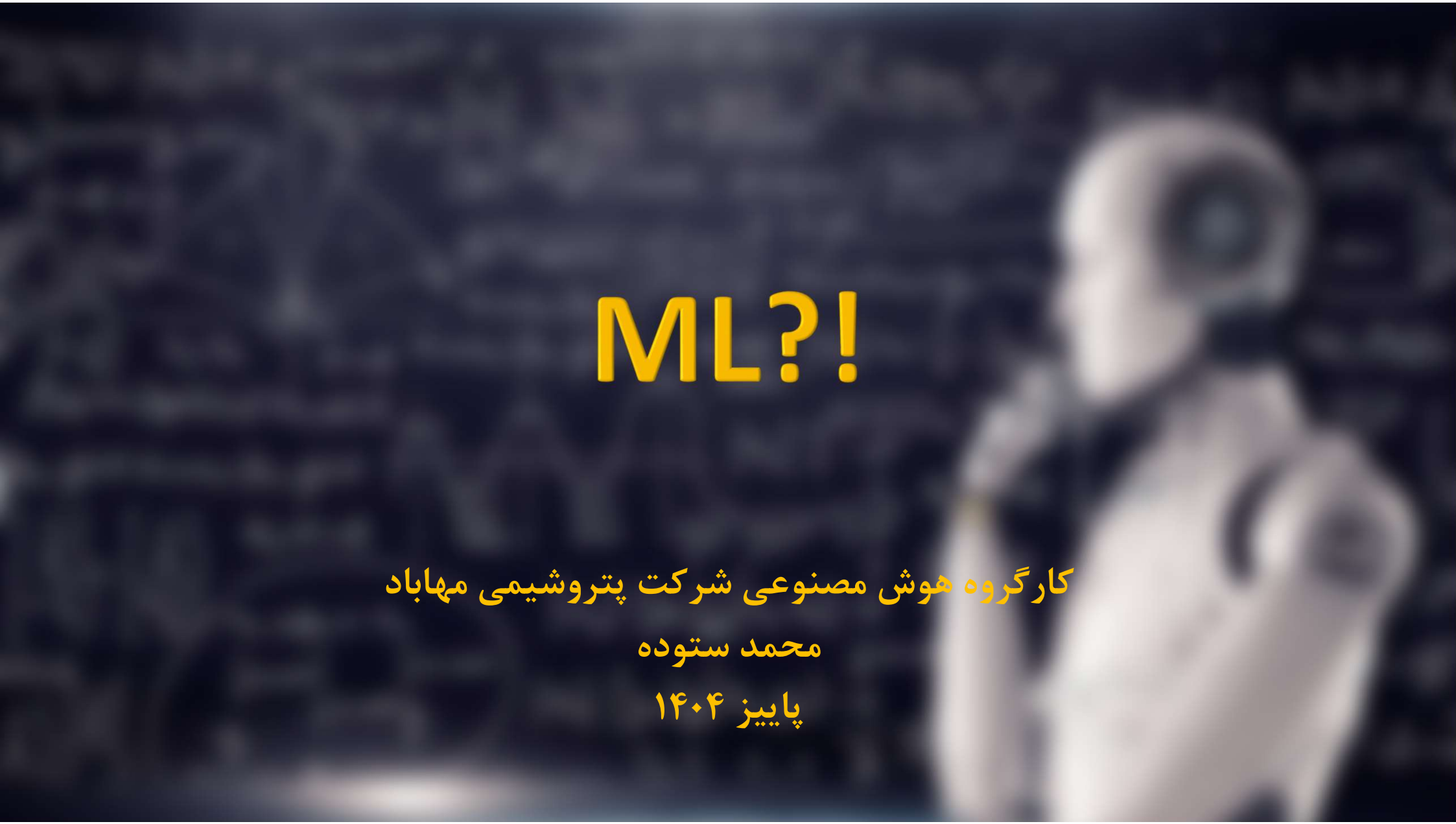


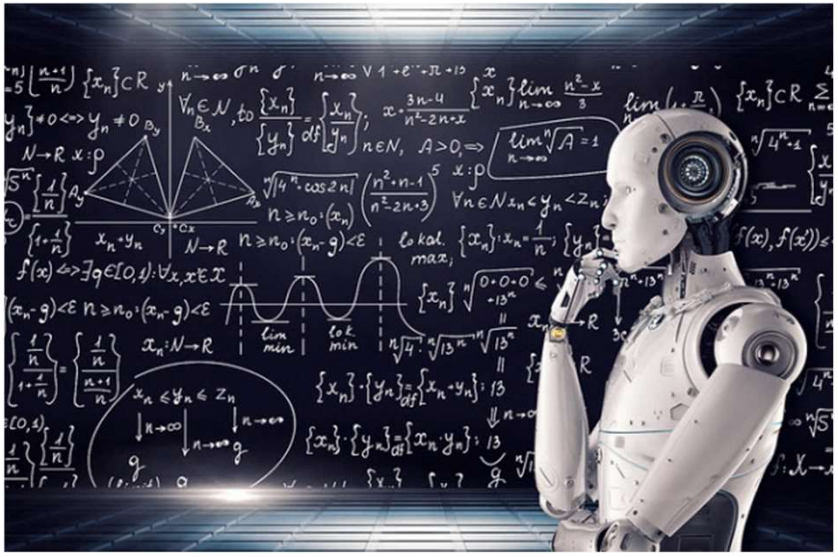
کارگروه هوش مصنوعی شرکت پتروشیمی مهاباد

محمد ستوده

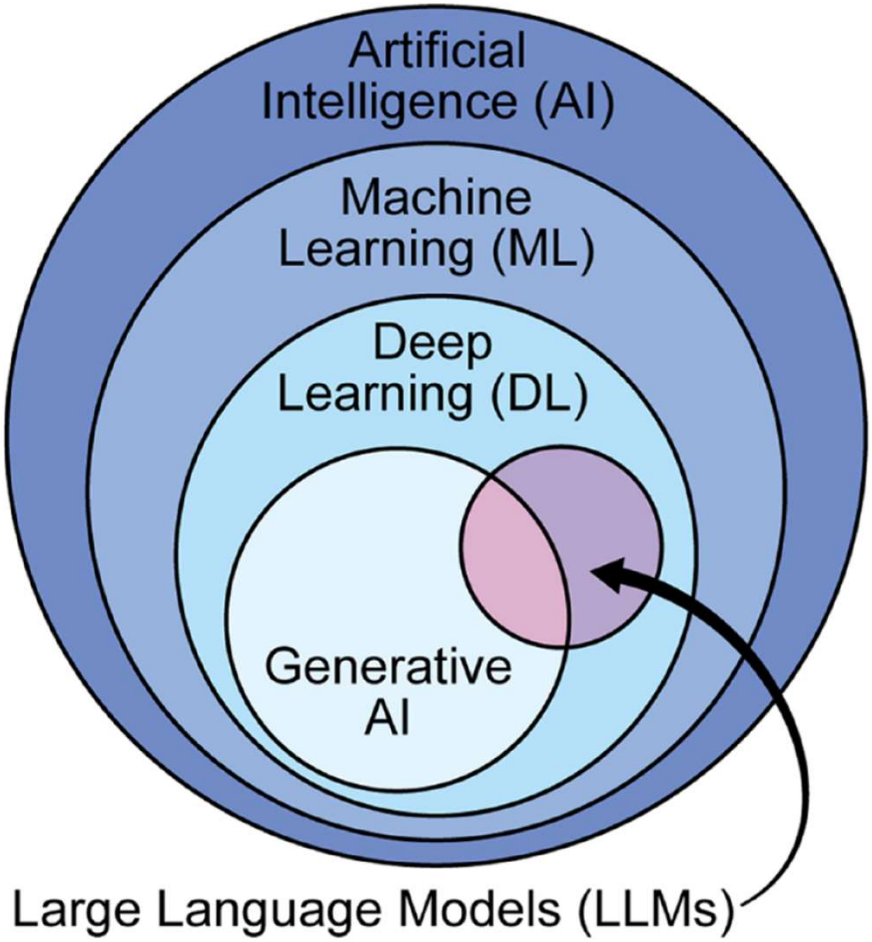
پاییز ۱۴۰۴

Artificial Intelligence (AI)

- سیستم‌های توانمند به یادگیری و تصمیم‌گیری خودکار
- شاخه‌ای از علوم کامپیوتر است که هدفش ساخت سیستم‌هایی است که بتوانند رفتارهای هوشمند انسانی مانند یادگیری، استدلال و تصمیم‌گیری را شبیه‌سازی کنند.



LLMs in AL


Artificial Intelligence (AI)
Machine Learning (ML)
Deep Learning (DL)
Generative AI
Large Language Models (LLMs)

Artificial Intelligence (AI)

1. Cognitive & Symbolic AI
2. Machine Learning (ML)
3. Data Mining & Predictive Analytics
4. Natural Language Processing (NLP)
5. Computer Vision (CV)
6. Robotics & Embodied AI
7. Multi-Agent Systems (MAS)
8. Generative AI
9. Affective & Social Computing
10. Explainable & Ethical AI
11. Applied & Domain-specific AI

Artificial Intelligence (AI)
1. Cognitive & Symbolic AI
1.1. Knowledge Representation (KR)
1.2. Automated Reasoning
1.3. Planning & Decision Making
1.4. Cognitive Modeling
2. Machine Learning (ML)
2.1. Supervised Learning
2.2. Unsupervised Learning
2.3. Semi-Supervised & Self-Supervised Learning
2.4. Reinforcement Learning (RL)
2.5. Probabilistic & Bayesian Learning
2.6. Graph-based Learning
2.7. Representation Learning
2.8. Federated, Online & Data Stream Learning
3. Data Mining & Predictive Analytics
3.1. Association Rule Mining
3.2. Sequential Pattern Mining
3.3. Temporal / Time-series Analysis
3.4. Predictive Modeling
3.5. Anomaly Detection
3.6. Graph Mining
3.7. Recommender Systems
4. Natural Language Processing (NLP)
4.1. Linguistic Processing
4.2. Semantic Processing
4.3. Pragmatic / Discourse Processing
4.4. Text Generation
4.5. Speech & Audio
4.6. Multimodal NLP
5. Computer Vision (CV)
5.1. Image Processing
5.2. Object Detection & Recognition
5.3. 3D Vision
5.4. Video Understanding
5.5. Multimodal Vision
6. Robotics & Embodied AI
6.1. Perception
6.2. Control & Motion Planning
6.3. Manipulation & Locomotion
6.4. Human-Robot Interaction (HRI)
6.5. Reinforcement Learning in Robotics
7. Multi-Agent Systems (MAS)
7.1. Agent Architectures
7.2. Distributed Coordination
7.3. Communication & Negotiation
7.4. Swarm Intelligence
7.5. Game-Theoretic Modelling
8. Generative AI
8.1. Generative Models
8.2. Text Generation (LLMs)
8.3. Image / Video / Audio Synthesis
8.4. Code Generation
8.5. Multimodal Generation
9. Affective & Social Computing
9.1. Emotion Recognition
9.2. Sentiment Analysis
9.3. Personality Modelling
9.4. Empathic Agents
10. Explainable & Ethical AI
10.1. Explainable AI (XAI)
10.2. Fairness & Bias Mitigation
10.3. AI Governance & Trust
10.4. Privacy-preserving AI
10.5. Causal Inference
11. Applied & Domain-specific AI
11.1. Medical AI
11.2. Industrial AI
11.3. Financial AI
11.4. Social & Recommender Systems
11.5. Education AI
11.6. Environmental / Climate AI

Machine Learning (ML)

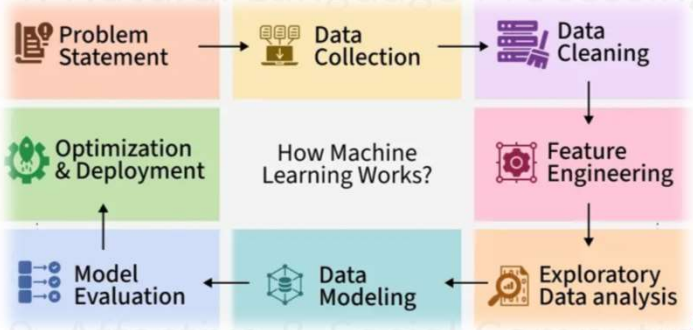
1. Cognitive & Symbolic AI

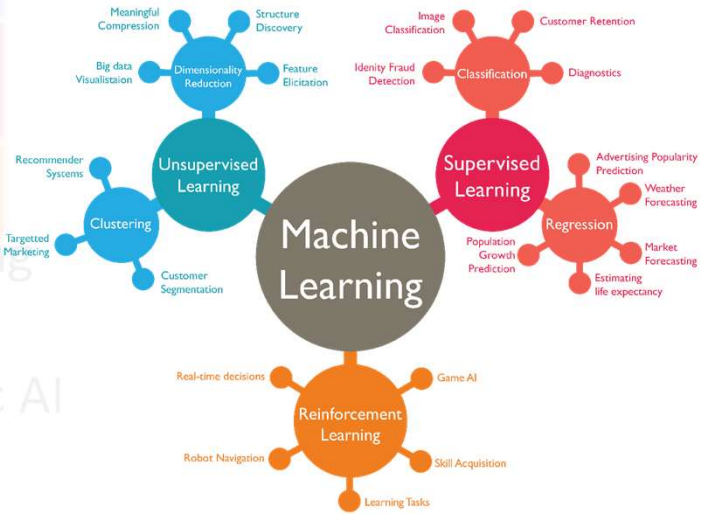
2. Machine Learning (ML)

3. Data Mining & Predictive Analytics

4. Natural Language Processing (NLP)

- هدف این است که سیستم‌ها بتوانند الگوها را از داده‌ها یاد بگیرند و پیش‌بینی انجام دهند تا عملکرد خودکار داشته باشند.





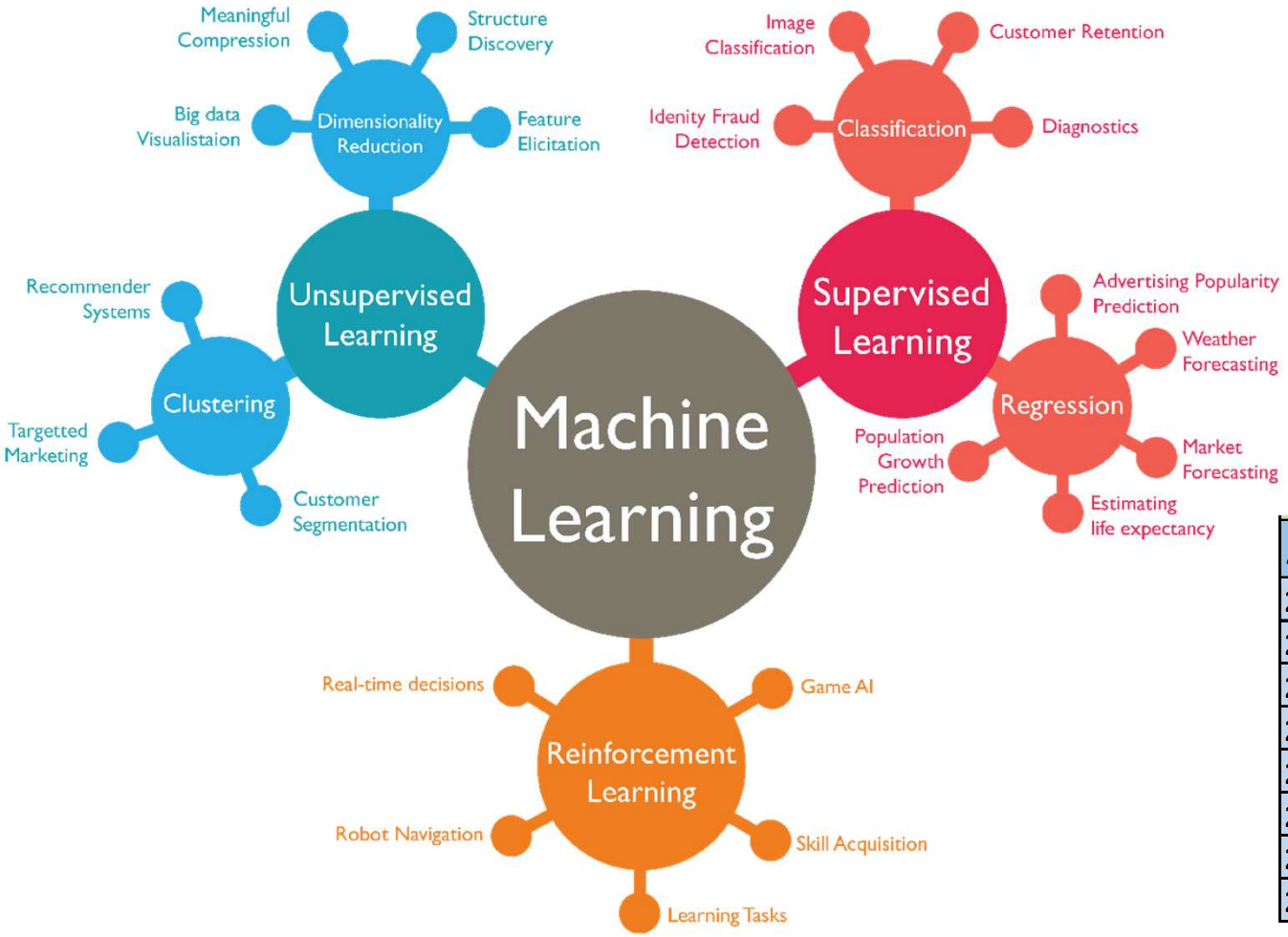
2. Machine Learning (ML)
2.1. Supervised Learning
2.2. Unsupervised Learning
2.3. Semi-Supervised & Self-Supervised Learning
2.4. Reinforcement Learning (RL)
2.5. Probabilistic & Bayesian Learning
2.6. Graph-based Learning
2.7. Representation Learning
2.8. Federated, Online & Data Stream Learning

9. Affective & Social Computing

10. Explainable & Ethical AI

11. Applied & Domain-specific AI

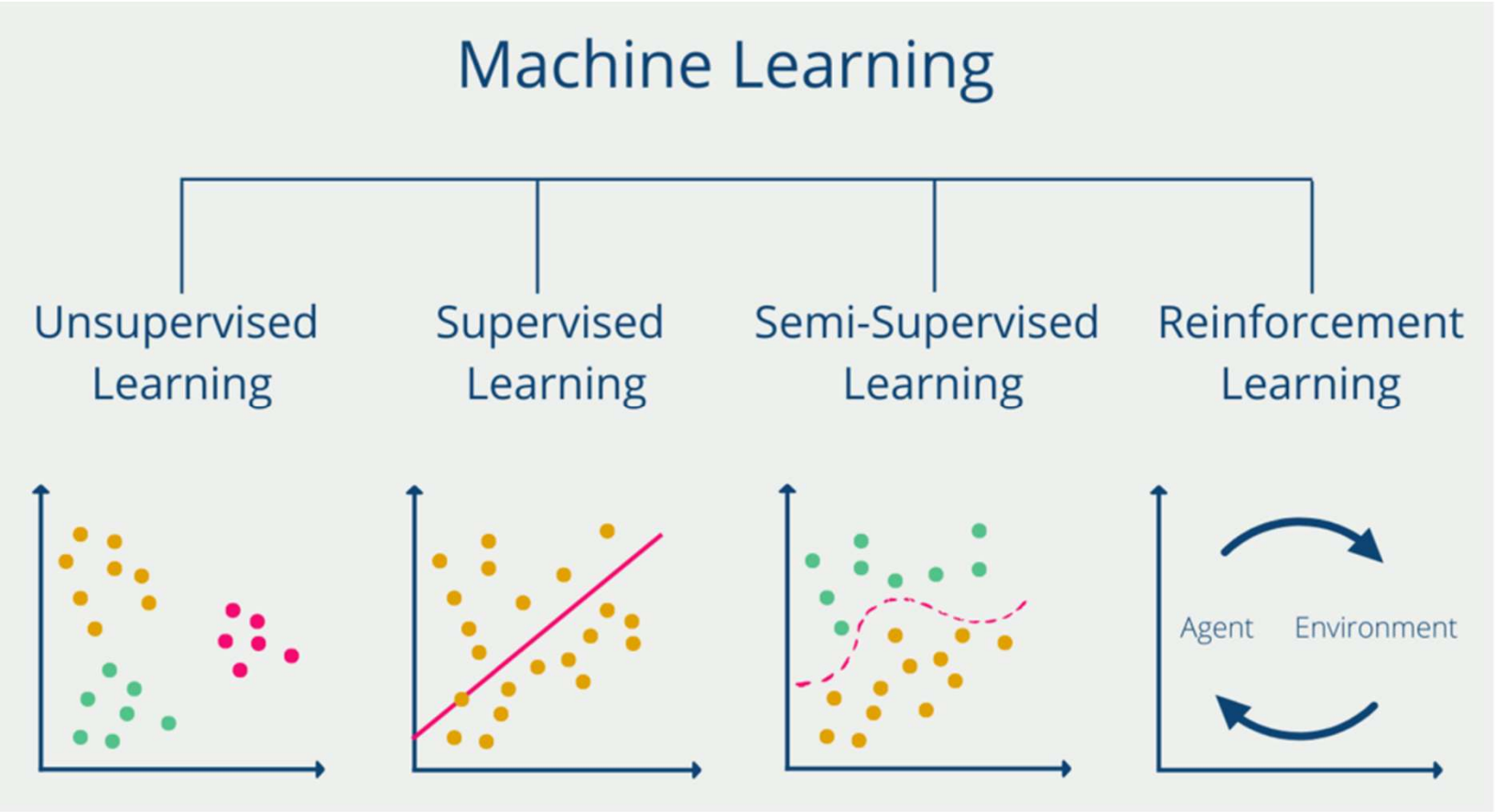
Machine Learning (ML)



یادگیری ماشین

2. Machine Learning (ML)
2.1. Supervised Learning
2.2. Unsupervised Learning
2.3. Semi-Supervised & Self-Supervised Learning
2.4. Reinforcement Learning (RL)
2.5. Probabilistic & Bayesian Learning
2.6. Graph-based Learning
2.7. Representation Learning
2.8. Federated, Online & Data Stream Learning

Machine Learning (ML)



یادگیری ماشین

- یادگیری نظارتی
- یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی

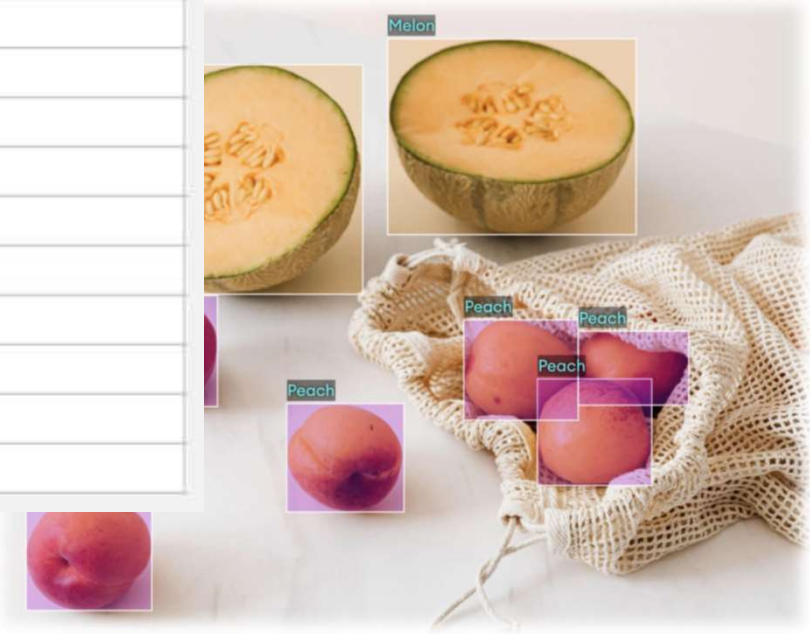
Data Features and Label

Features

Label

Outlook	Temperature	Humidity	Wind	Played football(yes/no)
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

Class

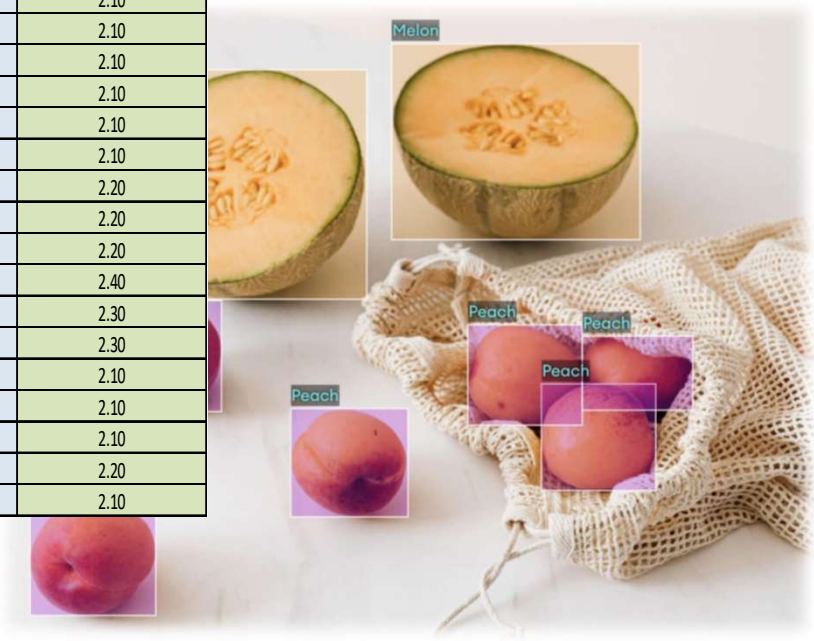


Data Features and Label

Features

Label

10PIC2301A.PIDA.PV	10LI2303.DACA.PV	10FIC2302.PIDA.PV	10FI2307.DACA.PV	MWCOMP1.SUM_1.PV (TOTAL MOLES)	CALCULATION.ATM_PRO.C[2] ATMER/PRODUCTION	10FIC2305A.PIDA.PV	MFI
23.38	53.19	23,203.46	1,516.35	90.2	84.99	1,642.54	2.10
23.48	53.16	23,169.77	1,517.22	90.23	84.99	1,781.31	2.00
23.47	53.91	23,077.76	1,515.36	90.36	84.99	1,673.84	2.10
23.39	53.2	22,928.17	1,499.03	90.48	85	1,674.31	2.20
23.4	53.19	23,135.88	1,498.90	90.49	84.99	1,678.51	2.20
23.3	53.28	23,507.67	1,479.06	91.58	85	1,736.79	2.10
23.39	53.47	23,633.39	1,490.01	91.38	84.99	1,743.93	2.10
23.33	54.02	23,548.68	1,473.74	91.41	85	1,678.58	2.10
23.42	53.82	23,363.09	1,482.95	91.45	85.01	1,723.64	2.10
23.45	53.44	23,186.29	1,475.92	91.65	85	1,717.23	2.10
23.41	53.01	22,917.92	1,470.68	91.58	85	1,687.33	2.10
23.41	52.88	23,175.02	1,466.20	92.58	85.02	1,663.23	2.20
23.41	52.9	23,290.16	1,464.75	93.05	85.01	1,663.43	2.20
23.33	52.56	23,854.76	1,469.68	91.97	85	1,639.47	2.20
23.39	53.32	23,492.53	1,474.51	91.97	84.99	1,738.05	2.40
23.28	53.78	23,363.73	1,473.97	91.66	85	1,692.06	2.30
23.29	53.46	23,464.24	1,474.26	91.68	84.99	1,693.47	2.30
23.41	52.84	23,160.91	1,460.86	92.36	84.99	1,668.90	2.10
23.23	53.5	23,383.71	1,449.28	92.02	85.01	1,602.02	2.10
23.36	53.29	23,439.02	1,454.07	92.26	85	1,548.02	2.10
23.27	53.41	23,242.30	1,466.48	92.15	85	1,594.28	2.20
23.51	53.82	22,946.33	1,486.54	92.01	85	1,540.81	2.10



Machine Learning (ML)

یادگیری ماشین:

- یادگیری نظارتی ------> همه داده‌ها لیبل یا برچسب دارند.
- یادگیری بدون نظارت--> هیچکدام از داده‌ها برچسب ندارند.
- یادگیری نیمه‌نظارتی---> تعداد محدودی از داده‌ها برچسب دارند.
- یادگیری تقویتی

10FI2307.DACA.PV	MWCOMP1.SUM_1.PV (TOTAL MOLES)	CALCULATION.ATM_PRO.C[2] ATMER/PRODUCTION	10FIC2305A.PIDA.PV	MFI
1,516.35	90.2	84.99	1,642.54	2.10
1,517.22	90.23	84.99	1,781.31	2.00
1,515.36	90.36	84.99	1,673.84	2.10
1,499.03	90.48	85	1,674.31	2.20
1,498.90	90.49	84.99	1,678.51	2.20
1,479.06	91.58	85	1,736.79	2.10
1,490.01	91.38	84.99	1,743.93	2.10
1,473.74	91.41			
1,482.95	91.45			
1,475.92	91.65			
1,470.68	91.58			
1,466.20	92.58			
1,464.75	93.05			
1,469.68	91.97			
1,474.51	91.97			
1,473.97	91.66			
1,474.26	91.68			
1,460.86	92.36			
1,449.28	92.02			
1,454.07	92.26			
1,466.48	92.15			
1,486.54	92.01			

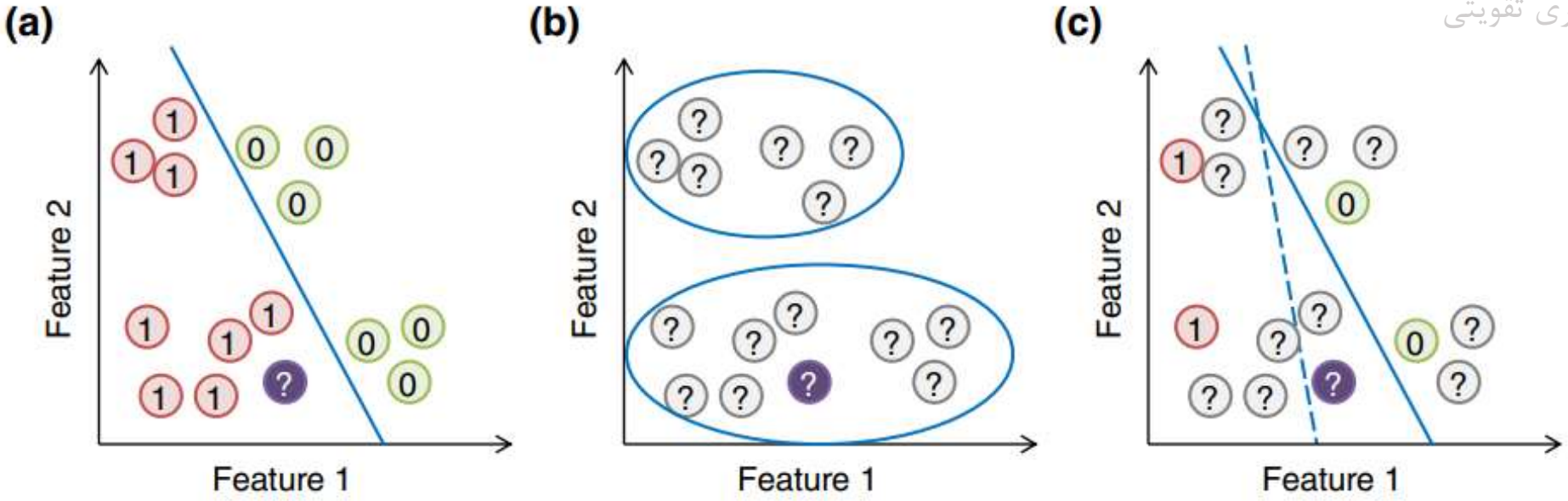
10FIC2302.PIDA.PV	10FI2307.DACA.PV	MWCOMP1.SUM_1.PV (TOTAL MOLES)	CALCULATION.ATM_PRO.C[2] ATMER/PRODUCTION	10FIC2305A.PIDA.PV
23,203.46	1,516.35	90.2	84.99	1,642.54
23,169.77	1,517.22	90.23	84.99	1,781.
23,077.76	1,515.36	90.36	84.99	1,673.
22,928.17	1,499.03	90.48	85	1,674.
23,135.88	1,498.90	90.49	84.99	1,678.
23,507.67	1,479.06	91.58	85	1,736.
23,633.39	1,490.01	91.38	84.99	1,743.
23,548.68	1,473.74	91.41	85	1,678.
23,363.09	1,482.95	91.45	85.01	1,723.
23,186.29	1,475.92	91.65	85	1,717.
22,917.92	1,470.68	91.58	85	1,687.
23,175.02	1,466.20	92.58	85.02	1,663.
23,290.16	1,464.75	93.05	85.01	1,663.
23,854.76	1,469.68	91.97	85	1,639.
23,492.53	1,474.51	91.97	84.99	1,738.
23,363.73	1,473.97	91.66	85	1,692.
23,464.24	1,474.26	91.68	84.99	1,693.
23,160.91	1,460.86	92.36	84.99	1,668.
23,383.71	1,449.28	92.02	85.01	1,602.

10FI2307.DACA.PV	MWCOMP1.SUM_1.PV (TOTAL MOLES)	CALCULATION.ATM_PRO.C[2] ATMER/PRODUCTION	10FIC2305A.PIDA.PV	MFI
1,514.93	90.24	85.01	1,635.93	
1,516.42	90.23	85	1,633.73	
1,514.66	90.22	85	1,629.05	
1,516.32	90.2	85	1,632.32	
1,515.79	90.21	85	1,634.39	
1,520.16	90.2	85.01	1,632.99	
1,515.34	90.22	85.01	1,636.33	
1,516.86	90.21	85.01	1,647.68	
1,516.35	90.2	84.99	1,642.54	2.10
1,517.63	90.19	85.05	1,655.55	
1,516.60	90.2	85	1,707.08	
1,520.01	90.23	85	1,705.75	
1,517.06	90.2	85	1,787.51	
1,517.93	90.18	84.99	1,789.45	
1,517.19	90.18	85.01	1,790.92	
1,519.70	90.2	85	1,784.38	
1,517.61	90.24	85	1,786.71	
1,516.06	90.23	85.01	1,788.72	
1,516.95	90.23	85	1,785.98	
1,517.22	90.23	84.99	1,781.31	2.00
1,519.09	90.24	85	1,783.78	
1,516.62	90.24	85.01	1,784.44	
1,515.12	90.28	84.99	1,681.58	
1,514.12	90.28	85	1,676.24	

Machine Learning (ML)

یادگیری ماشین

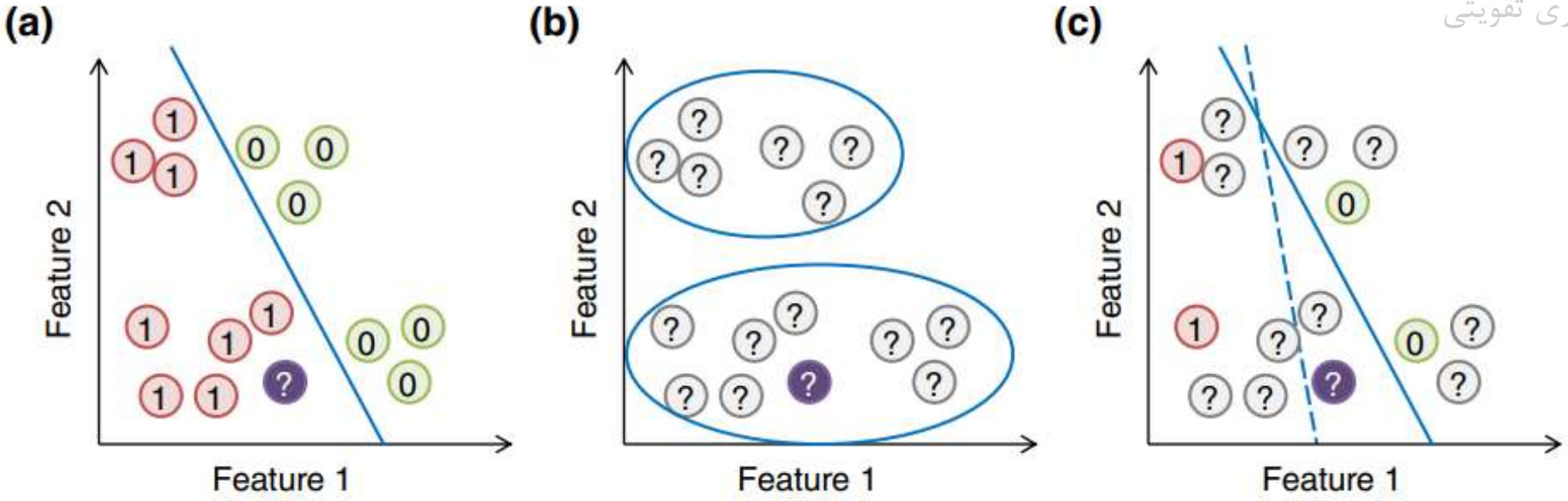
- یادگیری نظارتی
- یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی



Machine Learning (ML)

یادگیری ماشین:

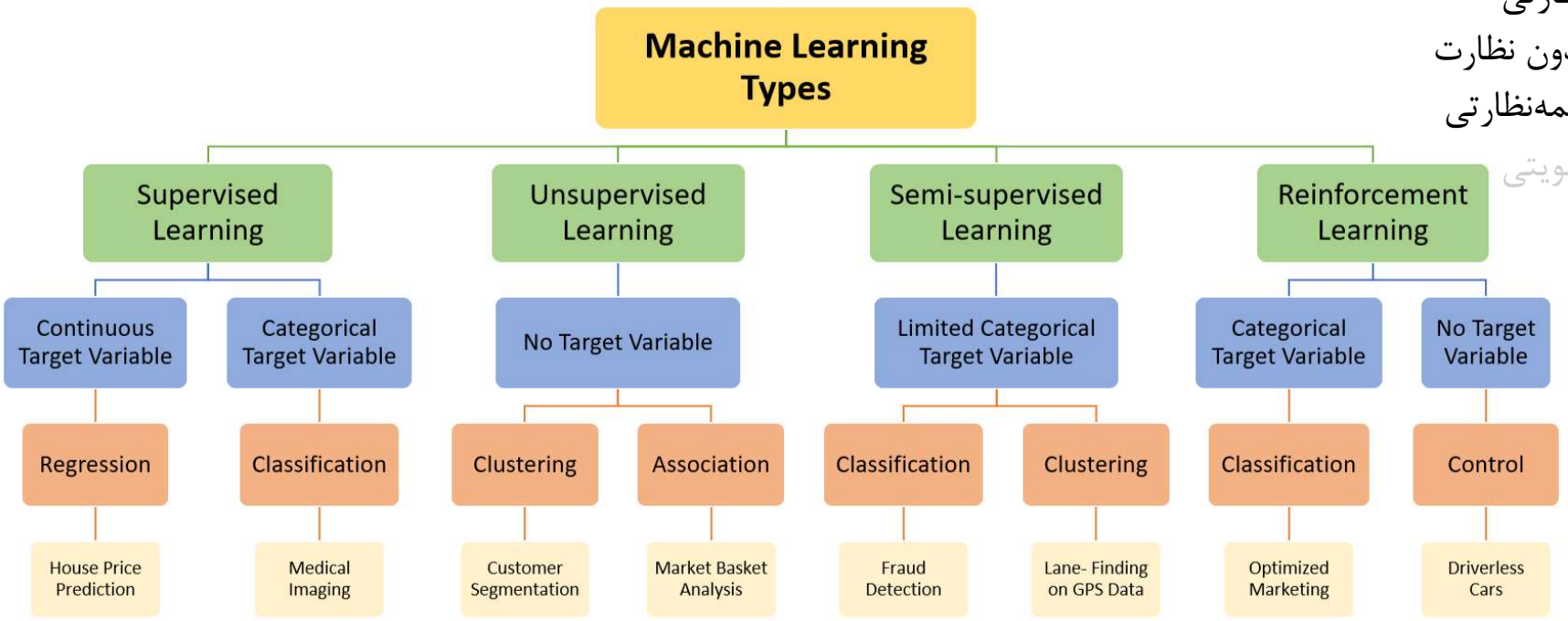
- یادگیری نظارتی ------> تخصیص برچسب/ مقدار
- یادگیری بدون نظارت--> تشخیص دسته
- یادگیری نیمه‌نظارتی---> تخصیص برچسب یا تشخیص دسته
- یادگیری تقویتی



Machine Learning (ML)

یادگیری ماشین:

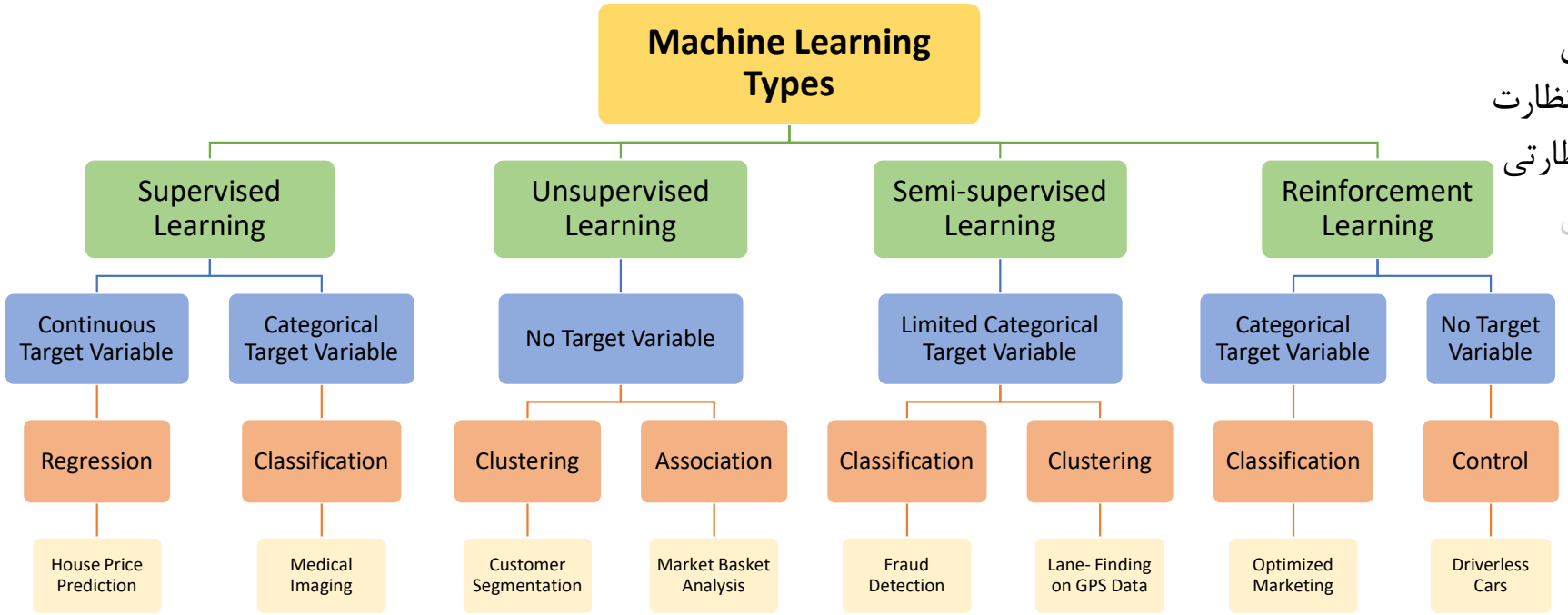
- یادگیری نظارتی
- یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی



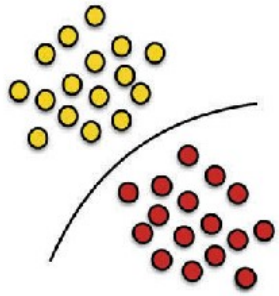
Machine Learning (ML)

یادگیری ماشین:

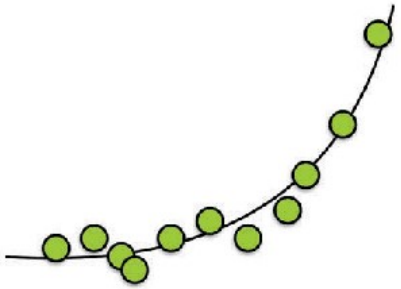
- یادگیری نظارتی
- یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی



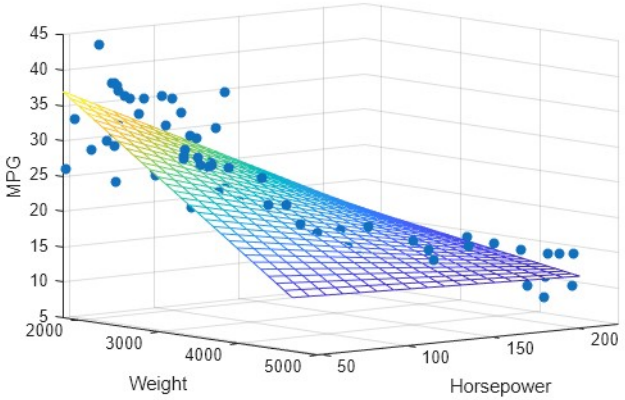
Machine Learning (ML)



Classification

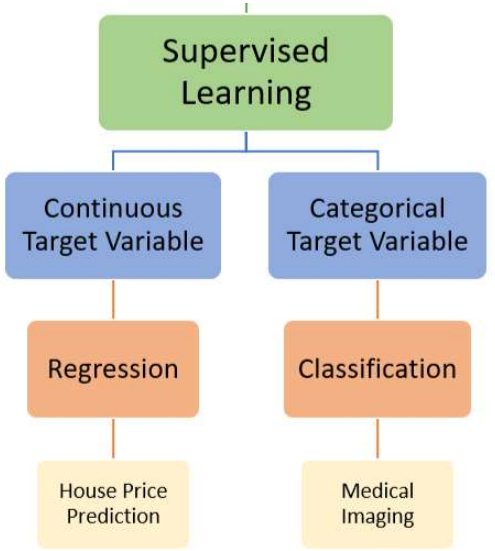


Regression

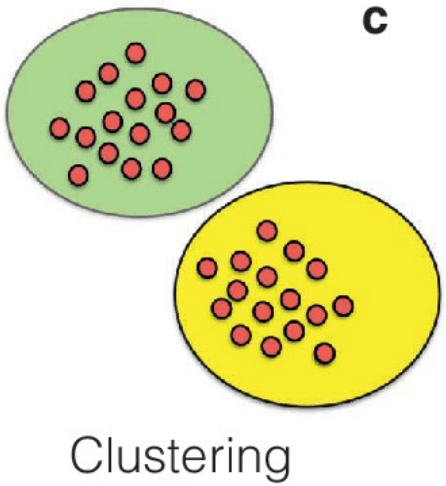


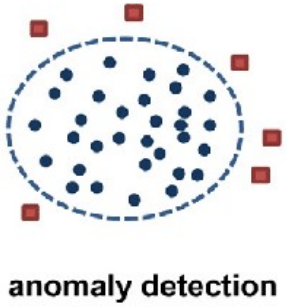
یادگیری ماشین:

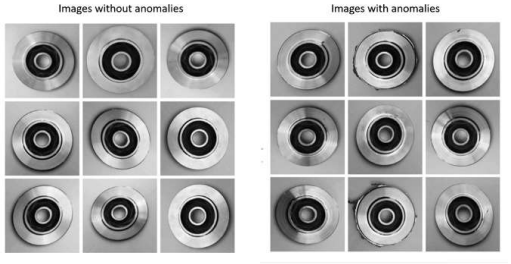
- ★ یادگیری نظارتی
- یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی

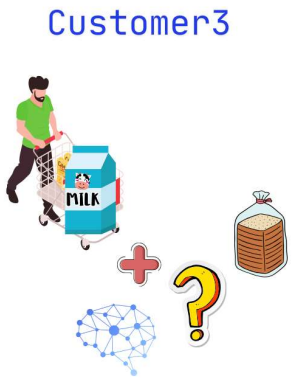


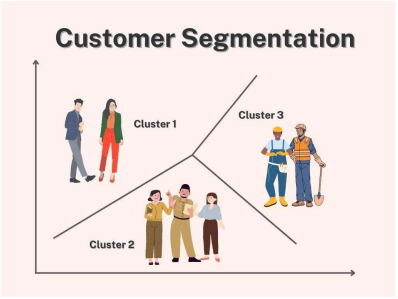
Machine Learning (ML)





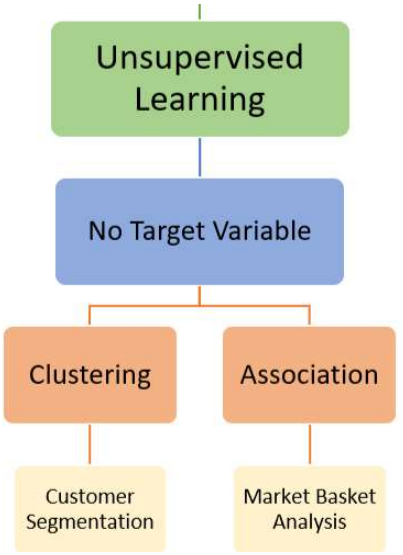






یادگیری ماشین:

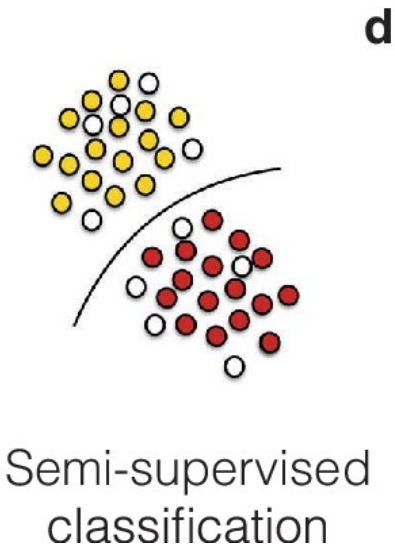
- یادگیری نظارتی
- ★ یادگیری بدون نظارت
- یادگیری نیمه‌نظارتی
- یادگیری تقویتی



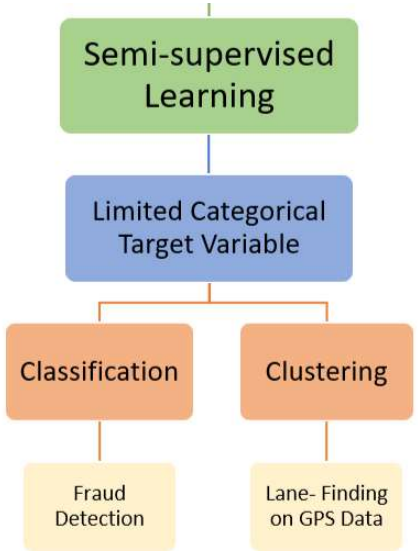
Machine Learning (ML)

یادگیری ماشین:

- یادگیری نظارتی
- یادگیری بدون نظارت
- ★ یادگیری نیمه‌نظارتی
- یادگیری تقویتی

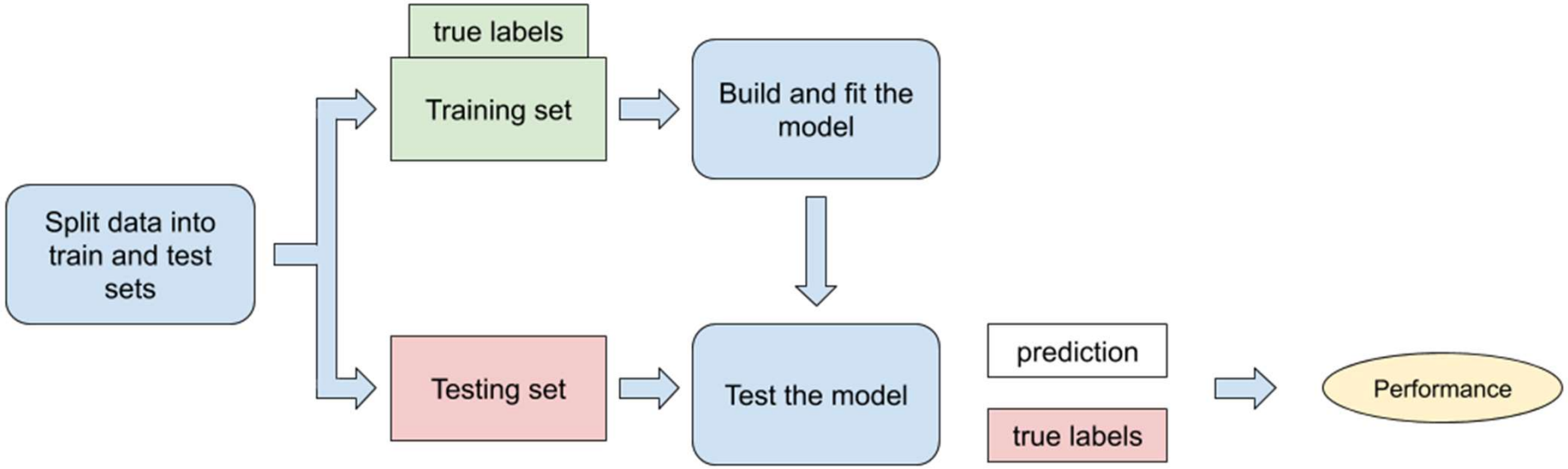


Semi-supervised classification

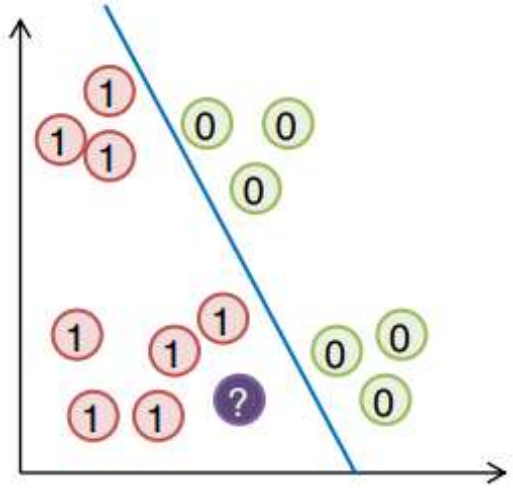


Machine Learning (ML)

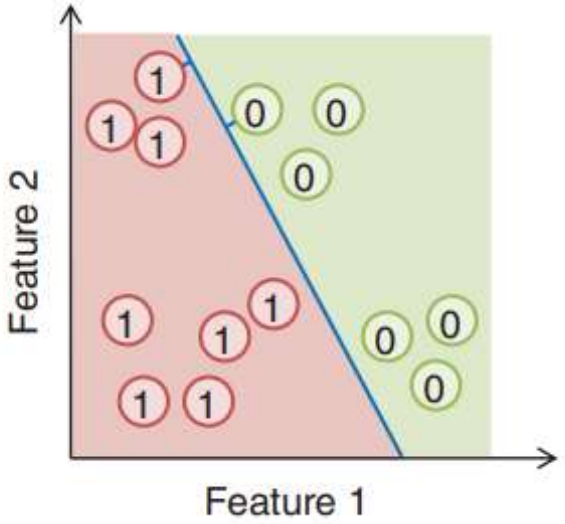
یادگیری: آموزش، تست و ارزیابی عملکرد

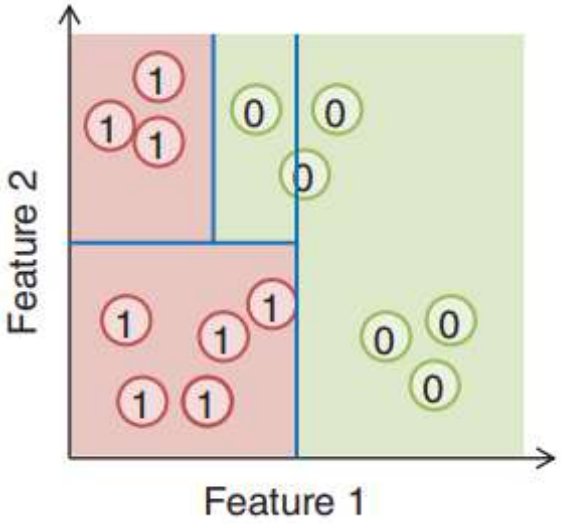


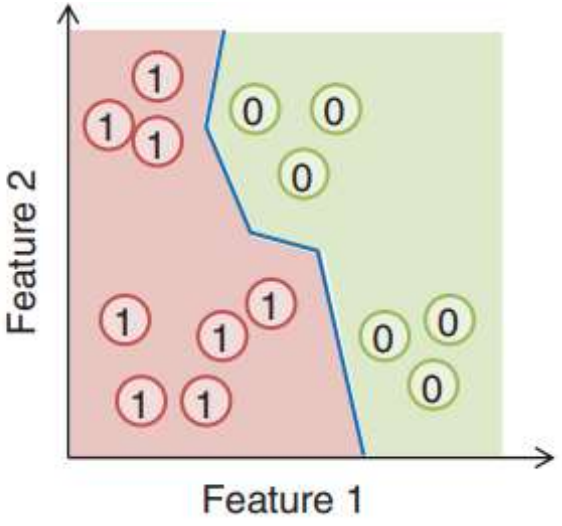
Machine Learning (ML)



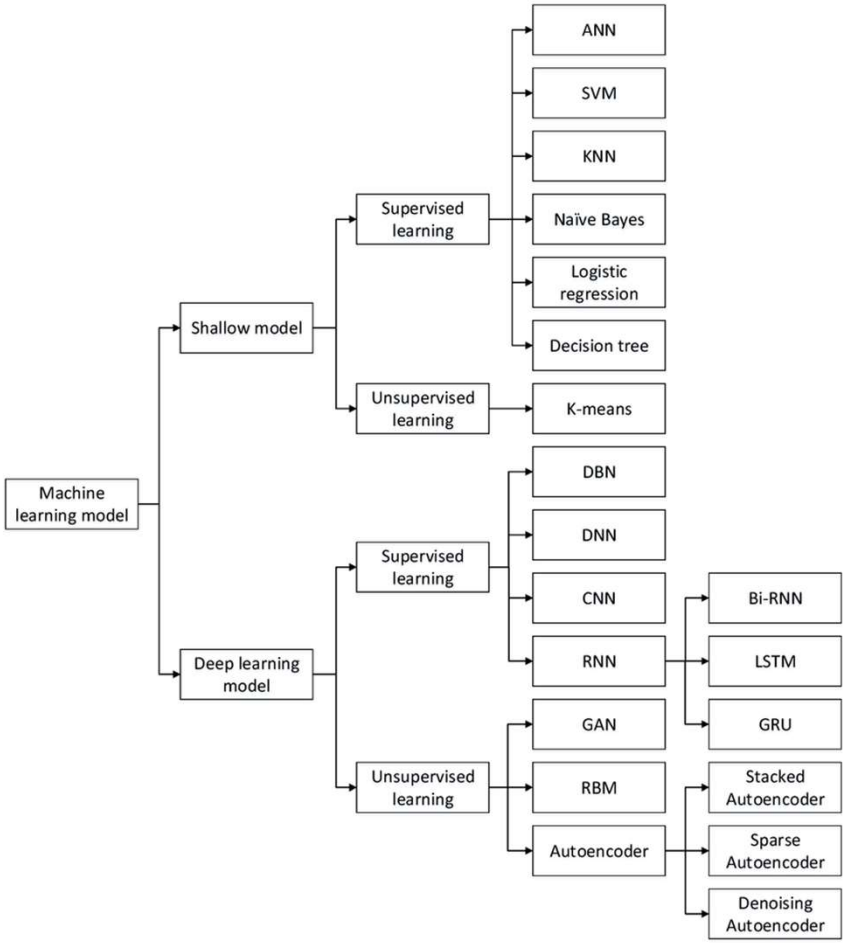
انواع مدل



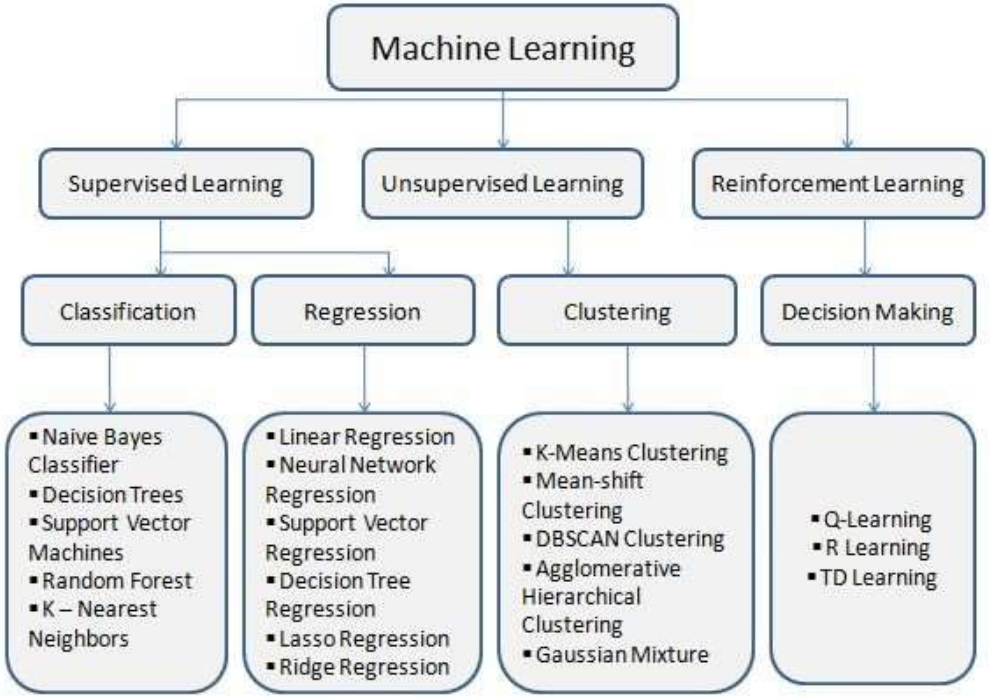




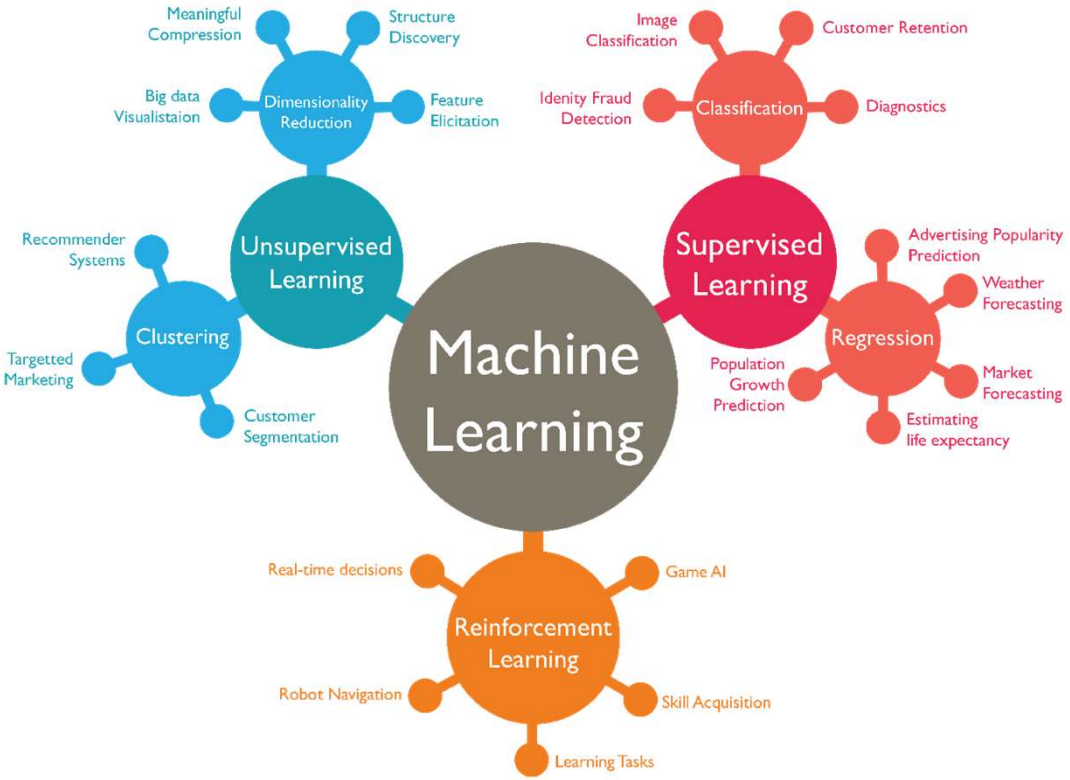
Machine Learning (ML)



انواع مدل



Thank You!


Machine Learning
Unsupervised Learning
Dimensionality Reduction
Meaningful Compression
Structure Discovery
Big data Visualistaion
Feature Elicitation
Clustering
Recommender Systems
Targetted Marketing
Customer Segmentation
Supervised Learning
Classification
Image Classification
Customer Retention
Idenity Fraud Detection
Diagnostics
Regression
Advertising Popularity Prediction
Weather Forecasting
Population Growth Prediction
Market Forecasting
Estimating life expectancy
Reinforcement Learning
Real-time decisions
Game AI
Robot Navigation
Skill Acquisition
Learning Tasks