

Module 1

AI, ML & Deep Learning - Visual Study Notes

Hierarchical Relationship

Deep Learning ⊂ Machine Learning ⊂ Artificial Intelligence

Key Definitions

-  **Artificial Intelligence**: Programs that sense, reason, act and adapt
-  **Machine Learning**: Programs that learn patterns from data without explicit programming
-  **Deep Learning**: ML using multi-layered neural networks

Major AI Breakthroughs

-  **Image Processing**: Computers outperform humans in image classification since 2015
-  **Machine Translation**: Near-human performance in language translation

Machine Learning Concepts

-  **Key Principle**: More data = better patterns (with diminishing returns)
- **ML Components**:
- **Features**: Input variables used for predictions
- **Target**: Variable being predicted

Types of Machine Learning

Supervised Learning vs Unsupervised Learning

Characteristic	Supervised	Unsupervised
Data	Labeled data with target	No labeled data/targets
Goal	Predict labels for new data	Find underlying structure
Example	Fraud detection	Customer segmentation

Evaluation

Clear metrics

No definitive right/wrong answers

Classical ML vs Deep Learning

Classical ML:

- Requires manual feature engineering
- Better for smaller datasets & rapidly changing data
- Works well with structured data

Deep Learning:

- Automatically extracts features from raw data
- Excels with large datasets
- Handles complex problems like image classification
- Uses neural networks for complex relationships

Impact of AI

 "AI will impact every major industry like electricity did 100 years ago" - Andrew Ng

 Applications: targeted marketing, supply chain, self-driving cars, smart homes

Summary Box

- **1** **AI > ML > Deep Learning** hierarchy shows increasing specialization
- **2** **Supervised ML** uses labeled data; **Unsupervised ML** finds hidden patterns
- **3** **Classical ML** works better for smaller datasets; **Deep Learning** excels with large complex data
- **4** AI's transformative impact spans multiple industries and applications

ARTIFICIAL INTELLIGENCE

A program that can sense, reason,
act, and adapt

MACHINE LEARNING

Algorithms whose performance improve
as they are exposed to more data over time

DEEP LEARNING

Subset of machine learning in
which multilayered neural
networks learn from
vast amounts of data

IBM

1x