ECC504-AI&ML

Introduction

Guidelines and Expectations

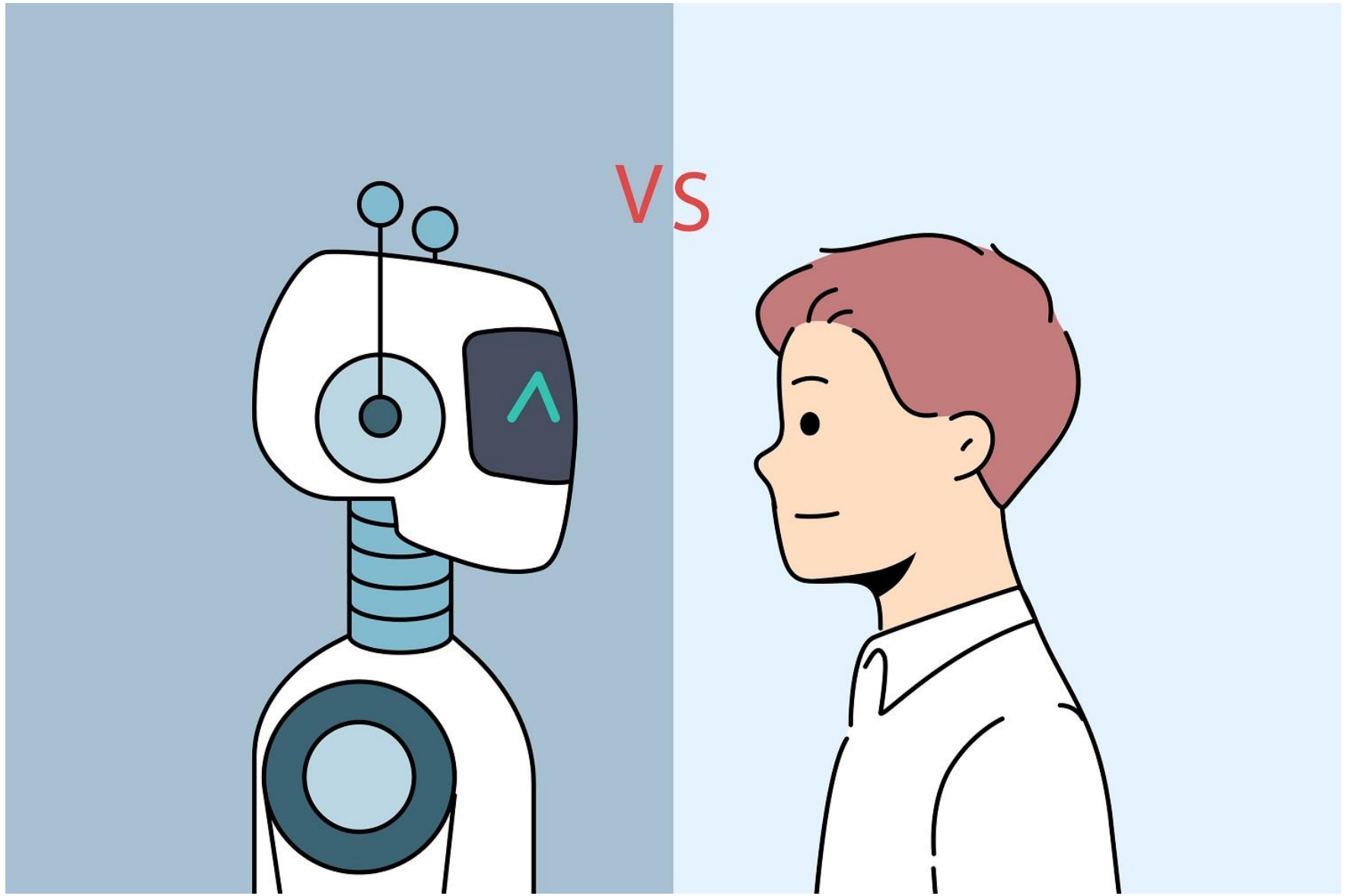
1. Two Capstone Projects:
   - Completion of two capstone projects is mandatory this semester.
2. Attendance Policy:
   - Low attendance is acceptable if your score in the examination remains above 75%.
   - If performance is poor and attendance is low, it will be reported along with marks (unless any major medical issue arises).
3. Discussion Hours: (course-related or beyond) on Tuesday and Thursday.
4. Importance of Initial Classes:
   - The initial classes are crucial for understanding the fundamentals.
   - Skipping early classes may result in loss of interest and difficulty in keeping up.

"What Is AI-ML, and Why Should We Care?"

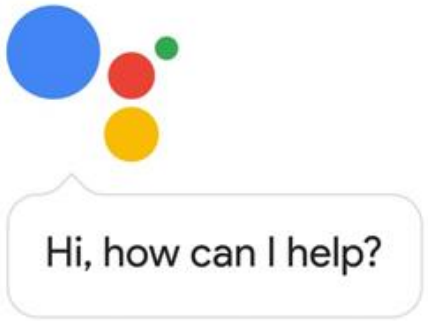
“AI Around You” ??

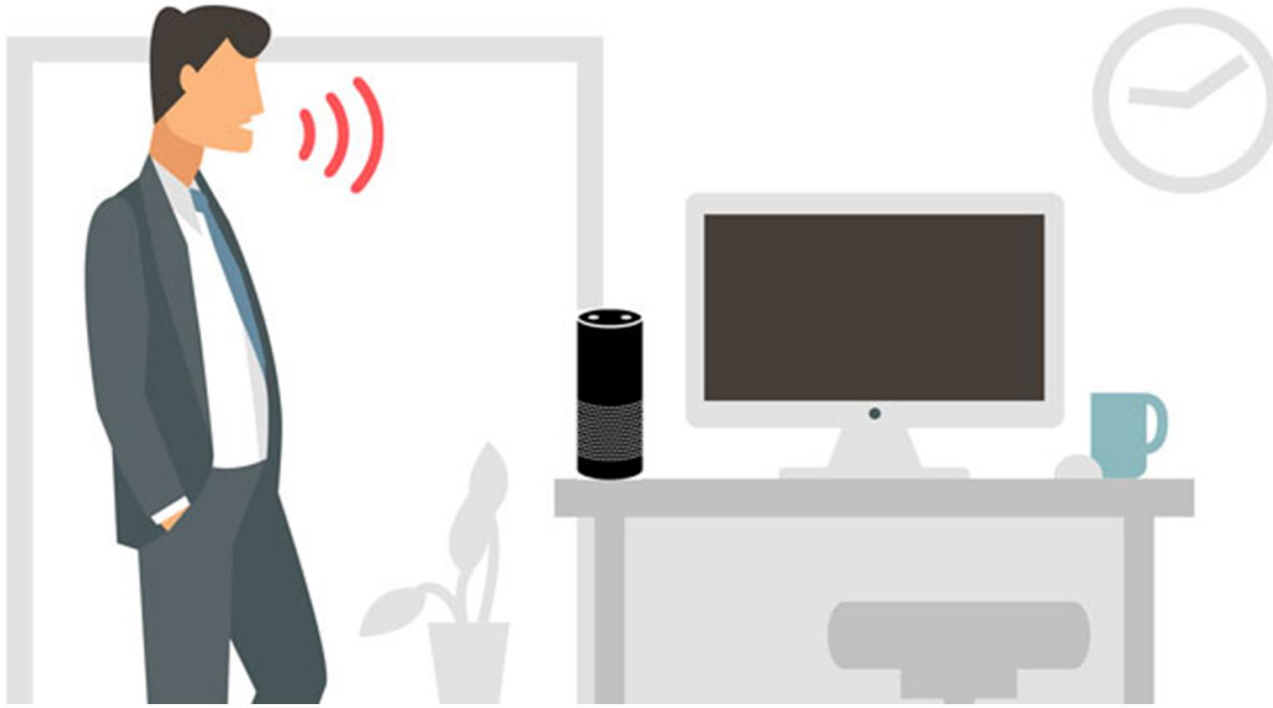
What do you think AI is?

HHI vs HMI


VS

Voice-based Automation





ANI vs AGI – Key Differences

- 🔹 ANI (Artificial Narrow Intelligence):
- - Designed for one specific task or domain
- - Examples: ChatGPT, Siri, Google Maps, Image Classifiers
- - Cannot transfer learning to unrelated tasks
- - Already exists and is widely used

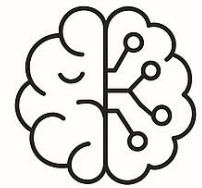
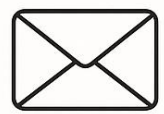
- 🔹 AGI (Artificial General Intelligence):
- - Human-level intelligence across all domains
- - Capable of reasoning, planning, and learning like a human
- - Still a research goal, not yet achieved
- - Fictional examples: Jarvis (Iron Man), HAL 9000

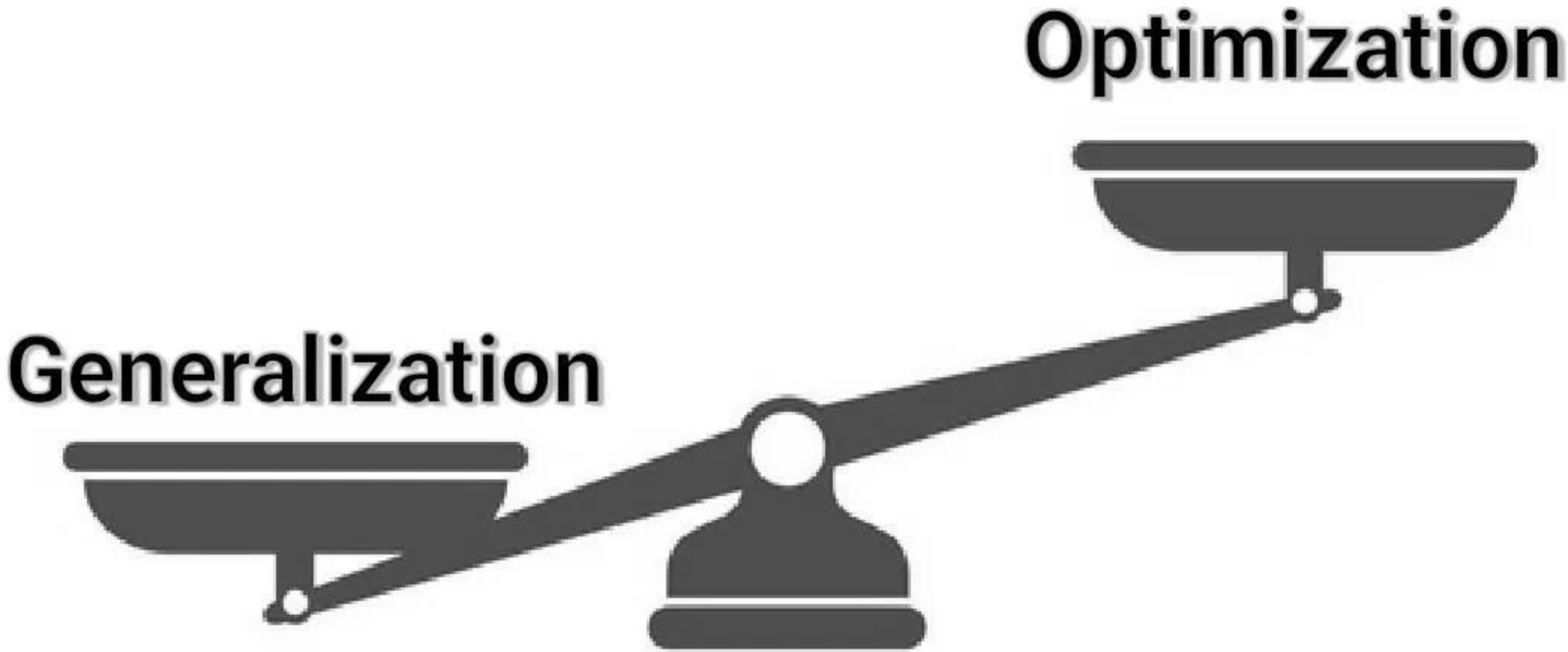
Terminology

- Model
- Training
- Optimization
- HPT
- Inference
- Generalization
- Evaluation
- Deployment

"AI/ML systems learn patterns from data to make predictions, decisions, or take actions—without being explicitly programmed for each scenario."

AI vs. Rule-Based Systems

Rule-Based System	AI/ML System
	
• Uses explicitly coded rules • Logic defined by human experts • Rigid – can't handle exceptions	• Learns patterns from data • Discovers logic from examples • Flexible – adapts to new scenarios
	
Spam Filter	**Loan Approval**
• Rule-Based: IF "lottery' in subject • **AI-Based:** Learns what spam looks like	• Rule-Based: IF income > ₹50k THEN approve • **AI-Based:** Learns who is good credit risk


Optimization
Generalization

Optimization: Use the training data to continuously strengthen the model to get the best results possible, you can think of it as “learning” of the machine.

Generalization: Refers to the performance of the trained model on unseen data.

2004 mugshot-style portrait

A

2023, conference room camera, cropped from video frame

C

2009, non-frontal, shadow

2008, poor contrast, non-frontal

2006, blur, non-frontal

2008, sunglasses

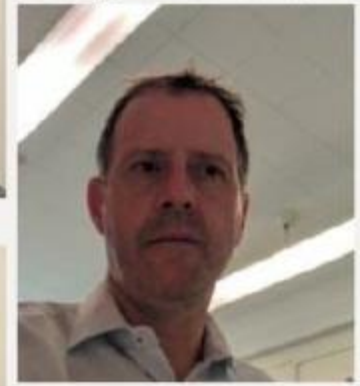
2008, poor contrast, shadow

2017, profile viewpoint

2017, extreme pitch angle

2017, extreme pitch angle

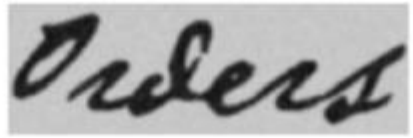
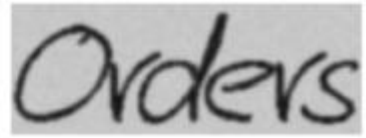
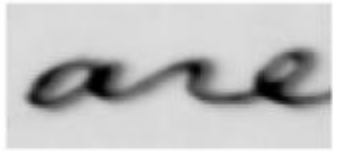
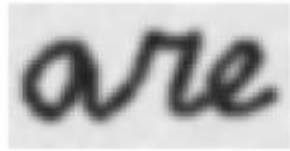
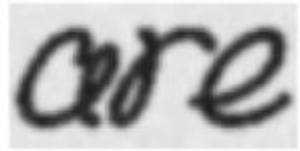
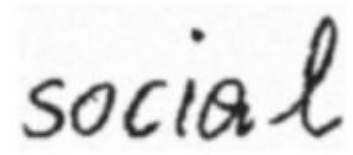
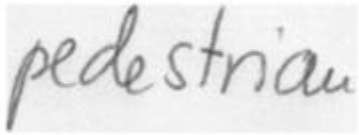
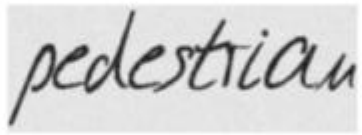
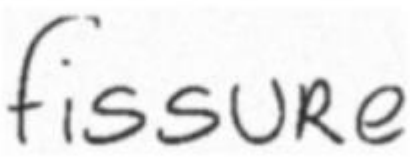
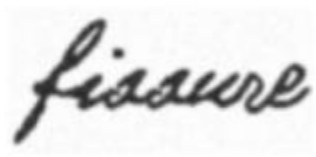
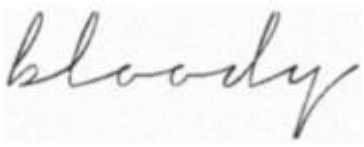
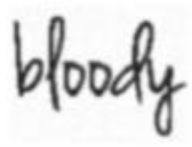
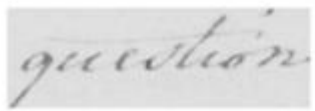
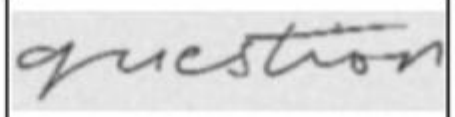
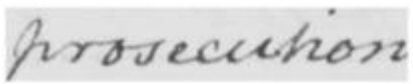
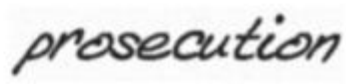
2021, scan of drivers license



2019, poor contrast

B

shutterstock.com · 1145442833

	Original	Predicted	Dissimilar
GW			
			
IAM			
			
CVL			
			
BT			
			

Dear Mr Darcy Freestyle Script

Dear Mr Darcy Bradley Hand ITC

Dear Mr Darcy Lucida Calligraphy

Dear Mr Darcy Lucida Handwriting

Dear Mr Darcy Mistral

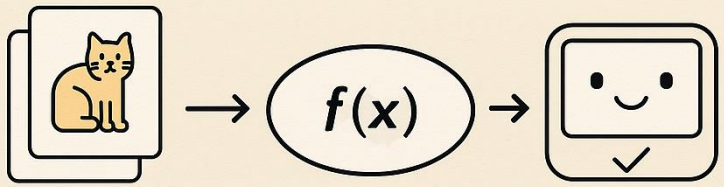
Dear Mr Darcy Script MT Bold

Dear Mr Darcy Segoe Script

Dear Mr Darcy Segoe Print

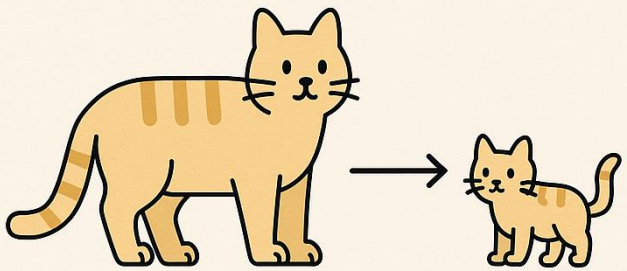
Understanding AI & ML

How do machines learn?



The goal of machine learning is:

To perform well on new, unseen data



Books

1. “**Deep Learning with Python**” – François Chollet

   Keras-based practical introduction, great for hands-on learners.
2. “**Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow**” – Aurélien Géron
3. “**Deep Learning**” – Ian Goodfellow, Yoshua Bengio, Aaron Courville

   The “Bible of Deep Learning” — foundational theory, architectures, optimization.