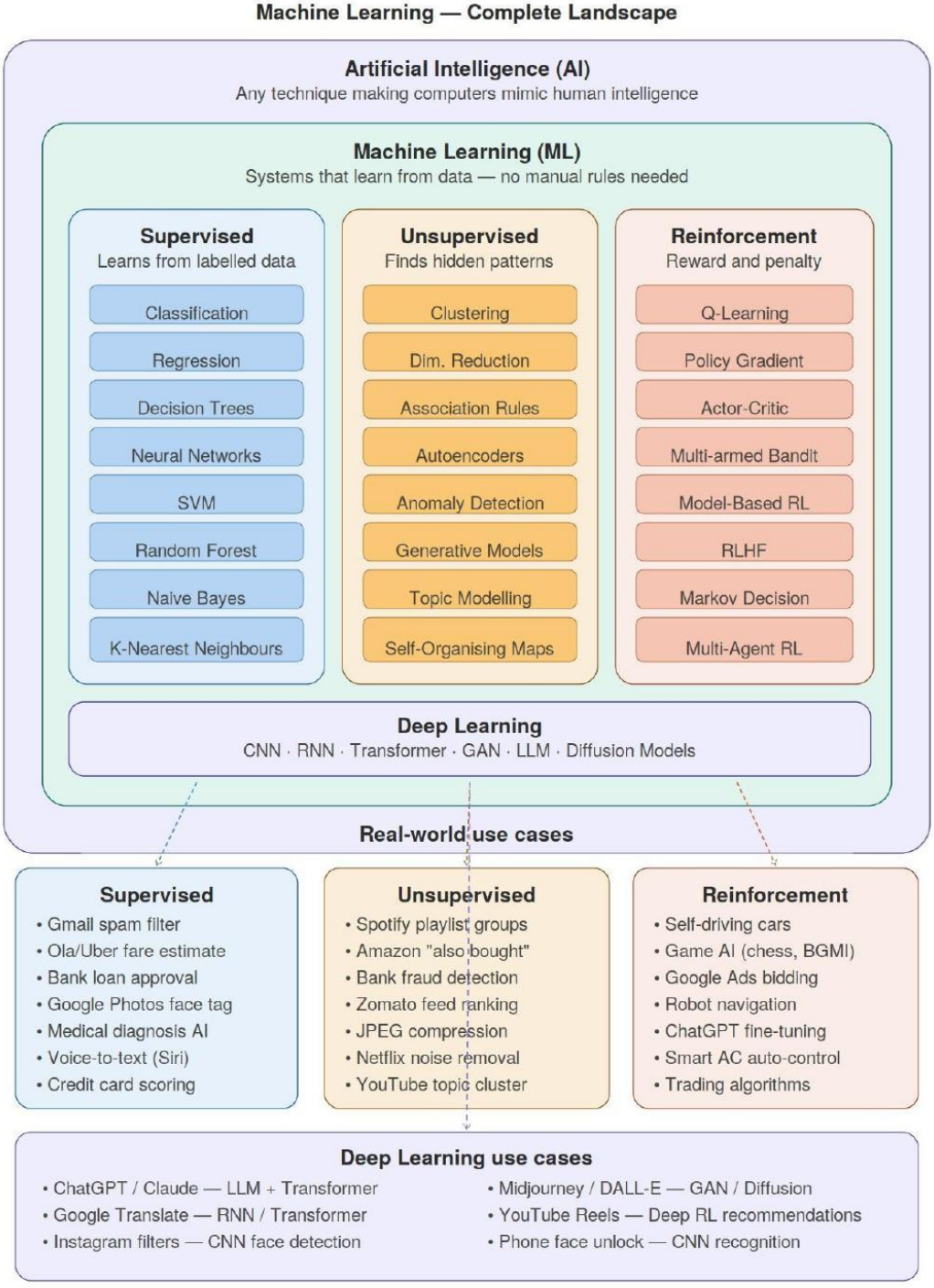
Machine Learning — Complete Landscape
Artificial Intelligence (AI)
Any technique making computers mimic human intelligence
Machine Learning (ML)
Systems that learn from data — no manual rules needed
Supervised
Learns from labelled data
Classification
Regression
Decision Trees
Neural Networks
SVM
Random Forest
Naive Bayes
K-Nearest Neighbours
Unsupervised
Finds hidden patterns
Clustering
Dim. Reduction
Association Rules
Autoencoders
Anomaly Detection
Generative Models
Topic Modelling
Self-Organising Maps
Reinforcement
Reward and penalty
Q-Learning
Policy Gradient
Actor-Critic
Multi-armed Bandit
Model-Based RL
RLHF
Markov Decision
Multi-Agent RL
Deep Learning
CNN · RNN · Transformer · GAN · LLM · Diffusion Models
Real-world use cases
Supervised
• Gmail spam filter
• Ola/Uber fare estimate
• Bank loan approval
• Google Photos face tag
• Medical diagnosis AI
• Voice-to-text (Siri)
• Credit card scoring
Unsupervised
• Spotify playlist groups
• Amazon "also bought"
• Bank fraud detection
• Zomato feed ranking
• JPEG compression
• Netflix noise removal
• YouTube topic cluster
Reinforcement
• Self-driving cars
• Game AI (chess, BGMI)
• Google Ads bidding
• Robot navigation
• ChatGPT fine-tuning
• Smart AC auto-control
• Trading algorithms
Deep Learning use cases
• ChatGPT / Claude — LLM + Transformer
• Google Translate — RNN / Transformer
• Instagram filters — CNN face detection
• Midjourney / DALL-E — GAN / Diffusion
• YouTube Reels — Deep RL recommendations
• Phone face unlock — CNN recognition

Understanding the Machine Learning Landscape — In Simple Words
Here is what the big diagram actually means, explained simply for students who are seeing it for the first time.

Artificial Intelligence (AI) — The Big Box

- AI is the broadest idea — any technique that makes a computer mimic human intelligence.
- Think of it as an umbrella term. Everything inside the diagram — ML, Deep Learning, all of it — falls under AI.
- Example: A chatbot answering your question, a spam filter, a self-driving car — all AI.

Machine Learning (ML) — Inside AI

- Instead of programmers writing fixed rules, the computer learns the rules from data on its own.
- Feed it thousands of examples, and it figures out the pattern by itself.
- Example: Show it 10,000 cat photos and it learns what a cat looks like — no one hard-coded "four legs + whiskers."

Supervised Learning — Learning with an Answer Key

- You give the computer both the questions AND the correct answers. It learns by comparing its guesses to the right answers.
  - **Classification:** Puts things into groups — spam or not spam, healthy or sick. The answer is always a category.
  - **Regression:** Predicts a number — like the price of a flat or next month's sales.
  - **Decision Trees:** Like a flowchart of yes/no questions that leads to a decision — approve or reject.
  - **Neural Networks:** Inspired by the brain. Layers of calculations that work together to recognise faces and understand language.
  - **SVM:** Draws the clearest dividing line between two groups of data.
  - **Random Forest:** Many decision trees voting together — the majority wins.
  - **Naive Bayes:** Uses probability — "given these words, how likely is this email spam?"
  - **K-Nearest Neighbours (KNN):** "You are like your neighbours." Classify a new point based on the category of the nearest existing points.

Unsupervised Learning — Finding Hidden Patterns

- You give the computer data but NO answers. It has to discover patterns on its own.
  - **Clustering:** Groups similar things automatically — like Spotify grouping listeners by music taste.
  - **Dimensionality Reduction:** Compresses complex data into fewer pieces while keeping what matters.
  - **Association Rules:** "People who buy X also buy Y" — how Amazon's also-bought recommendations work.
  - **Autoencoders:** Compresses data then rebuilds it — used for image compression and noise removal.
  - **Anomaly Detection:** Spots unusual activity — like your bank blocking a suspicious midnight transaction.
  - **Generative Models:** Creates new data from scratch — realistic images, voices, or text.
  - **Topic Modelling:** Reads thousands of articles and finds the main topics inside them automatically.

    - **Self-Organising Maps:** Maps complex data onto a simple grid so patterns become visible.

Reinforcement Learning — Learning by Trial and Error

- Like training a dog. The computer gets a reward for good actions and a penalty for bad ones.
- It tries millions of combinations until it gets really good at the task.

Deep Learning — The Powerhouse

- A powerful neural network with many layers — "deep" simply means many layers stacked together.
- Needs lots of data, but can solve problems that older methods cannot touch.
    - **CNN (Convolutional Neural Network):** Built to understand images — used in face unlock, Instagram filters, and medical scans.
    - **LLM (Large Language Model):** A giant Transformer trained on billions of pages of text — this is ChatGPT and Claude.

AI in Focus: How Face Unlock Uses Neural Networks

When your phone unlocks just by looking at it, a CNN runs on a tiny chip inside your device. Here is how it works in plain steps.

How It Works — Step by Step

- **The camera captures your face. Apple Face ID also shoots invisible infrared dots to build a 3D map — so a flat photo cannot fool it.**Step 1 — Capture:
- **The CNN scans your face layer by layer — first detecting edges, then shapes like your nose and jaw. The result is a number code called a face embedding — your unique face password.**Step 2 — Feature Extraction (the CNN at work):
- **Your face embedding from right now is compared against the one stored when you set up Face ID. If the match score is above a threshold (very high for security), the phone unlocks. This comparison takes milliseconds.**Step 3 — Matching:
- **Every time you unlock successfully, the stored embedding quietly updates. That is why Face ID still recognises you after you grow a beard, put on glasses, or change your hairstyle — the neural network adapts over time.**Step 4 — Continuous learning:

Why a CNN and Not a Regular Neural Network?

A regular neural network sees every pixel as separate. A CNN knows that nearby pixels connect to form shapes — making it far faster and more accurate for anything visual.

DAY 2 / 10-DAY AI BOOTCAMP / 1 HOUR

ChatGPT and Claude — Getting Started

Navigate the interface, set up accounts, complete 6 real tasks.

TIME	ACTIVITY	TYPE
0:00–0:15	Interface tour — ChatGPT and Claude on projector	DEMO
0:15–0:50	Hands-on — accounts setup + 6 real tasks	HANDS-ON
0:50–1:00	What AI can and cannot do — the honest list	WRAP-UP

Part 1 — Interface Tour: ChatGPT and Claude (0:00 – 0:15)

Open chat.openai.com on the projector. Walk through the interface slowly

ChatGPT — what to point out:

- The message box at the bottom — this is where you type.
- The sidebar on the left — every conversation you have is saved here by title.
- Type a question and press Enter. Watch the response stream word by word. Say: “That streaming is not a delay — that IS the model generating text, one word at a time, exactly as we discussed.”
- Ask a follow-up question in the same chat. Show that it remembers the earlier message. Then click “New Chat” and ask the same follow-up. It has no memory. Say: “Every new chat is a blank slate.”

Claude — what to point out:

- Open claude.ai — similar layout, message box at the bottom.
- Claude tends to give longer, more structured answers. ChatGPT is often more concise. Neither is always better — it depends on the task.
- The memory rule applies here too: within one chat it remembers everything, across different chats it remembers nothing.

The Memory Rule — Crucial for Daily Use

- Within one conversation: AI remembers everything you said. Refer back freely.
- Between conversations: AI remembers nothing. Every new chat, you are a stranger to it.
- For ongoing projects: either stay in the same chat, or paste a brief context summary at the start of each new session.

Part 2 — Use the Tools (0:15 – 0:50)

Create accounts first — this takes about 8 minutes. Walk around and assist

- Go to chat.openai.com — click Sign Up — use email — verify — done. No credit card needed.
- Go to claude.ai — click Sign In — use Google or email — verify — done. Also free.

Six tasks every student completes today:

Task 1 — Ask Something Real

Type a question you genuinely want answered — not a test question, something personal. Health, career, recipes, study help, local news — anything. Read the full response carefully.

Task 2 — Ask a Follow-Up

Based on the answer, ask a follow-up without repeating the original question. Notice it remembers the context automatically.

Example: If you asked about symptoms of a cold, follow up with “What home remedies work best?”

Task 3 — Change the Language

Ask: “Explain that again in Hindi.” Watch it switch instantly. Try mixing Hindi and English if you like.

Task 4 — Make It Simpler

Ask: “Explain that as if I am in Class 7.” See how completely the vocabulary and sentence structure change.

Task 5 — Ask for a List

Ask: “Give me 5 advantages of learning computer skills for someone looking for a job in India today.” Notice the formatted, structured output.

Task 6 — Compare Both Tools

Ask the exact same question on both ChatGPT and Claude. Compare the answers. Which is clearer? Which is more detailed? Which would you prefer?

Part 3 — What AI Can and Cannot Do (0:50 – 1:00)

Before we finish today, let's be completely honest about what these tools are good for and where they will let you down.

AI CAN do these well:

- ✓ Write and edit any kind of text — emails, letters, essays, reports, social media posts
- ✓ Explain concepts at any level — expert, student, or child — in any language
- ✓ Summarise long documents into key points in seconds
- ✓ Generate ideas, suggestions, options and alternatives on any topic
- ✓ Write, explain and debug code in most programming languages
- ✓ Create tables, schedules, lists and structured documents
- ✓ Answer general knowledge questions (with verification still needed for facts)

AI CANNOT be relied on for:

- ✗ Browse the internet in real time — it cannot check today's news or live prices
- ✗ Remember you between different conversations — every new chat, you are a stranger
- ✗ Diagnose illness or give legal advice — it gives general information only
- ✗ Do maths reliably — always verify any calculation independently
- ✗ Know recent events — its knowledge has a cutoff date
- ✗ Keep your information private — never share Aadhar, bank details, or passwords

Tomorrow: we learn the one skill that makes AI five times more useful. It takes ten minutes to learn and you will use it every single day for the rest of your career.

BY END OF THIS CLASS, STUDENTS WILL:

- ✓ Navigate the ChatGPT and Claude interfaces independently
- ✓ Have active free accounts on both tools
- ✓ Complete all 6 hands-on tasks successfully
- ✓ Explain the AI memory rule: same chat remembers, new chat forgets
- ✓ State what AI can and cannot reliably do

ChatGPT and Claude — Getting Started

Set up your accounts, learn the interface, and complete 6 real tasks.

Name: _____ Roll No.: _____ Date: _____

The Two Tools We Use — ChatGPT and Claude

Both tools are free to use. Both are powerful. They work the same way — you type a message, they respond. The key differences are in style and strength.

	ChatGPT	Claude
Website	chat.openai.com	claude.ai
Best for	General tasks, quick answers	Long writing, detailed explanations
Style	Concise, often shorter responses	Thorough, structured responses
Memory	Within one chat only	Within one chat only
Cost	Free tier available	Free tier available

The Memory Rule — Most Important Rule for Daily Use

HOW AI MEMORY WORKS

› WITHIN one conversation: AI remembers everything you said. You can refer to earlier messages freely.

› BETWEEN conversations: AI remembers NOTHING. Every new chat is a blank slate. It does not know your name, your previous questions, or your preferences.

› For ongoing work: either stay in the same chat, or paste a short context summary at the start of a new session.

Six Tasks You Completed Today

Task 1 — Ask Something Real

You typed a genuine question and read the full response.

Task 2 — Ask a Follow-Up

You asked a follow-up without repeating the original question — AI remembered.

Task 3 — Change the Language

You asked AI to explain in Hindi (or another language). It switched instantly.

Task 4 — Simplify

You asked AI to explain as if you were in Class 7. The vocabulary completely changed.

Task 5 — Ask for a List

You asked for 5 advantages of computer skills in India. AI gave a clean formatted list.

Task 6 — Compare Both Tools

You asked the same question on ChatGPT and Claude and compared the outputs.

What AI Can and Cannot Do

Use this as a quick reference before starting any task with AI:

AI IS GOOD AT	AI IS NOT RELIABLE FOR
Writing and editing any kind of text	Real-time information (today's news, live prices)
Explaining concepts at any level	Medical diagnosis or legal advice
Summarising long documents	Maths calculations (always verify)
Generating ideas and options	Facts about recent events (knowledge cutoff)
Writing and explaining code	Remembering you between sessions
Translating between languages	Keeping your personal data private

WHAT YOU LEARNED TODAY

✓ Navigate both ChatGPT and Claude independently

✓ Explain the memory rule: same chat remembers, new chat forgets

✓ Complete all 6 hands-on tasks successfully

✓ Know what AI can and cannot reliably do

DAY 2 ASSIGNMENT

Task 1 — **Explore a Topic You Care About**

Pick any topic you are genuinely curious about — career, health, cooking, sports, anything. Ask ChatGPT at least 4 follow-up questions in one conversation. Write the topic you chose and what the most useful thing AI told you was.

Task 2 — **Language Experiment**

Ask AI to explain the same concept in (1) English, (2) Hindi, and (3) "as simply as possible for a 10-year-old." Write 1 sentence about how the outputs were different.

Task 3 — **Spot a Limitation**

Find one thing AI could NOT do well or got wrong during your session today. Describe what happened and why you think AI failed at that task.

Note: Save both ChatGPT and Claude in your browser bookmarks before tomorrow.

Claude AI Login Guide (English & Hindi)

English Instructions:

Step 1: Open https://claude.ai in your browser.

Step 2: Click on 'Sign In' at the top-right corner.

Step 3: Enter your email address and click Continue.

Step 4: Check your email for OTP and enter it.

Step 5: You are now logged in and can use Claude AI.

Note: No password required. Use a valid email. Check spam if OTP not received.

Hindi Instructions (Hindi text below):

Step 1: Apne browser me https://claude.ai kholen.

Step 2: Upar daahine kone me 'Sign In' par click karein.

Step 3: Apna email daalein aur Continue dabayen.

Step 4: Email me aaya OTP daalein.

Step 5: Ab aap Claude AI ka upyog kar sakte hain.

Note: Password ki zarurat nahi. Sahi email dein. OTP na mile to Spam check karein.