AI and Machine Learning Applications

Class 6-8

Chapter 1

Understanding Artificial Intelligence: Basics and Everyday Uses

Raman's Ingenious Solution: A Grandfather's New Friend

Raman's grandfather, Mr. Mehta, lived alone in a serene village surrounded by lush greenery and chirping birds. While the peaceful environment was soothing, loneliness often engulfed him. Worse, his memory was slipping with age, and he frequently forgot to take his medicines on time. Raman, living in the bustling city and juggling a demanding job, found it challenging to visit his grandfather as often as he wished.

One evening, as Raman sat at his desk, pondering how he could help, an idea struck him. *What if Artificial Intelligence technology could bridge the gap?* He decided to gift his grandfather an Alexa device, thinking it might simplify his life. Excited, Raman visited his grandfather over the weekend with the smart device in hand.

Initially, Mr. Mehta was puzzled by the little gadget. "What is this? Some sort of radio?" he asked, squinting at the sleek design. Raman chuckled, "No, Dadaji, this is Alexa. She can talk to you, set reminders, and even control things in your home!"

Skeptical but curious, Mr. Mehta watched as Raman demonstrated. He set up Alexa, showing how to ask questions, play music, and set alarms. "Alexa, remind me to take my medicine at 9 AM and 9 PM," Raman said. The device confirmed, and Mr. Mehta's eyes widened in amazement.

Over the next few days, Mr. Mehta started using Alexa more and more. He found it amusing to have a "companion" that responded to his voice. "Alexa, play old Hindi songs," he'd say, and his favorite melodies would fill the room. Alexa also became his personal assistant, reminding him about medicines, meals, and even the weather forecast.

As Raman noticed his grandfather's growing comfort with Alexa, he took it a step further. He introduced him to the concept of a smart home. With a few upgrades, Raman automated

the lights, fans, AC, and even the heater. Now, with just a simple command to Alexa, Mr. Mehta could turn devices on and off without getting up.

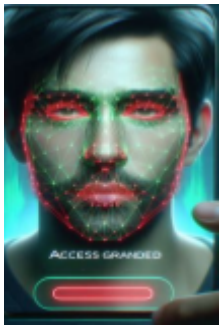
One cold winter evening, Mr. Mehta sat comfortably in his chair, the heater humming softly in the background. Smiling, he mused aloud, “Alexa, you’ve made my life so much easier.” He began telling his friends in the village about his "new helper."

Thanks to Raman’s thoughtful gesture, his grandfather not only felt less lonely but also regained a sense of independence and convenience. For Raman, knowing that Alexa was there to assist his beloved Dadaji brought immense peace of mind.

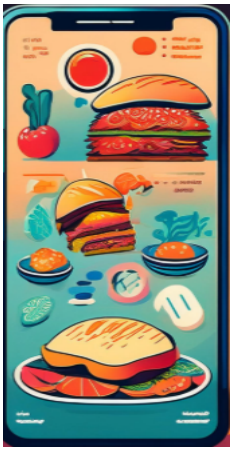
The bond between Mr. Mehta and Alexa grew stronger, a heartwarming reminder of how technology, when used thoughtfully, can touch lives in the most unexpected ways.

This story introduces us to the importance of Artificial Intelligence in day-to-day life. Let’s dive deeper into it.

Understanding Artificial Intelligence



Have you ever used facial recognition to unlock your laptop or gain access to an app, marvelling at how it identifies your face in seconds?
Have you watched Netflix or YouTube recommend shows and videos you might like, as if it knows your preferences better than anyone else?
Have you noticed how apps like Zomato or Swiggy suggest restaurants based on your taste or frequently offer deals at places you often order from?
Or maybe you’ve used apps like Duolingo that provide personalized lessons and real-time corrections to help you learn a new language faster?



The common thread behind all these amazing capabilities is **Artificial Intelligence (AI)**. Whether we realize it or not, AI plays a significant role in simplifying and enhancing our daily lives. To better understand AI, let’s break it down.

The term **Artificial Intelligence** is composed of two words:

- **Artificial**: Referring to anything created or developed by humans, rather than occurring naturally.
- **Intelligence**: The ability to think, learn, solve problems, and make decisions.

Together, Artificial Intelligence is the concept of embedding human-like intelligence into machines so that they can perform tasks that typically require human cognition.

But how do we teach machines to become intelligent? Let’s explore this idea further.

Understanding How Machines Become Intelligent

Making machines intelligent mirrors the way humans develop their intellect. When we are born, we have no knowledge of the world. Gradually, through learning from parents, teachers, and experiences, we acquire information and skills. Similarly, machines are trained by feeding them data and allowing them to learn from it.

For instance, to teach a machine to distinguish between cats and dogs, thousands of labeled images of each are provided. The machine learns to identify unique features, such as ear shape or fur patterns. Once trained, it can accurately classify new images as either a cat or a dog.

The Role of Data in AI

AI relies on various forms of data to perform specific tasks. This data can include:

- **Numerical data**: Measurements, statistics, or time-series data.
- **Textual data**: Words, phrases, or structured text.
- **Visual data**: Images, diagrams, or photos.
- **Audio data**: Voices, sounds, or music.
- **Video data**: A combination of visuals and sound.

Let’s explore how different data types enable specific AI applications:

1. Image Data: Unlocking Phones with Facial Recognition

Smartphones equipped with facial recognition rely on image data. During setup, your phone captures detailed images of your face, analyzing features such as eye distance, jawline, and nose shape.

- **How it works**: When you attempt to unlock the phone, its AI compares the current image with stored facial data, granting access if there’s a match.

2. Audio Data: Personalized Voice Assistants

Virtual assistants like Alexa and Google Assistant use audio data to create a unique voiceprint for each user. Over time, they learn voice patterns and nuances, enabling personalized interactions.

- **How it works**: When you issue a command like "Play my favourite song," the AI matches your voice to the stored profile and responds accordingly.

3. Text Data: Predictive Typing and Auto-Complete

Text-based data powers features like auto-complete, which suggests the next word based on patterns in your previous inputs.

- **How it works**: AI models analyze commonly used words and phrases to predict your typing behavior and save time.

Exploring AI Domains

AI applications can be broadly categorized into three domains: **Data Science**, **Computer Vision**, and **Natural Language Processing (NLP)**.

1. Data Science

(Finding Patterns in Data)

Imagine a shopkeeper who remembers your favorite snacks. Based on what you've bought before, they suggest other items you might like. Data science does the same thing, but with huge amounts of information.

Data science focuses on analyzing structured and unstructured data to extract insights, predict trends, and enable decision-making.

Real-Life Applications

- **Streaming Recommendations**: Netflix and Spotify suggest content based on viewing or listening history.
- **Health Monitoring**: Devices like Fitbits analyze health metrics to provide personalized advice.
- **Transport Optimization**: Uber and Ola improve routes and predict ride demand.
- **Weather Apps**: AI provides location-based weather forecasts.

2. Computer Vision

(Giving machines "eyes" to understand and interpret what they see)

Imagine playing a game of "I Spy." You describe something you see, like "a red ball," and someone guesses what it is. Computer vision trains machines to play this game using thousands of pictures to learn what different objects look like.

This domain enables machines to interpret and analyze visual data like images and videos.

Real-Life Applications

- **Medical Diagnosis**: AI interprets X-rays to detect illnesses.
- **Retail Analytics**: Stores use AI to track customer behavior and optimize layouts.
- **Self-Driving Cars**: Vehicles recognize objects like pedestrians, lanes, and traffic lights.

- **Photo Apps**: Apps like Google Photos can identify and organize your pictures based on people or places.

3. Natural Language Processing (NLP)

(**Teaching computers to "listen," "talk," and "understand" human language**)

Think of how you explain something to a friend in simple words. NLP does the same with machines. It teaches them to understand our words and respond appropriately.

NLP focuses on enabling machines to understand, interpret, and respond to human language.

Real-Life Applications

- **Chatbots**: Simulate human conversations for customer service.
- **Language Translation**: Convert text between languages in real-time.
- **Content Moderation**: Filter inappropriate comments on social media.

Watch this video for understanding the concepts clearly:

https://youtube.com/watch?v=tWle79ZMErU&feature=shared

Hands-On Activities

Here are detailed, hands-on activities to help beginners understand the three domains of AI using simple and accessible tools like **Teachable Machine** (by Google) or other beginner-friendly AI platforms.

Activity 1. Data Science Activity: "Sorting Favorite Colors Using Data Visualization"

Objective: Understand how data is collected, organized, and visualized to identify patterns.

Tools Needed:

- A free spreadsheet tool (Google Sheets, Excel).
- Access to a computer or smartphone.

Steps:

1. **Collect Data**:
    - Create a survey for a group of participants (friends, classmates, or family). Ask them to select their favorite color from a list (red, blue, green, yellow, etc.).
    - Record their responses in a spreadsheet.

2. **Organize Data**:
    - In the spreadsheet, create two columns: *Names* and *Favorite Colors*. Enter the survey responses.
3. **Visualize Data**:
    - Use the spreadsheet's charting tool to create a bar chart or pie chart of the favorite colors.
4. **Analyze the Data**:
    - Discuss which color is the most popular.
    - Talk about how companies like social media platforms use data to decide which features or ads to prioritize.

This activity help Participants see how data collection and visualization can reveal insights, similar to how businesses analyze user behavior.

Activity 2. Computer Vision Activity: "Training a Machine to Recognize Hand Gestures"

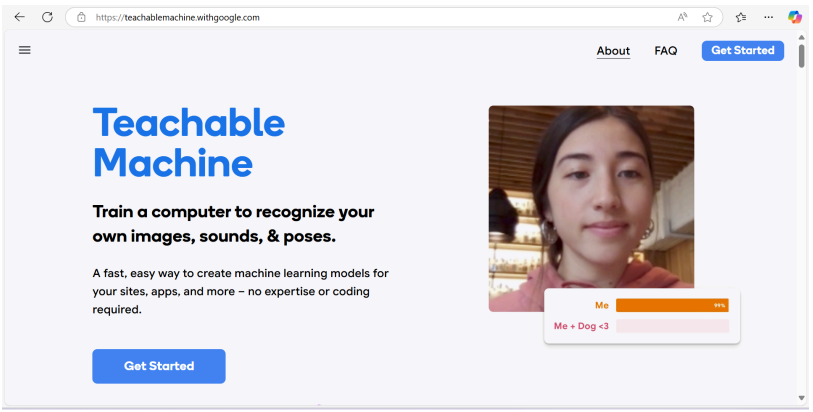
Objective: Learn how machines "see" and classify objects or gestures.

Tools Needed:

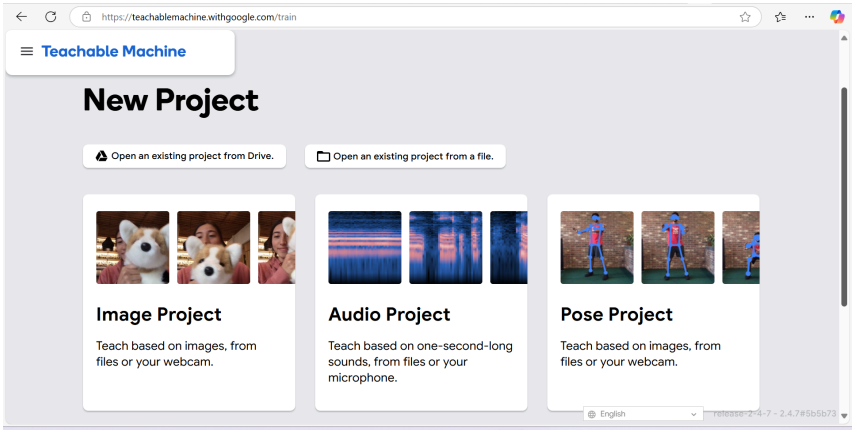
- Google Teachable Machine
- A webcam or smartphone camera.

Steps:

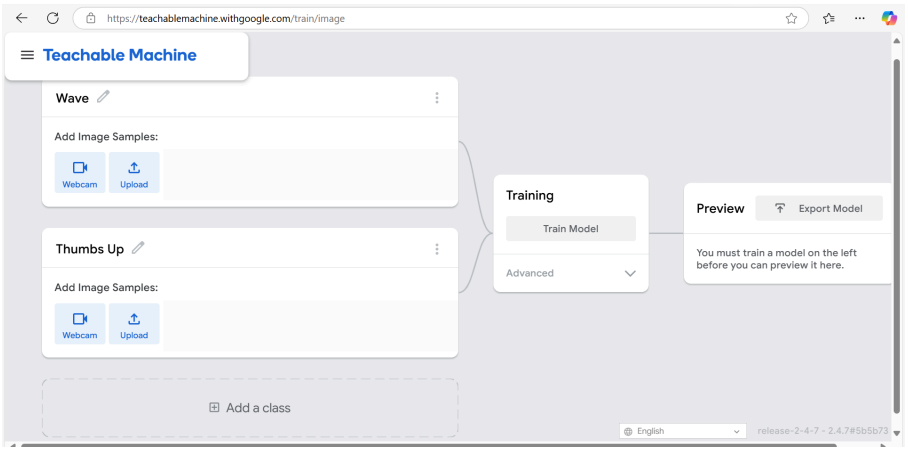
1. **Access Teachable Machine**:
    - Open the Teachable Machine website and select the **Get Started** option.



    - Now select the **Image Project** option. Select **Standard Image Model option** present on the next screen.



2. **Create Classes**:
    - Define two or three classes, such as *Wave*, *Thumbs Up*, and *Open Hand*.



3. **Collect Training Data**:
    - Use the webcam to record yourself performing each gesture multiple times (e.g., wave your hand for the *Wave* class). Collect at least 20-30 images per class for accuracy.
4. **Train the Model**:
    - Click "Train Model" to teach the machine how to recognize the gestures.
5. **Test the Model**:
    - Perform one of the gestures in front of the camera and let the model predict which gesture it sees.

This activity help participants learn how machines use patterns in images to classify objects or actions, gaining insight into computer vision technology.

Activity 3. Natural Language Processing (NLP) Activity: "Training a Sentiment Classifier"

Objective: Understand how machines process and classify text data.

Tools Needed:

- Teachable Machine
- A list of text samples expressing positive and negative sentiments.

Steps:

1. **Access Teachable Machine**:
    - Open Teachable Machine and select the **Text Project** option.
2. **Create Classes**:
    - Define two classes: *Positive Sentiment* and *Negative Sentiment*.
3. **Collect Training Data**:
    - For the *Positive Sentiment* class, input cheerful sentences like "I love this movie!" or "This product is amazing!"
    - For the *Negative Sentiment* class, input critical sentences like "I didn't enjoy this experience" or "This is a waste of money."
4. **Train the Model**:
    - Train the model using your input data.
5. **Test the Model**:
    - Input new sentences (e.g., "This food is great" or "I am unhappy with the service") and see how the model classifies them.

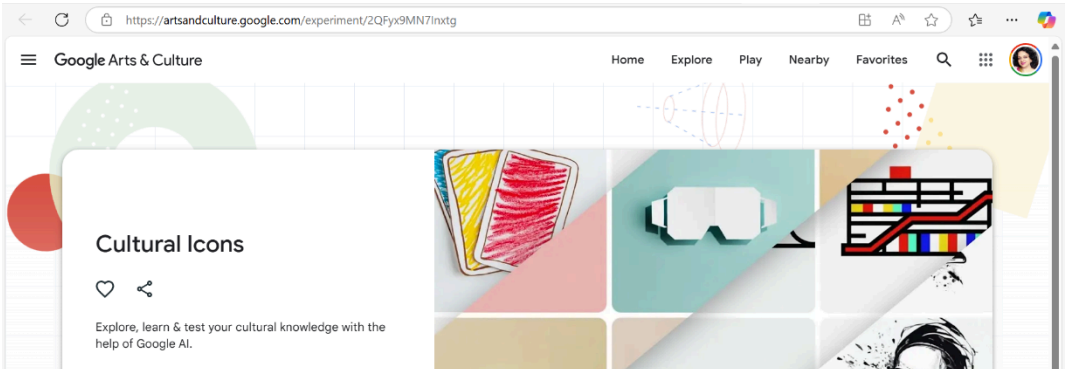
This activity help participants experience how machines interpret human language and classify it, similar to how customer review platforms or chatbots work.

AI Experiments by Google Arts & Culture:

Google Arts & Culture hosts a range of **AI experiments** that combine technology, creativity, and cultural exploration. These experiments allow users to interact with art, history, and culture in innovative ways, showcasing the potential of artificial intelligence in expanding our understanding of the world. Here are some notable AI-driven experiments available on the platform:

1. **Cultural Icons:**

Explore, learn & test your cultural knowledge with the help of Google AI



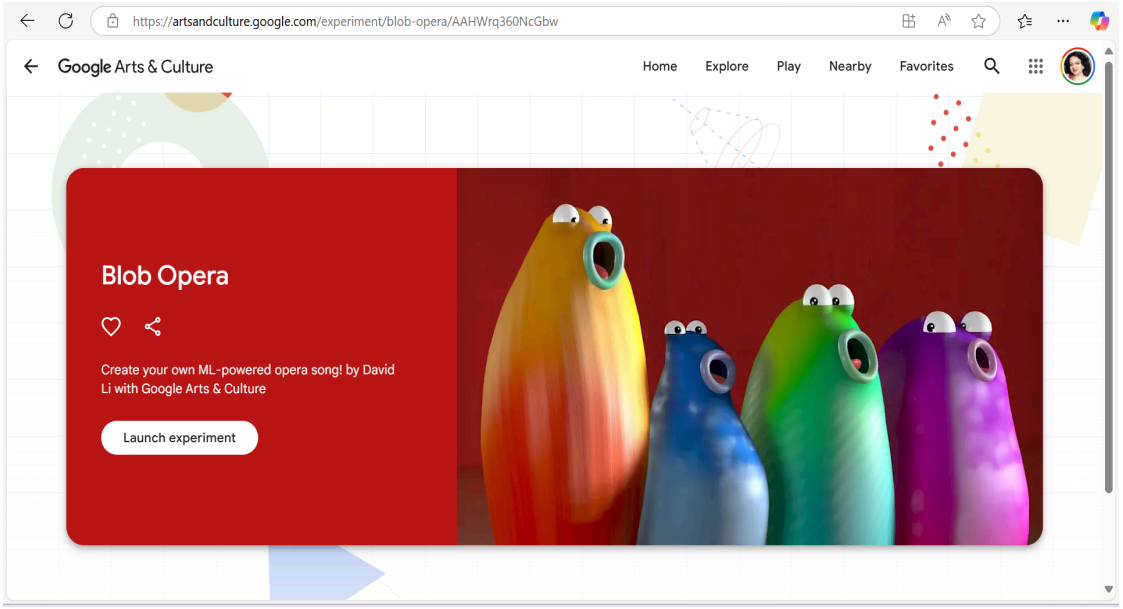
- **What It Does**:
  Cultural Icons identifies, organizes, and highlights significant historical and cultural symbols, making it easier to explore their stories and relevance. This AI-powered tool dives into collections from museums and archives worldwide to bring you curated content about landmarks, famous individuals, artifacts, and more.

- **How It Works**:
  Using computer vision, natural language processing, and other AI techniques, the experiment identifies patterns, themes, and connections between cultural artifacts and icons. Users can browse through timelines, maps, or categories to explore rich historical and cultural information.

  You can click on each cultural icon to start a conversation and learn more or play a guessing game with the help of AI.

2. Blob Opera:

Create your own ML-powered opera song! by David Li with Google Arts & Culture



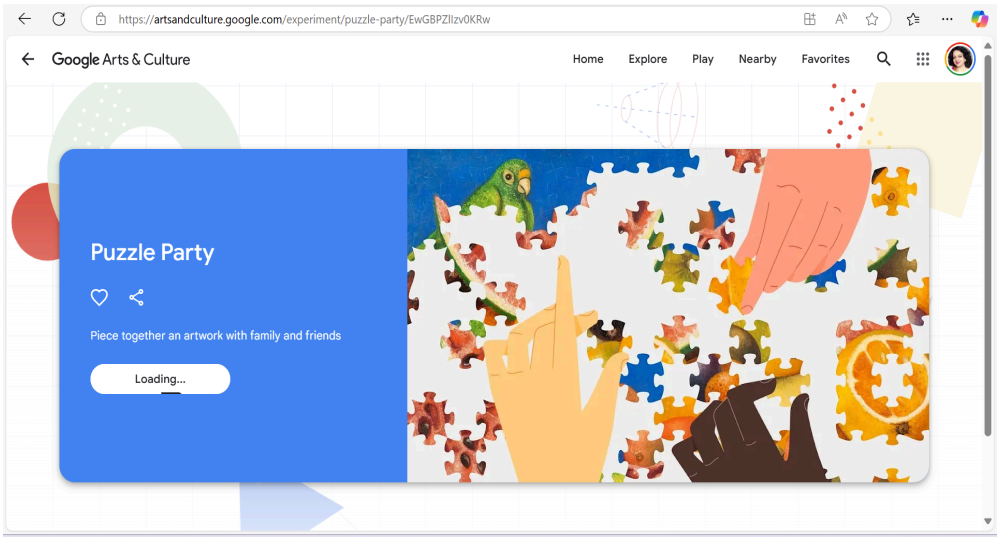
- **What It Does**:
  Create and conduct a group of AI-powered opera singers. Each "blob" represents a different voice (e.g., soprano, bass) and sings harmoniously as you adjust pitch and melody.

- **How to Try It**:
  Drag the blobs up or down to control pitch and left or right to create different vowel sounds. The AI ensures the blobs sing in perfect harmony.

- **Learning Outcome**:
  Understand how AI generates and harmonizes audio in real-time based on user input.

3. Puzzle Party:

Piece together an artwork with family and friends



- **What It Does**:
  Solve jigsaw puzzles of famous artworks with friends. The AI splits artworks into puzzle pieces for collaborative play.
- **How to Try It**:
  Choose an artwork and invite friends to assemble it together online.
- **Learning Outcome**:
  See how AI gamifies cultural content to make it engaging.

These experiments provide a hands-on way to explore AI's role in arts and culture. They make the intersection of technology and creativity tangible, engaging, and accessible for all ages. Encourage beginners to play with these tools and reflect on how AI enhances our understanding of cultural heritage!