

INTRO TO AI/ML

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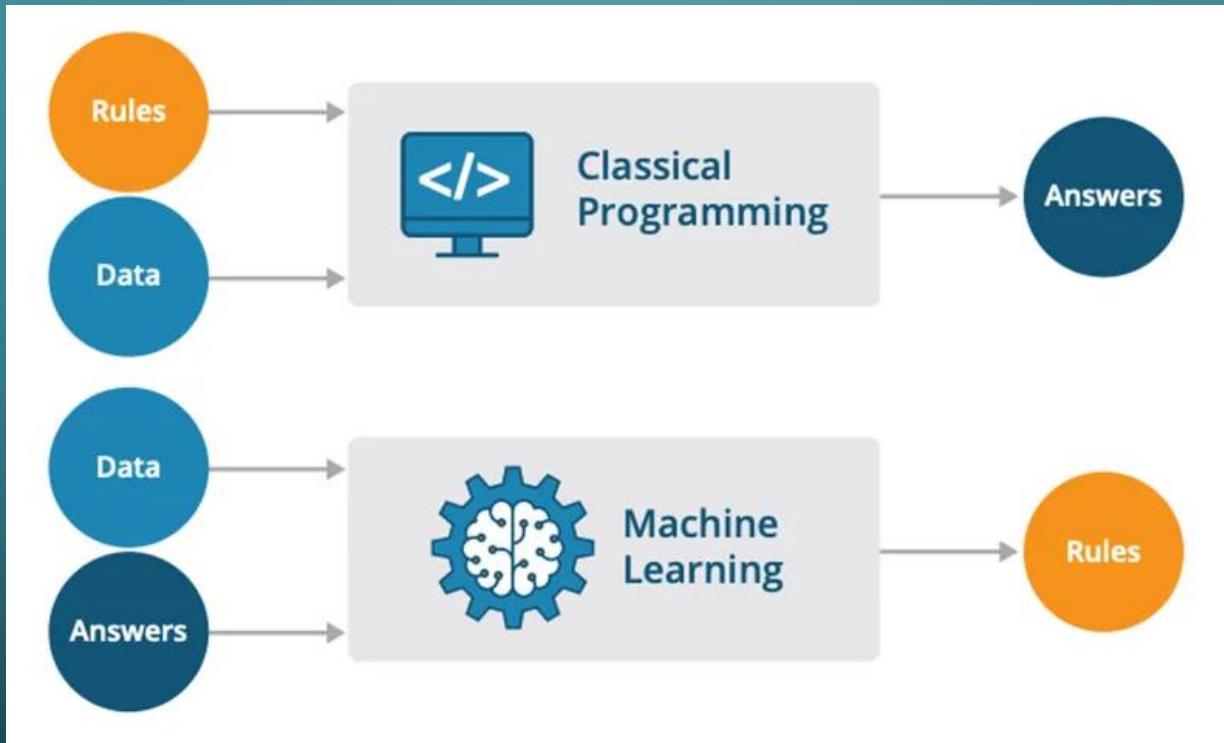
APRIL 9TH, 2025

AGENDA

- ML vs Traditional Programming
- ML we see everyday
- Types of ML
- What we need to learn to master ML
- ML Learning Process
- Supervised Learning
- Unsupervised Learning
- Reinforcement Learning
- Deep Learning
- Generative AI
- Learning Resources

MACHINE LEARNING VS TRADITIONAL PROGRAMMING^[1]

AI pioneer Arthur Samuel define Machine Learning as
“the field of study that gives computers the ability to learn without explicitly being programmed.”^[2]

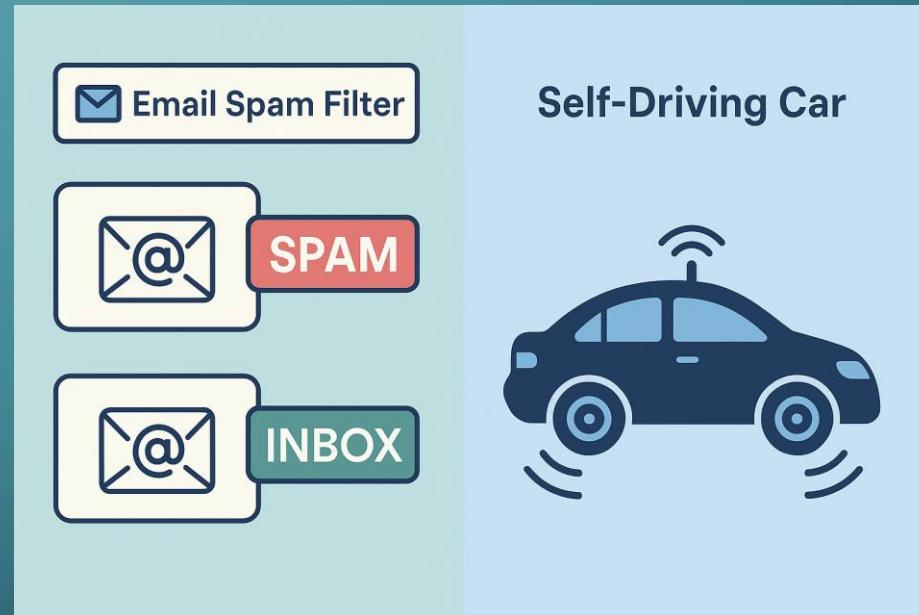


^[1] <https://sravya-tech-usage.medium.com/traditional-programming-vs-machine-learning-e9bbbed5e491c>

^[2] <https://mitsloan.mit.edu/ideas-made-to-matter/machine-learning-explained>

MACHINE LEARNING: WE SEE EVERYDAY

- Email Spam Filter
- Netflix Movie Recommendations
- ChatGPT
- Self Driving Cars

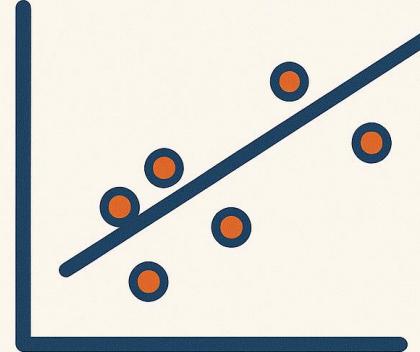


Source: ChatGPT

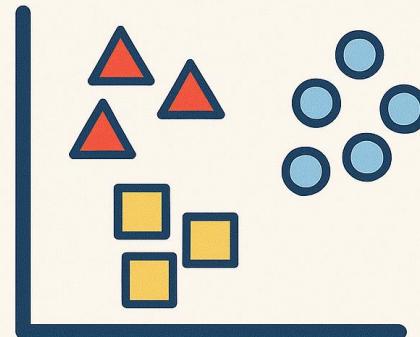
TYPES OF MACHINE LEARNING

- Supervised Learning
- Unsupervised Learning
- Deep Learning
- Reinforcement Learning
- Generative AI: Transformers and others

Supervised Learning



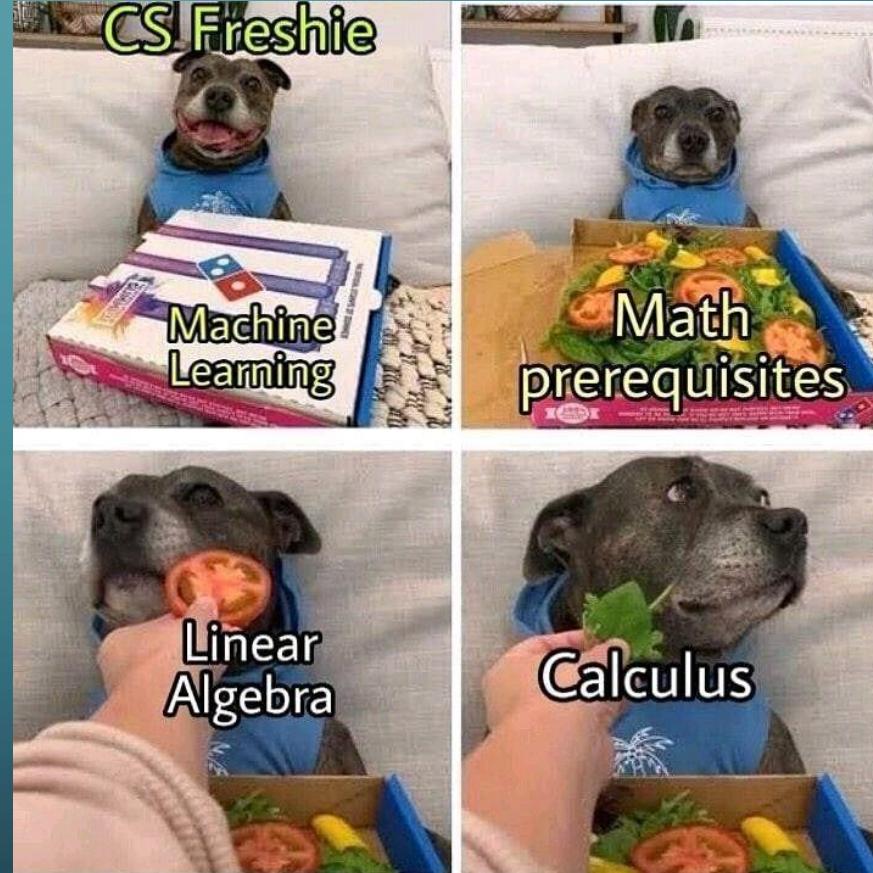
Unsupervised Learning



Source: ChatGPT

WHAT YOU NEED TO MASTER ML

- Linear Algebra
- Statistics
- Probability
- Calculus
- Programming: Python



Source: Social Media

THE LEARNING PROCESS

Step-by-step:

1. Collect data 
2. Train model 
3. Test model 
4. Make predictions 



Source: <https://xkcd.com/>

SUPERVISED LEARNING^[3]

- Supervised learning is a category of ML that uses labeled datasets to train algorithms to predict outcomes and recognize patterns
- **Regression:** Used to predict a continuous value using the relationship between two or more variables.
- **Classification :** Used to group data by predicting a categorical label based on the input data.



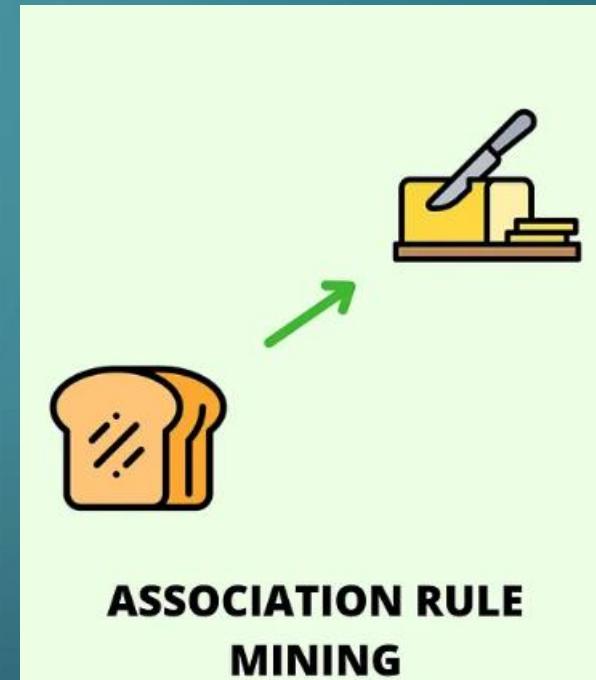
Source: ChatGPT

^[3] <https://cloud.google.com/discover/what-is-supervised-learning>

UNSUPERVISED LEARNING^[4]

- Unsupervised learning is a type of ML that learns from data without human supervision.
- **Clustering:** Technique for breaking unlabeled data into groups.
- **Association Rule Mining:** It is a rule-based approach to find associations in data.
- **Dimensionality reduction:** Reduce features to a limited few.

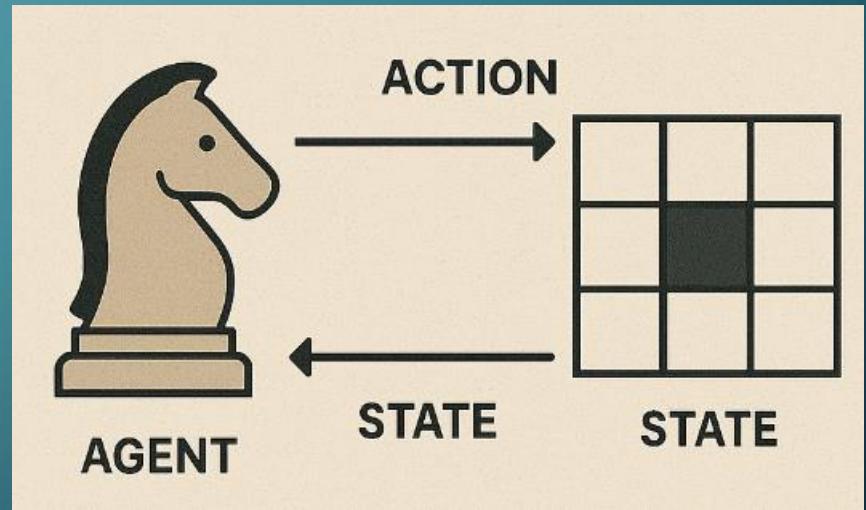
^[4] <https://cloud.google.com/discover/what-is-unsupervised-learning>



Source:
<https://medium.com/@utkarsh.kant/comparing-association-rule-mining-with-other-similar-methods-d964eaafad91>

REINFORCEMENT LEARNING^[5]

- Reinforcement learning is a ML technique that trains software to make decisions to achieve the most optimal results.
- It mimics the trial-and-error learning process that humans use to achieve their goals.
- RL algorithms use a reward-and-punishment paradigm as they process data.
- They learn from the feedback of each action and self-discover the best processing paths to achieve final outcomes.

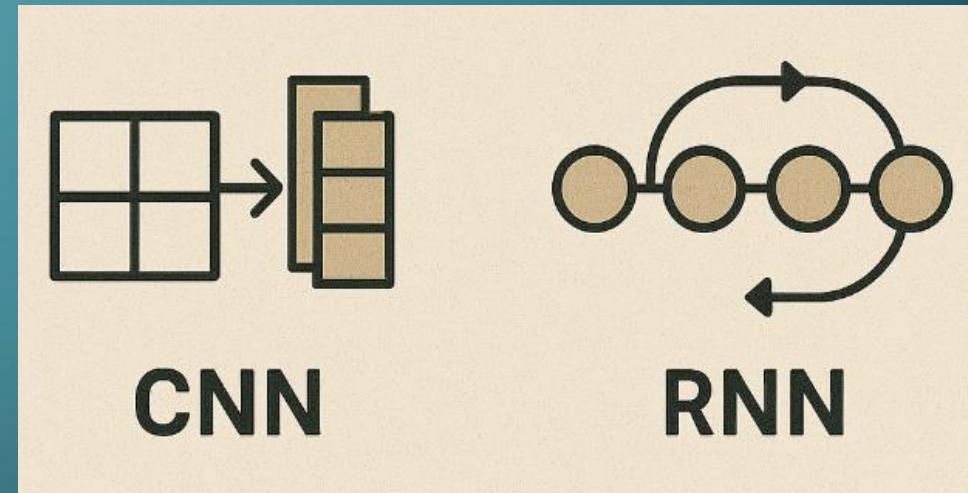


Source: ChatGPT

^[5] <https://aws.amazon.com/what-is/reinforcement-learning/>

DEEP LEARNING^[6]

- Deep learning is a subset of ML that uses multilayered neural networks, called deep neural networks, to simulate the complex decision-making power of the human brain.
- **Convolutional neural networks (CNNs)** are used primarily in computer vision and image classification applications.
- **Recurrent neural networks (RNNs)** are typically used in natural language and speech recognition applications as they use sequential or time-series data.

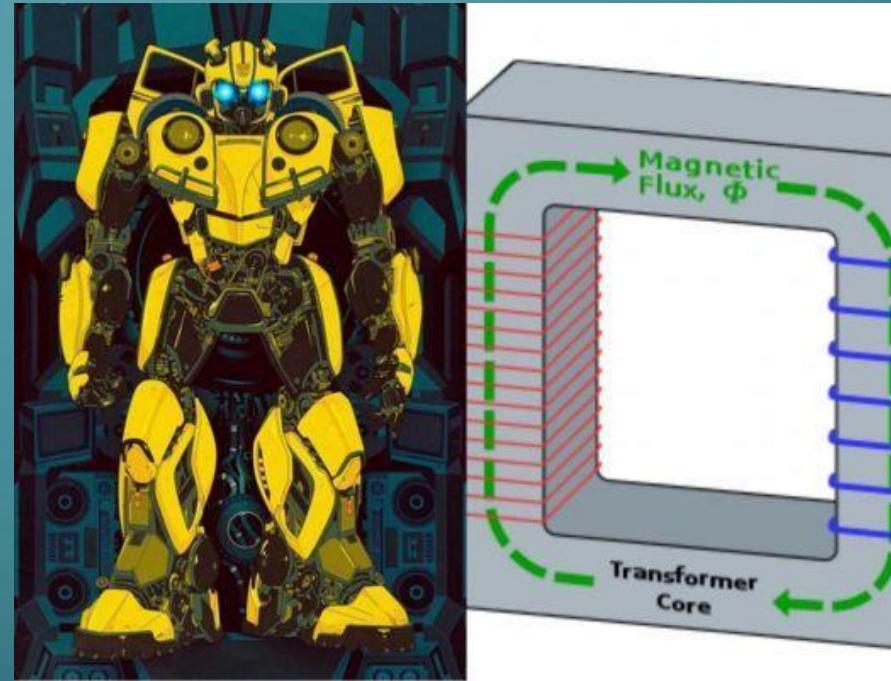


Source: ChatGPT

^[6] <https://www.ibm.com/think/topics/deep-learning>

GENERATIVE AI^[7]

- Gen AI is artificial intelligence that can create original content—such as text, images, video, audio or software code—in response to a user's prompt or request.
- **Transformers:** Transformers use a concept called *attention*—determining and focusing on what's most important about data within a sequence



Transformers at school Transformers at college Transformers today

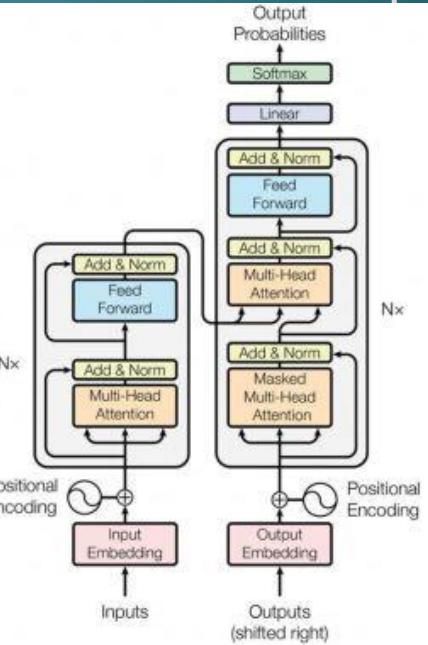


Figure 1: The Transformer - model architecture.

^[7] <https://www.ibm.com/think/topics/generative-ai>

Source: Social Media

RESOURCES TO LEARN

- [Intro to Statistical Learning with Python Book](#)
- [Intro to Statistical Learning with Python: Youtube Playlist](#)
- [Intro to Machine Learning: Kaggle Course](#)
- [AI For Everyone: Course by Andrew Ng on Coursera](#)
- [Essence of Linear Algebra: Youtube Playlist by 3Blue1Brown](#)
- [Statistics: Youtube Playlist by Khan Academy](#)