



SNS COLLEGE OF TECHNOLOGY
An Autonomous Institution
Coimbatore-35



Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A++’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECT303-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

III YEAR/ V SEMESTER

UNIT 1 – FUNDAMENTALS OF MACHINE LEARNING

TOPIC – INTRODUCTION TO MACHINE LEARNING



19ECT303-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING Syllabus



UNIT I	FUNDAMENTALS OF MACHINE LEARNING
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Definition of learning systems-Goals and applications of machine learning-Types of Machine Learning- - Machine Learning Process-Terminology-Weight Space-The Curse of Dimensionality- Testing Machine Learning Algorithms.

UNIT II	SUPERVISED LEARNING
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Regression: Linear Regression-Parametric Models-Multivariate Regression. Classification: Bayesian Decision Theory-parametric and non-parametric methods- Multivariate Classification-Logistic Regression-K-Nearest Neighbor classifier. Decision Tree based methods for classification and Regression-Ensemble methods.

UNIT II	UNSUPERVISED LEARNING
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Introduction-Clustering-K-means clustering, EM algorithm, Hierarchical Clustering-Principal Component Analysis-Probabilistic PCA.



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UNIT IV	NEURONS & NEURAL NETWORKS
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The Brain and The Neuron-Neural Networks-Perceptron-Training the perceptron -Perceptron Learning Algorithm-Multilayer Perceptron-Back Propagation -Dimensionality Reduction.

UNIT V	DEEPLARNING
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Convolutional Networks, Recurrent Neural Networks, Bidirectional RNNs, Deep Recurrent Networks, Recursive Neural Networks, Applications – Speech Recognition.

COURSE OUTCOMES

At the end of the course student should be able to:

C01	Demonstrate the concepts of machine learning, and its algorithms
C02	Understand supervised learning algorithms for different applications
C03	Analyze unsupervised learning algorithms for different applications
C04	Solve problems using artificial neural networks
C05	Acquire knowledge about deep learning techniques



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TEXT BOOKS

1	EthemAlpaydin,“IntroductiontoMachineLearning”,4 th edition,MITPress, March2020.
2	Mitchell,Tom,“MachineLearning”, NewYork,McGraw-Hill,FirstEdition,2013.
3	IanGoodFellow,YoshuaBengio,AaronCourville,“DeepLearning”,MITPressBook,2016.

REFERENCES

1	StephenMarshland,“MachineLearning:AnAlgorithmicPerspective”,Chapman&Hall/CRC2009.
2	MehryarMohri,AfshinRostamizadeh,AmeetTalwalkar,“FoundationsofMachineLearning”,MITPress (MA)2012.



Why **Machine Learning** is important?



- Machine Learning can reduce costs, mitigate risks, and improve quality of life by recommending products/services, detecting cybersecurity breaches, and **enabling self-driving cars**. It is becoming more common and will soon integrate into many facets of life.
- Machine Learning is a popular subfield of Artificial Intelligence used in various fields, including **healthcare, finance, infrastructure, marketing, self-driving cars, recommendation systems, chatbots, social sites, gaming, cyber security, and others**.



Why **Machine Learning** is important?



- Machine Learning is critical because it allows businesses to interpret customer behavior trends and understand business operation patterns in a broader context. Furthermore, today's top companies, such as Facebook, Google, and Uber, are prioritizing Machine Learning in their operations.



What is **Artificial Intelligence**?

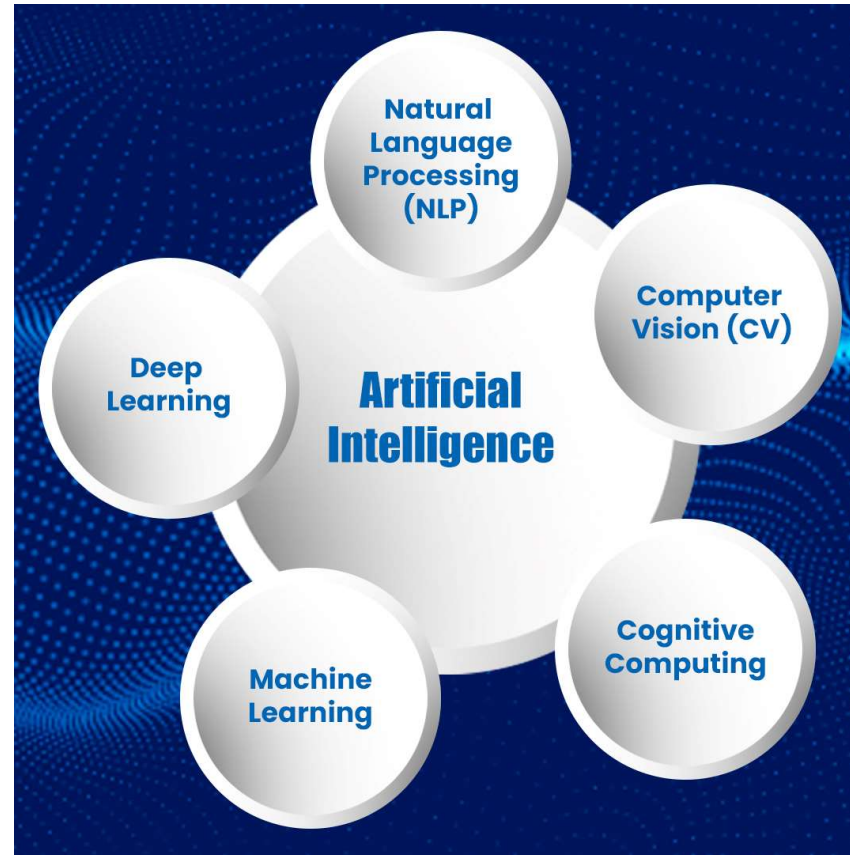


Artificial intelligence (AI) is an area of **computer science** that emphasizes **the creation of intelligent machines** that **work** and **react** like humans.

- **AI** is an interdisciplinary science with multiple approaches.
- **AI** has become an essential part of the technology industry.

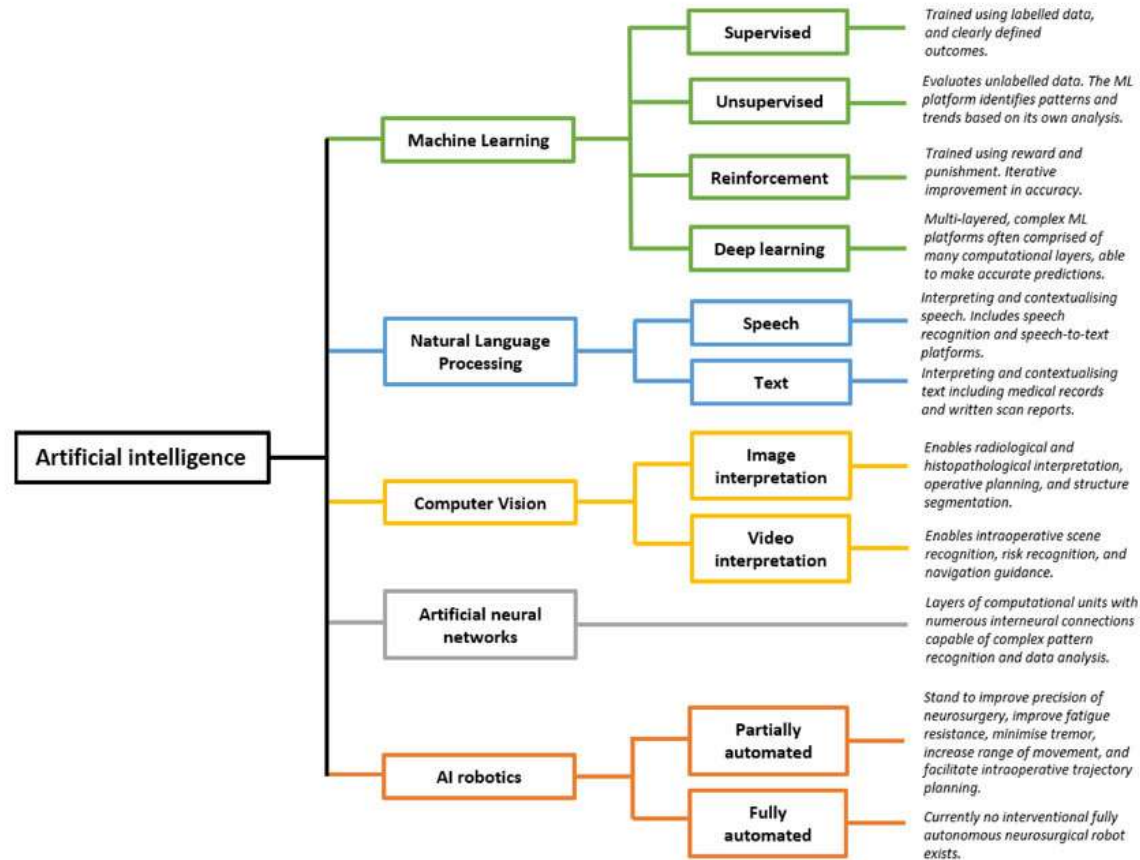


Subdomains of **Artificial Intelligence**





Subdomains of Artificial Intelligence

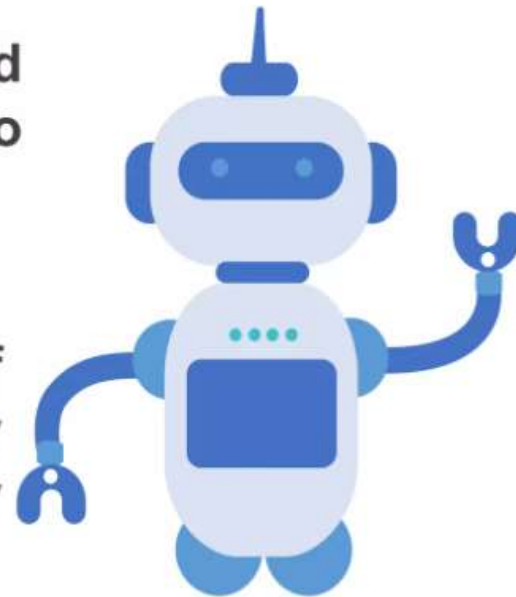




What is **Machine Learning** ?

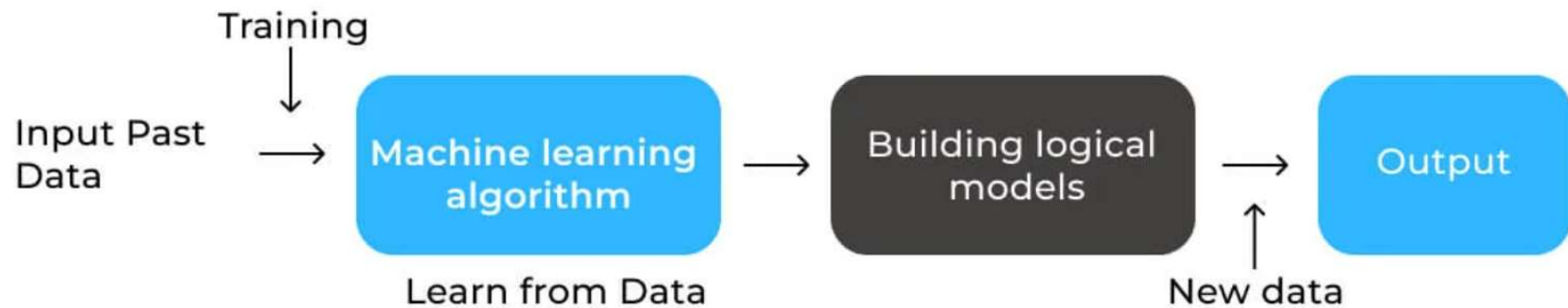


- Machine Learning is the science (and art) of programming computers so they can learn from data.
- Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed. —**Arthur Samuel, 1959**



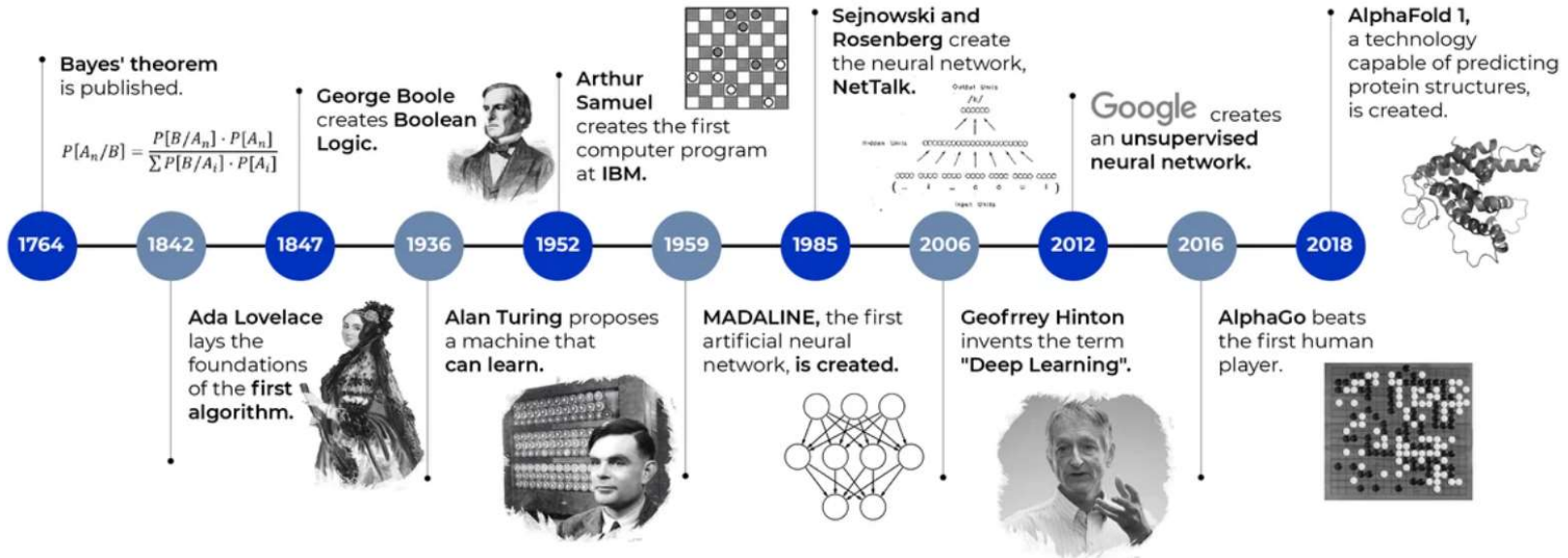


How does **Machine Learning** works?



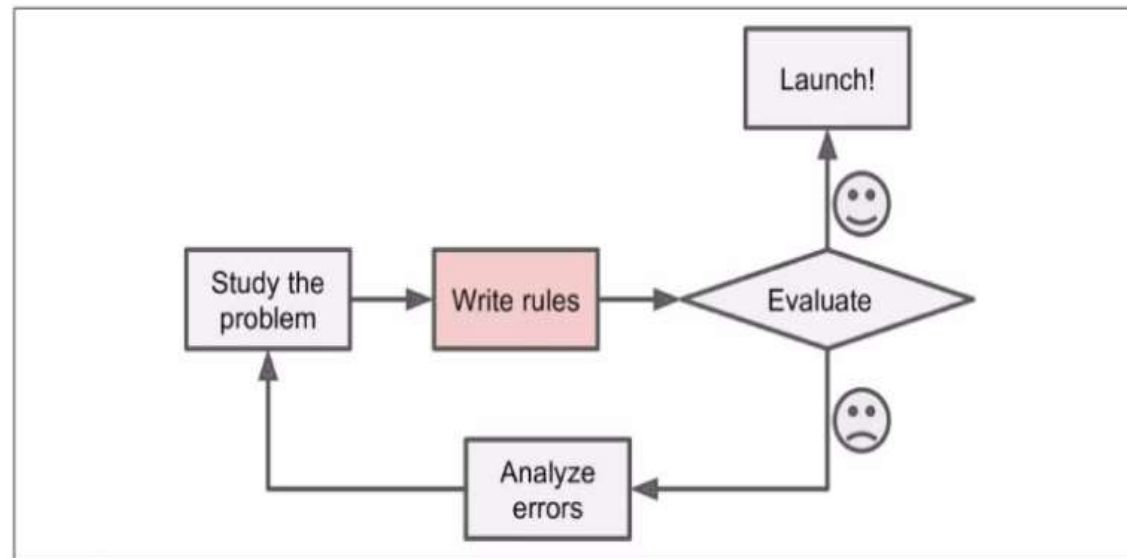


Machine Learning Timeline





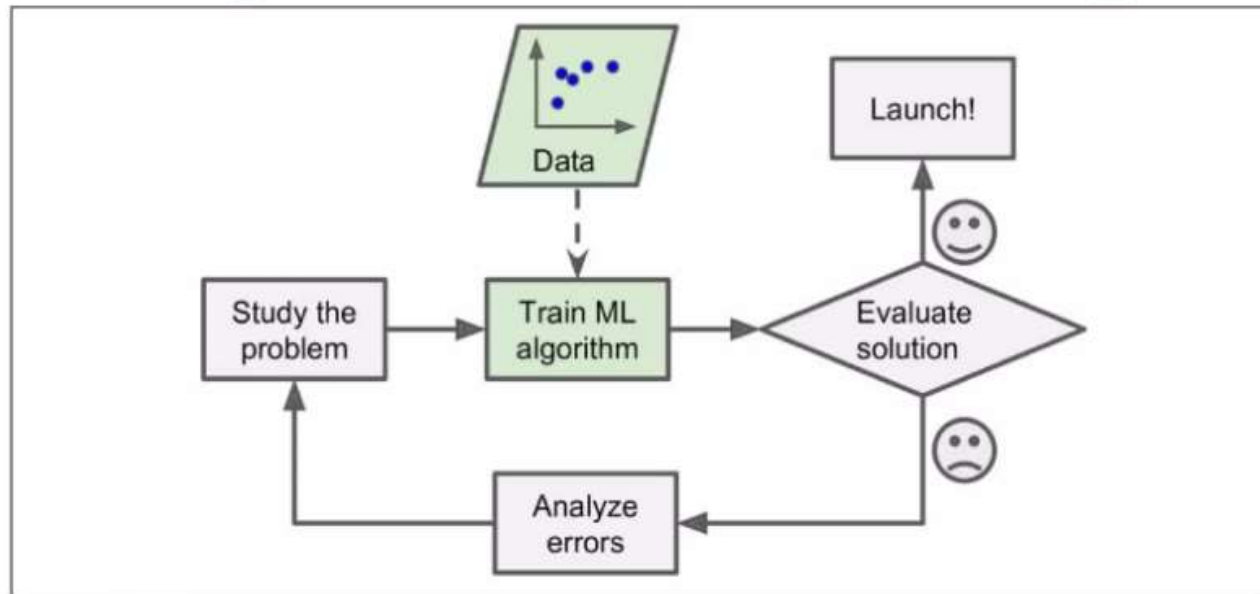
Why use **Machine Learning** ?



The traditional approach. If the problem is not trivial, your program will likely become a long list of complex rules pretty hard to maintain.



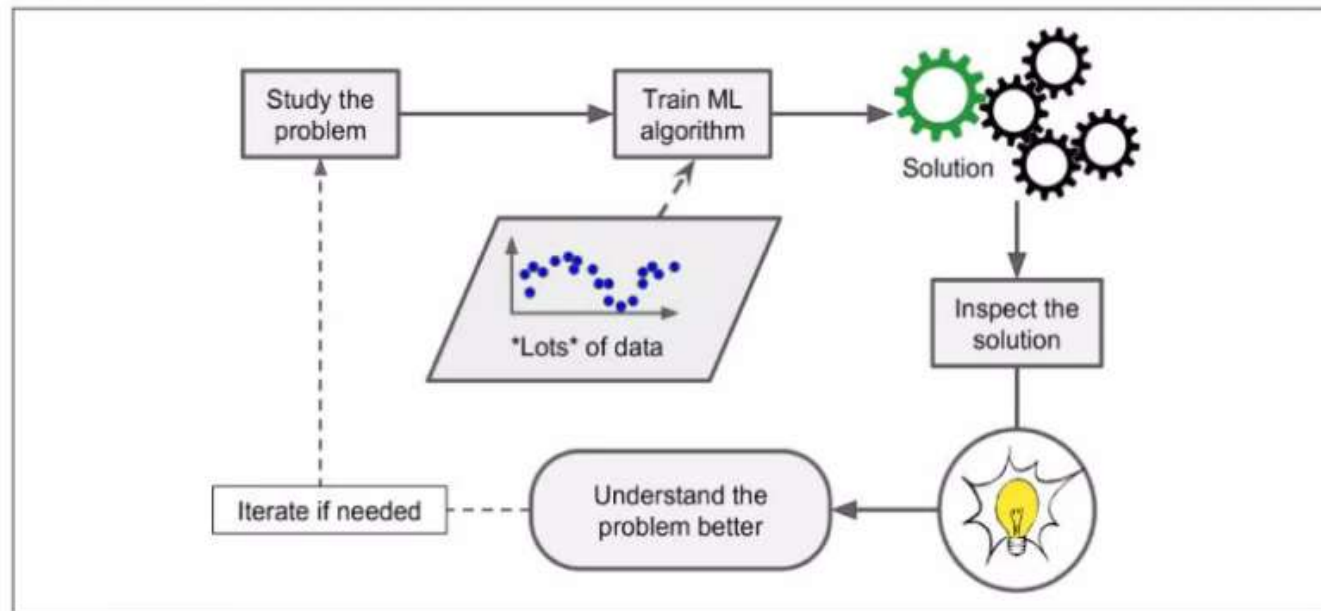
Why use **Machine Learning** ?



Machine Learning approach. The program is much shorter, easier to maintain, and most likely more accurate.



Why use **Machine Learning** ?



Machine Learning can help humans learn.

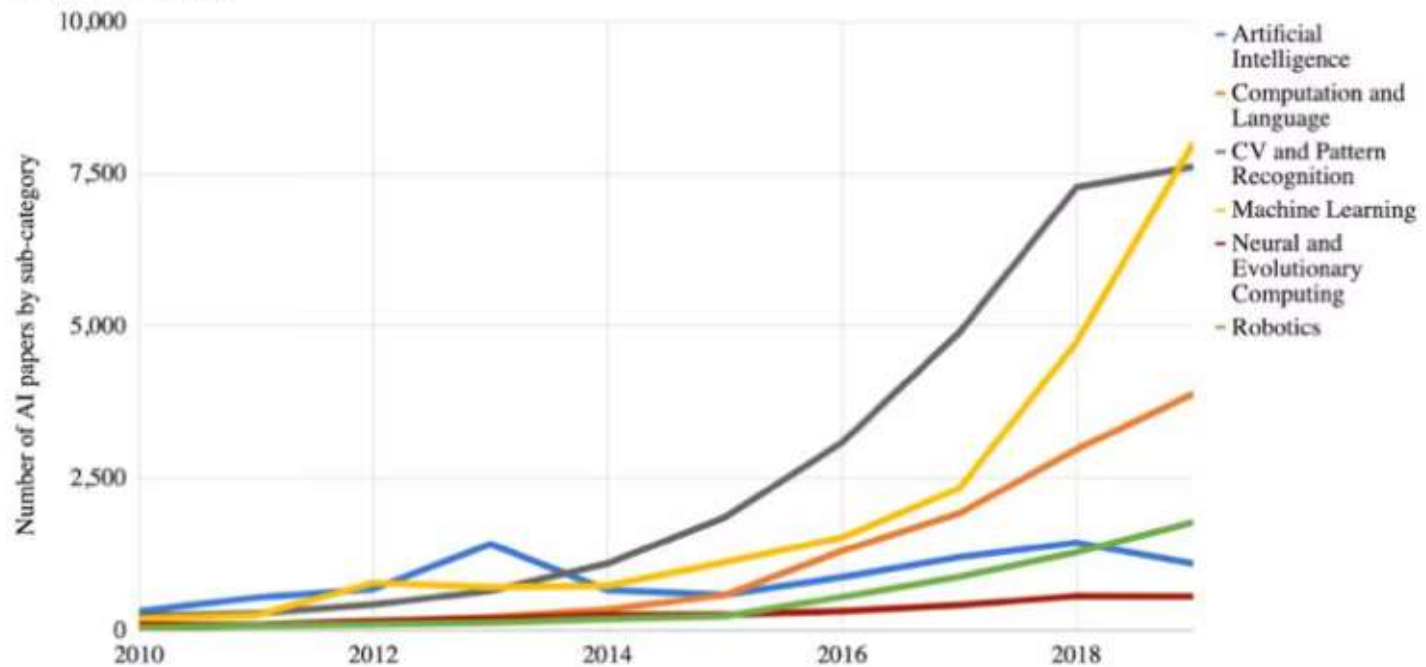


Why use **Machine Learning** ?



Number of AI papers on arXiv, 2010-2019

Source: arXiv, 2019.



AI Index 2019 Annual Report.



Applications of **Machine Learning**



Machine learning is currently the preferred approach in the following domains:

- 1) **Speech analysis:** e.g., speech recognition, synthesis.
- 2) **Computer vision:** e.g., object recognition/detection.
- 3) **Robotics:** e.g., position/map estimation.
- 4) **Bio-informatics:** e.g., sequence alignment, genetic analysis.
- 5) **E-commerce:** e.g., automatic trading, fraud detection.
- 6) **Financial analysis:** e.g., portfolio allocation, credits.
- 7) **Medicine:** e.g., diagnosis, therapy conception.
- 8) **Web:** e.g., Content management, social networks, etc.



Assessment



1. What is the **need of AI**?
2. What are the difference between **AI & ML**?
3. List the **subdomains of AI**.
4. List few day to day **AI applications**.
5. What is the expected **growth of AI in the year of 2025**?



SUMMARY & THANK YOU

29/07/2024

INTRODUCTION TO ML/19ECT303-AIML/Mrs.A.Sakira Parveen/AP/ECE/SNSCT