age..years.	: int	21 36 23 39 38 48 39 40 65 23
\$ Concurrent.Credits	: int	3 3 3 3 1 3 3 3 3 3 ...
\$ Type.of.apartment	: int	1 1 1 1 2 1 2 2 2 1 ...
\$ No.of.Credits.at.this.Bank	: int	1 2 1 2 2 2 2 1 2 1 ...
\$ Occupation	: int	3 3 2 2 2 2 2 2 1 1 ...
\$ No.of.dependents	: int	1 2 1 2 1 2 1 2 1 1 ...
\$ Telephone	: int	1 1 1 1 1 1 1 1 1 1 ...
\$ Foreign.Worker	: int	1 1 1 2 2 2 2 2 1 1 ...



SUPERVISED LEARNING

USE CASE II

Problem Statement: To establish a mathematical equation for distance as a function of speed, so you can use it to predict distance when only the speed of the car is known.

```
> cars
```

	speed	dist
1	4	2
2	4	10
3	7	4
4	7	22
5	8	16
6	9	10
7	10	18
8	10	26
9	10	34
10	11	17
11	11	28
12	12	14
13	12	20
14	12	24
15	12	28

Linear Regression
algorithm

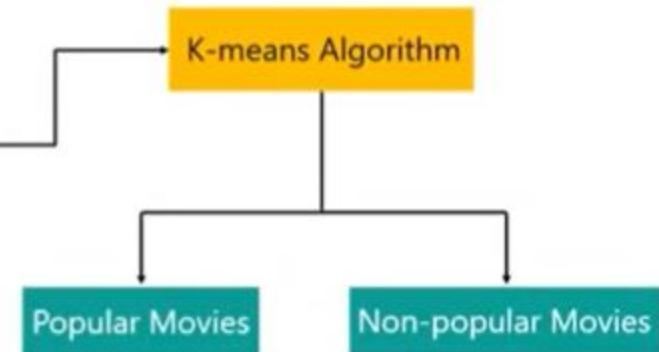
Predict the distance, when the
speed of a car is given

SUPERVISED LEARNING

USE CASE III

Problem Statement: To cluster a set of movies as either good or average based on their social media out reach

	director_facebook_likes	actor_3_facebook_likes	actor_1_facebook_likes	cast_total_facebook_likes
Avatar	0	835	1000	4834
Pirates of the C...	563	1000	40000	48350
Spectre	0	161	11000	11700
The Dark Knigh...	22000	23000	27000	106759
John Carter	475	530	640	1873
Spider Man 3	0	4000	24000	46055
Tangled	15	284	799	2036
Avengers: Age ...	0	19000	26000	92000
Harry Potter an...	282	10000	25000	58753
Batman v Super...	0	2000	15000	24450
Superman Retur...	0	903	18000	29991
Quantum of Sol...	395	393	451	2023
Pirates of the C...	563	1000	40000	48456



UNSUPERVISED LEARNING

USE CASE IV

Problem Statement: To perform Market Basket Analysis by finding association between items bought at the grocery store

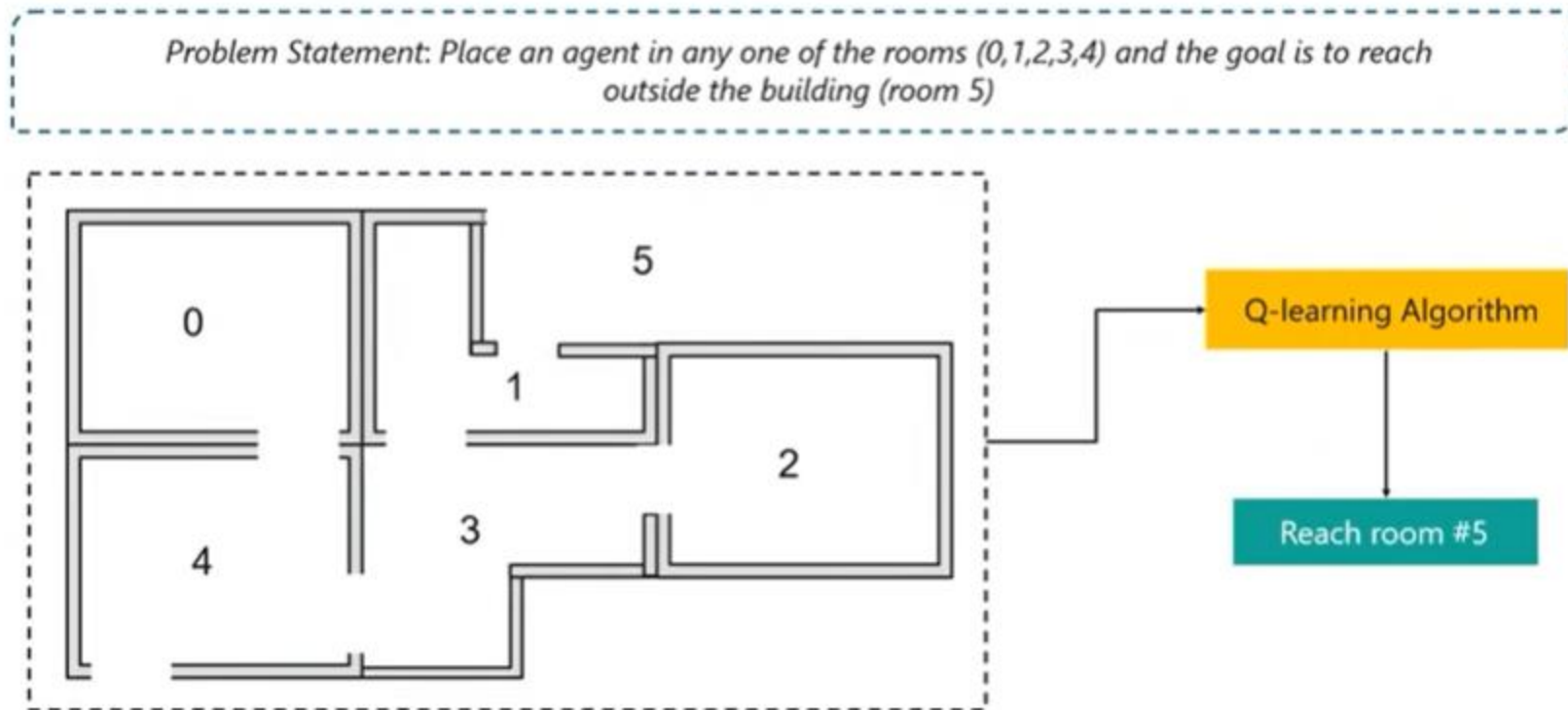
	A	B	C	D	E	F	G	H
1	citrus fruit	semi-finish	margarine	ready soups				
2	tropical fr	yogurt	coffee					
3	whole milk							
4	pip fruit	yogurt	cream che	meat spreads				
5	other veg	whole mil	condense	long life bakery product				
6	whole mil	butter	yogurt	rice	abrasive cleaner			
7	rolls/buns							
8	other veg	UHT-milk	rolls/buns	bottled be	liquor (appetizer)			
9	pot plants							
10	whole mil	cereals						
11	tropical fr	other veg	white bre	bottled w	chocolate			
12	citrus fruit	tropical fr	whole mil	butter	curd	yogurt	flour	bottled w
13	beef							
14	frankfurte	rolls/buns	soda					
15	chicken	tropical fruit						

Association rule mining &
Apriori Algorithm

Perform Market Basket Analysis

UNSUPERVISED LEARNING

USE CASE V



REINFORCEMENT LEARNING



THANK YOU!!