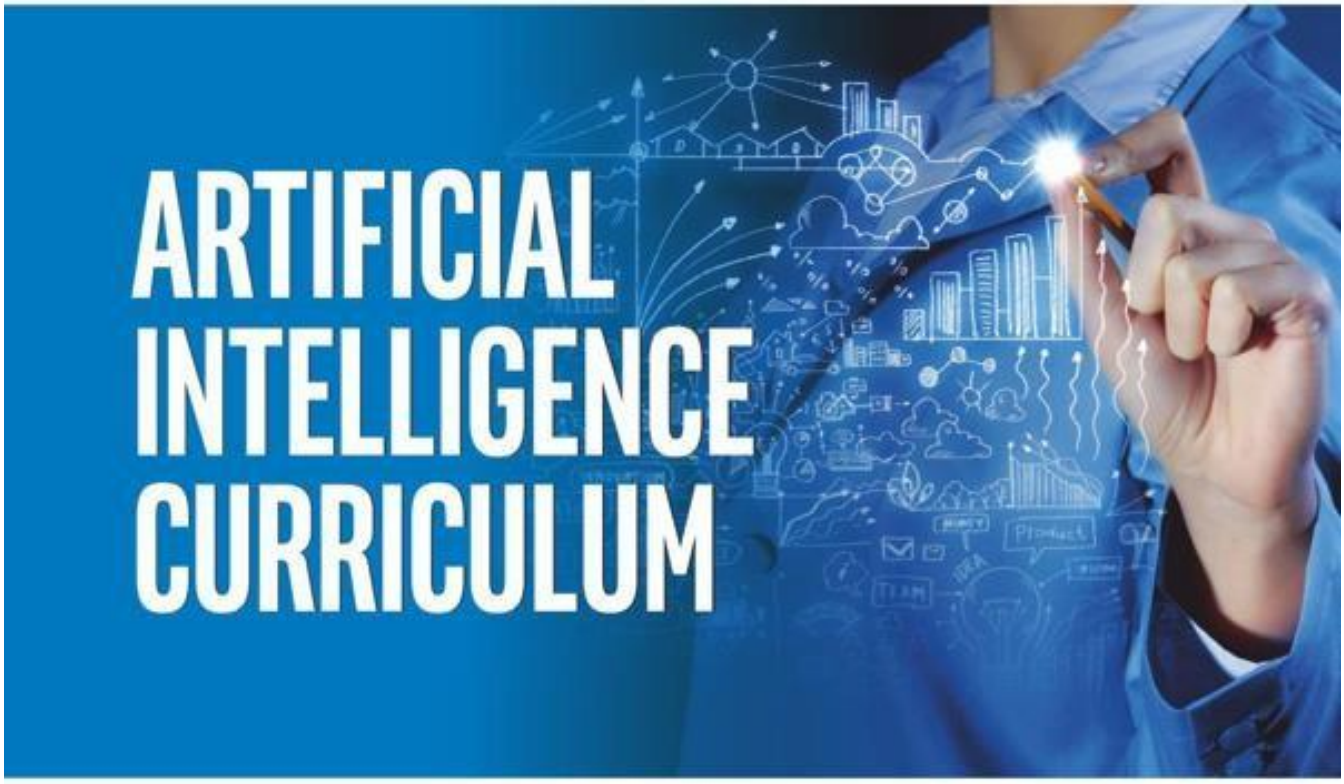

Class 8

Facilitator Handbook

ARTIFICIAL INTELLIGENCE CURRICULUM

Curated with support from Intel®

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About the Book

Welcome to the world of Artificial Intelligence!

As we embark on this educational journey, it is our pleasure to introduce you to the AI facilitator handbook for class VIIII. In an era where technology permeates every aspect of our lives, understanding Artificial Intelligence (AI) is not just advantageous but essential for the holistic development of young minds.

This book is designed specifically for AI teachers and students of Class VIII, offering a deeper exploration of Artificial Intelligence concepts and applications. It provides a detailed understanding of the AI Project Cycle, covering its stages and their importance in real-world problem-solving. Additionally, the book introduces students to AI ethics, emphasizing responsible AI practices and the significance of ethical considerations in the development and use of AI technologies.

With a focus on structured learning and relatable examples, this book helps students to explore and leverage AI to solve real-life challenges. It aims to inspire students to apply AI knowledge responsibly and ethically towards an AI-ready future.

Happy learning!

TABLE OF CONTENTS

UNIT – I
Session - I
AI Project cycle

Lesson Title: AI Project Cycle and its stages	**Approach:** Session + Activity

Summary: The project cycle represents a series of phases guiding project progression. It is a cyclical process followed to complete an AI project and helps to understand the process better and faster. By defining the problem, gathering relevant data, analyzing it, building a model, and evaluating its performance, you can ensure your AI project achieves its goals. The AI project cycle provides a roadmap for developing effective AI solutions.

Learning Objectives:

1. Understand the concept of a project cycle.
2. Explore the AI project cycle and its significance in completing AI projects effectively.
3. Identify the different stages involved in the AI project cycle and their key tasks.
4. Recognize the role of problem scoping and data acquisition in a successful AI project.
5. Explain the purpose of data exploration and model evaluation in the AI development process.

Learning Outcomes:

1. Students will gain an understanding of the project cycle.
2. Students will delve into the AI project cycle and grasp its significance in efficiently completing AI projects.
3. Students will be able to explain the stages of the AI project cycle and their significance.
4. Students will be able to differentiate between problem scoping and data acquisition and their contributions to AI projects.
5. Students will be able to describe the importance of data exploration in understanding data and model evaluation in ensuring model effectiveness.

Key-concepts:

1. Understanding project and project cycle
2. Understanding AI project cycle
3. Understanding Problem Scoping, Data Acquisition, Data Exploration, Modeling, Evaluation, Deployment stages of AI project cycle

1.1 Recap

Before we start our lesson, let us recap what we have learned in the previous module.

Sustainability

- The word "Sustainability" comes from the word "Sustain"
- Do you know what "Sustain" means?
- It means to maintain, support, withstand or endure
- Thus, sustainability means, to maintain the world we live in
- The key idea is – we must act responsibly so that the resources on our planet can support future generations to come

Society and Sustainability

Society basically refers to people around us

- To be truly sustainable, we need everyone in our society to follow sustainability
- Imagine if some segments of society are not sustainable
- Can we truly achieve full sustainability?
- No, that would not be possible
- Hence, we need to think of sustainability from a societal point of view

Sustainable Development Goals (SDGs)

The SDGs are made up of 17 goals that have been agreed to by all countries that are part of the United Nations (that's most of the world!). Each of these goals have specific targets.
These goals were established by the United Nations in 2015. Each of these goals has several targets. Explore the website for more information:
https://sustainabledevelopment.un.org/sdgs

- The goals are divided into three broad categories:
  - Economy
  - Society
  - Biosphere

SDG Wedding Cake

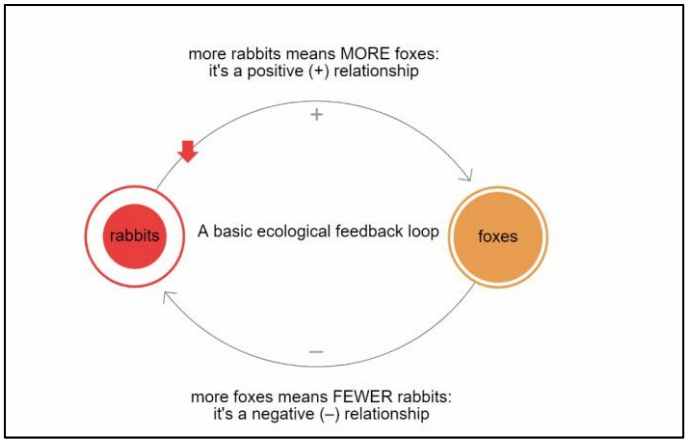
- This concept states that to achieve a sustainable world we must do the following:

  The economy must serve the society within the resources provided by our Earth (Biosphere).

Systems Thinking

- A system is simply a group of interconnected things
- Systems behave differently from their individual components
- Systems are represented visually using Systems Map
- This simply means that its components interact and affect each other. This feature of systems is known as interconnectedness.
- Example: Water Cycle, School, the Digestive System, food chains

This example of foxes & rabbits, shows that increasing the number of rabbits means that foxes have more food available for hunting, which consequently increases the number of foxes as more food is available for them. However, this would then lead to decrease in number of rabbits as more and more rabbits are hunted.



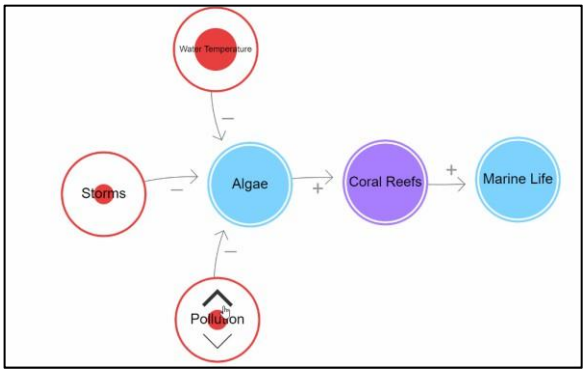
Basics of System Map

- We use systems maps to understand complex issues with multiple factors that affect each other.
- In a system, every element is interconnected. In a systems map, we try to represent that relationship using arrows.
- Within a system map, we will identify loops. These loops are important because they represent a specific chain of causes and effects. A system typically has several chains of causes and effects.
- You may notice that some arrows are longer than others. A longer arrow represents a longer time for a change to happen. We also call this a time delay.
- To change the outcome of a system, as a change maker, we have two options - change the elements in a system or change the relationships between elements. It is usually more effective to change the relationship between elements in a system.

System Map

Here's an example of how your systems map could look like! Do you feel the relationship between various components has been accurately represented?

- Coral Reefs
- Algae
- Pollution
- Water Temperature
- Storms
- Marine Life



1.2 Introduction to Project and Project Cycle

- What is a project?
- Have you worked on any projects in your class?
- Can you list down different things that you did to complete the project?

What is a Project?

- A Project is a series of tasks or a group of activities that need to be completed to reach a specific goal under given constraints.
- These tasks or activities are usually performed with limited resources and time.

What is a Project Cycle?

- A Project cycle is a sequence of phases through which a project progresses.
- The number of phases and sequence of the cycle may vary depending on the type of project.

1.3 Example: Coffee Production System

Let's take an example of a coffee production system to learn what a project means.

Steps in Coffee Production

The major steps in coffee production are – Harvesting, Processing, Roasting and Packaging.

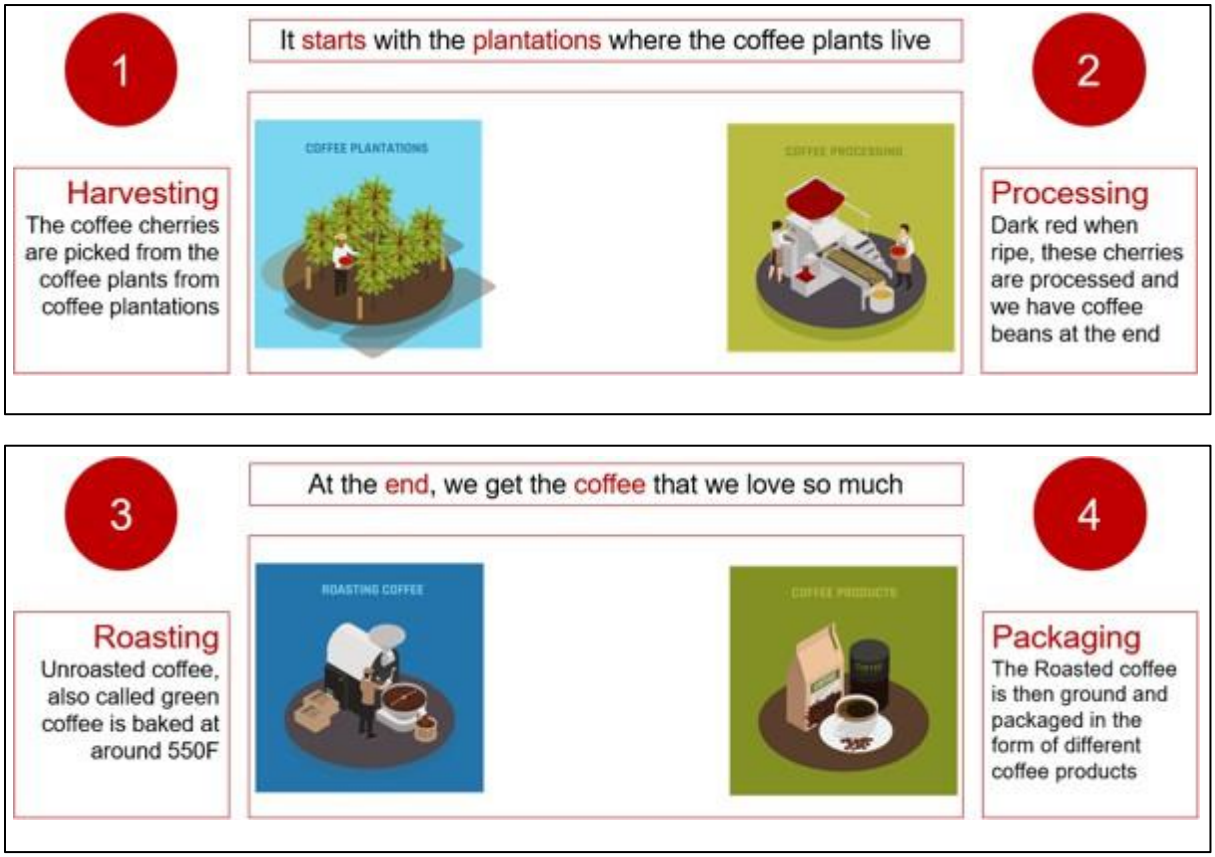
What is a Project Cycle?

Coffee production follows a well-defined project cycle:

Coffee seedlings are nurtured in fields for several years until the first harvest.

1. **Harvesting:** Ripe coffee cherries are carefully picked by hand or machine.
2. **Processing:** Different methods remove the fruit surrounding the coffee bean, impacting flavour.
3. **Roasting:** Beans are roasted to develop flavour and aroma before packaging for sale.
4. **Packaging:** Roasted coffee is then packaged in the form of coffee products.

This cycle ensures the quality and deliciousness of the coffee you enjoy!



Steps in coffee production

Can you list the 4 steps involved in coffee production?

1. H
2. P
3. R
4. P

Solution

1. Harvesting
2. Processing

3. Roasting
4. Packaging

1.4 What is an AI Project Cycle?

- AI project cycle is the cyclical process followed to complete an AI project.
- AI project cycle takes us through different steps involved in a project.
- AI project cycle helps us:
    - to create better AI projects easily
    - to create AI projects faster
    - to understand the process

Imaging applying our AI skills to explore and identify habitable planets, just like in Sci-fi movies. How could AI assist in analyzing astronomical data, predicting planetary conditions, or even simulating life-supporting ecosystems on distant worlds?

Let's try to solve one extraterrestrial problem using AI Project Cycle. Imagine we want to find an 'Earth-like exoplanet'

Finding an Earth-like exoplanet

- An exoplanet is any planet beyond our solar system.
- Our aim is to find an Earth-like planet far away from Earth.

Some examples of Earth-like planets are Gliese 667Cc and Kepler-69c.

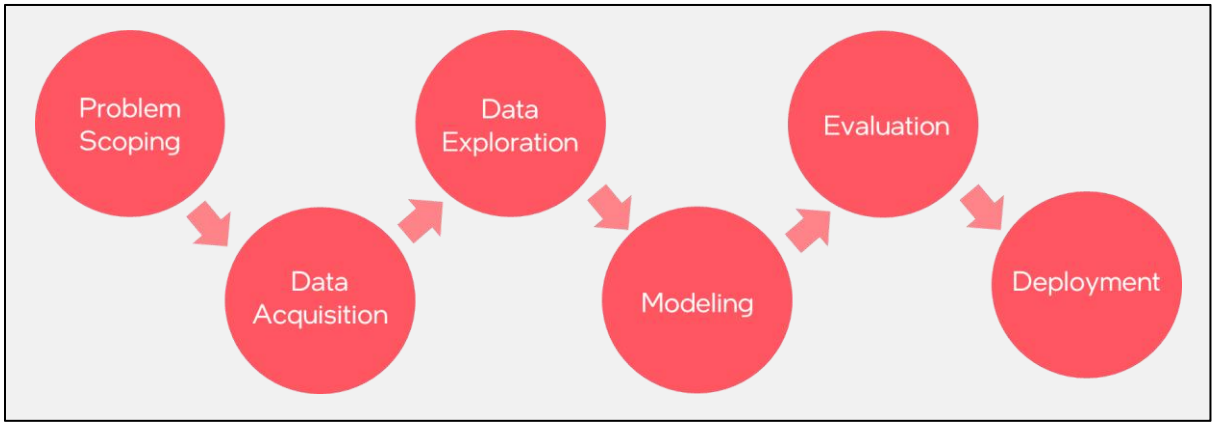
Let's watch a quick video on exoplanets

- In this short video, you will learn more about exoplanets
- You will also see different kinds of exoplanets that have been found

YouTube video link: https://www.youtube.com/watch?v=4IXYp9Fse44&feature=youtu.be

1.5 Stages of AI Project Cycle

AI project cycle contains 6 different stages. Let's look at each stage one by one!



Stage 1, In the ***Problem Scoping*** stage we *define a goal for this project*.

In Stage 2, we have ***Data Acquisition*** in which you *collect the data you think you will need* to train your model.

In Stage 3, we have ***Data Exploration***, the main objective of this stage is *to visualize data in a form that is human readable/ human* friendly (usually through Graphs/Plots)

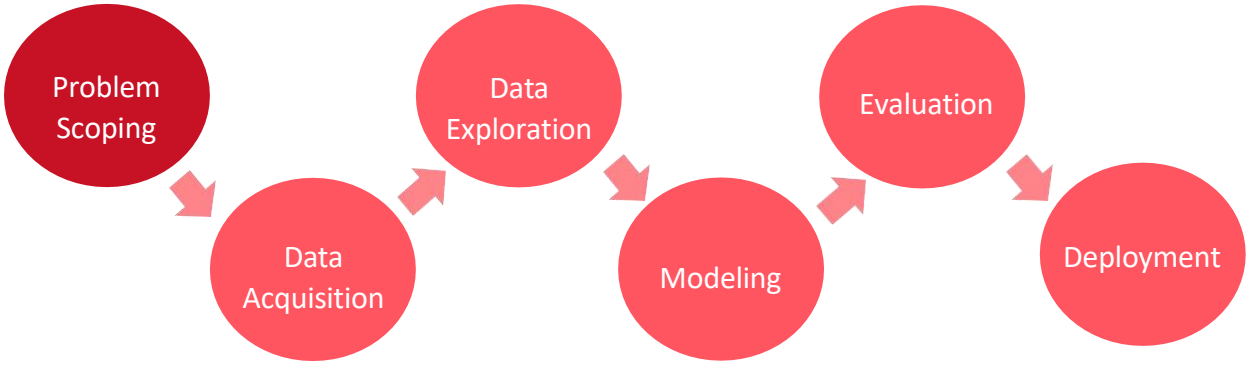
In Stage 4, we have ***Modeling***, the main objective of modeling is to *implement algorithms and fine-tune the model* which gives you the best results.

In Stage 5, we have ***Evaluation***, the main objective of this stage is to *test and evaluate the different models and choose the best model*.

In Stage 6, we have ***Deployment***, the main objective of this stage is to *deploy your solution based on the model* you've selected.

1.5.1 Problem Scoping

In the Problem Scoping stage, we *define a goal for the project*. It is one of the most important stages to kick-start the AI process.



The main objective of this stage is to define a goal for this project. It is one of the most important stages to kick-start the AI process.

It's like finding the goal post and positioning yourself to kick the ball into the goal post.

So, this is the most important step in the whole project cycle.

It includes:

- To figure out the problem that needs to be solved
- To understand the various aspects of the problem
- To develop a vision to solve a problem

We will explore problems scoping using the 4Ws method. Let us try to solve the extraterrestrial problem (which we discussed earlier in this session) using AI Project Cycle.

4Ws Problem Canvas

WHO

Who is having the problem?

- Who are the stakeholders?
    - Space Organizations
    - Human Race
- What do you know about them?
    - Various space organizations have set up telescopes on land and in space to collect data

WHAT

What is the nature of the problem?

- What is the problem?
    - Identifying an Earth like exoplanet with our existing resources
    - Space travel has its limitations
- How do you know it is a problem?
    - Research journals, documentaries, and news articles

WHERE

Where does the problem arise?

- What is the context/ situation in which the stakeholders experience the problem?
    - Rise in sea levels, melting of polar ice caps and pollution of air, soil, and water.

WHY

Why do you believe it is a problem worth solving?

- What would be of key-value to the stakeholders?
    - Find an Earth-like exoplanet as close to the solar system as possible
- How would it improve their situation?
    - Finding an exoplanet will help in analyzing astronomical data, predicting planetary conditions, or even simulating life-supporting ecosystems on distant worlds

Activity

Purpose: To understand the 4Ws framework for problem scoping

Say: 4Ws framework will allow youth to ask 'Who, What, Where, and Why', enabling them to scope a genuine problem.

Activity Guidelines:

- First, we must select a problem.
- In this activity we will consider the problem of finding an Earth like exoplanet using our existing resources.
- Then we fill the problem scoping template for this problem.

Problem Statement Template

This is what a problem statement template looks like:

Our	[stakeholders]	Who
has a problem that	[issue, problem, need]	What
when / while	[context, situation].	Where
An ideal solution would	[benefit of solution for them]	Why

It is used to frame the 4Ws into a paragraph to describe your problem, the stakeholders involved and how solving the problem would benefit them.

Example:

Problem: Finding an exoplanet

Our	Space Organizations, Human race	Who
has a problem that	Need to find an Earth like exoplanet	What
when / while	Utilizing our existing resources	Where
An ideal solution would	Help in analyzing astronomical data, predicting planetary conditions, or even simulating life- supporting ecosystems on distant worlds	Why

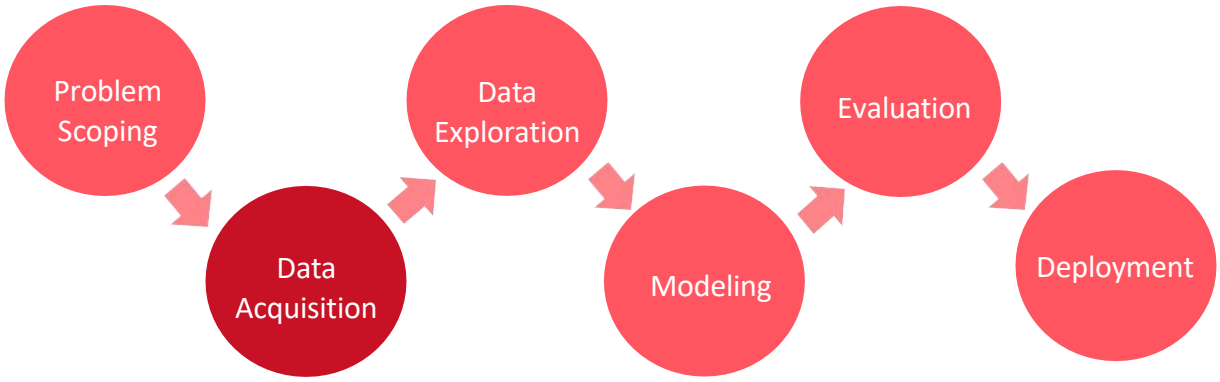
Do it yourself:

Problem: Air pollution is a growing concern in our city, affecting the health of people and the environment. Children, especially, face challenges like breathing issues and reduced outdoor playtime due to poor air quality. Understand the problem using 4 Ws.

		Who
		What
		Where
		Why

1.5.2 Data Acquisition

In Stage 2, we have Data Acquisition in which we collect the data we think we will need to solve the problem using AI.



For Data Acquisition:

- It is important that the data AI learns from is dependable and correct
- Data can be collected using different methods and depending on the chosen method, the type, and way of presentation of data may also differ

Various types of data

The data that we collect in the data acquisition stage can be of different types: Textual data, Numeric data and Visual data (images and videos).

01 - Textual data

Often presented in computer

02- Numeric data

Often presented in tables

Name	Height	Weight	Age
John Doe	5'3"	50 kg	15
[Student 2]	4'3"	45 kg	14
[Student 3]	3'5"	34 kg	13
[Student 4]	4'6"	43 kg	15
[Student 5]	5'1"	50 kg	15
[...]	...	...	...

03- Visual data

Often comprises of images and videos

In AI, data acquisition is the foundation for building effective models. The data can be collected from primary and secondary sources.

Primary Sources: Fresh, original data collected specifically for your AI project.

Examples:

- Conducting surveys or questionnaires
- Running experiments and collecting sensor data
- Manually collecting and labeling data (e.g., image annotation)
- Using APIs to access data from internet-connected devices

Secondary Sources: Pre-existing data collected by other organizations or individuals. It's readily available and often free or low-cost.

Examples:

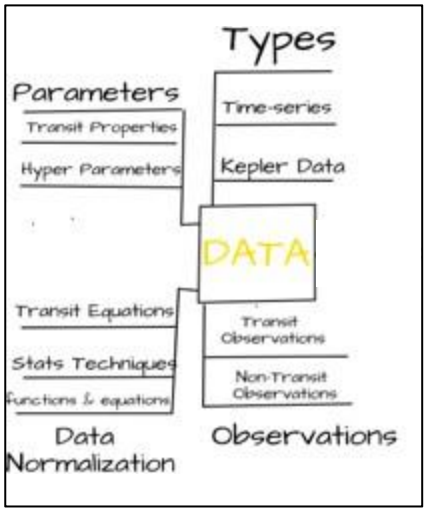
These are some popular secondary data sources.

A list of government websites:

1. Indian Government Dataset
2. Australian Government Dataset
3. EU Open Data Portal
4. New Zealand's Government Dataset
5. Singapore Government Dataset

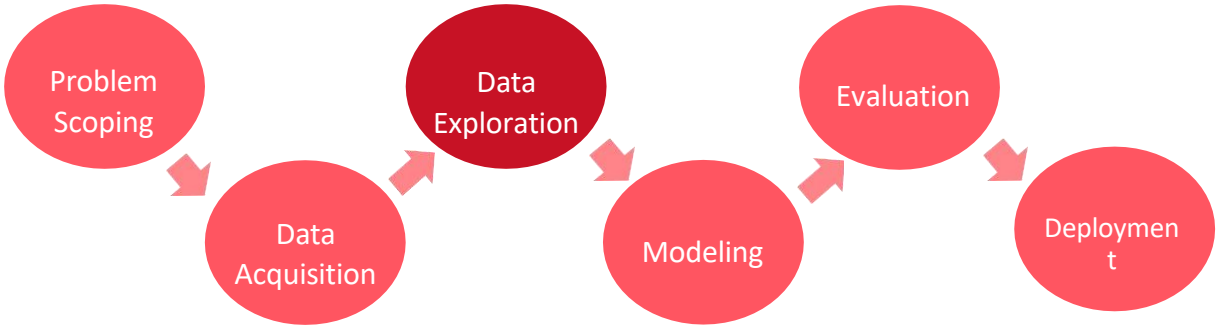
Data Acquisition – Exoplanet Use case

- Data acquisition is the next step after the problem scope is defined.
- This step is to gather data from space missions (telescopes) and then analyze and generate more data if needed.



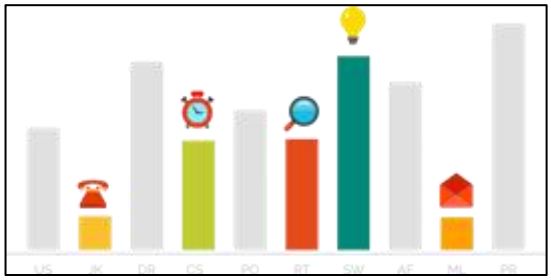
1.5.3 Data Exploration

In Stage 3, we have Data Exploration, the main objective of this stage is to represent data in a form that is human readable/ human friendly (usually through Graphs/Charts)

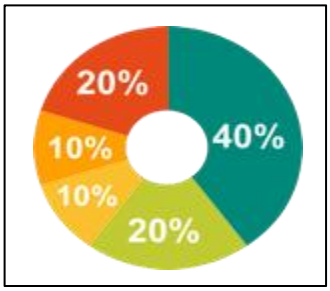


To analyze data and present it in an easily understandable, visual form.

- It is easy to take decisions based on data that is presented in an easily understandable form.
- Data can be presented in different forms which include:



Bar Graph



Pie Chart

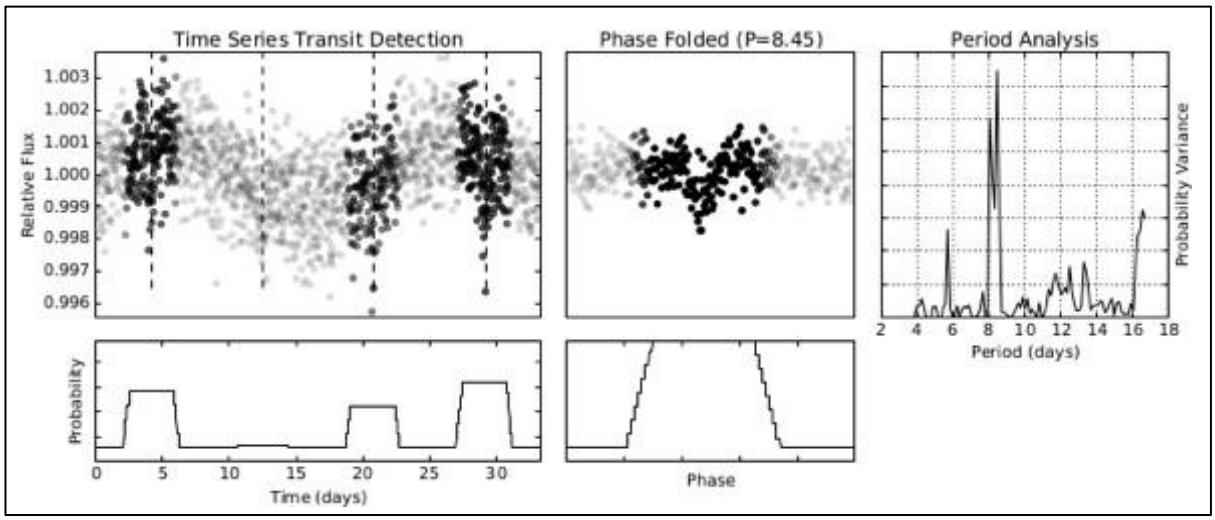
Do it yourself:

What are some alternative graphical techniques used for representing data?

Data Exploration – Exoplanet Use case

- For detecting an exoplanet, data is captured by telescopes during the duration of transit happens.
- We can easily understand that the data collected during this duration is nothing but time series.
- This data can be further explored using visualization tools.

- As shown in the image, scatterplots and graphs have been used to interpret the data.



Activity: Data Acquisition and Exploration!

Purpose: To practice data acquisition and data exploration

Say: Data acquisition and Exploration is all about collecting data, recording it and visualizing it for better understanding.

In this activity, you'll dive into the exciting world of data collection, exploration, and analysis. Data acquisition is the process of gathering raw data from various sources, while exploration involves organizing, summarizing, and visualizing the data to uncover insights. By the end of this activity, you'll gain a better understanding of how data can be used to tell a story and answer important questions.

We'll start by collecting data—this could be from a dataset, an online source, or even a simple survey. Once the data is in hand, the next step is to explore it! This includes cleaning, sorting, and analyzing the data to identify patterns and trends. You'll also learn how to visualize the data using charts and graphs, which will help to make complex information
easier to understand.

Through this process, you'll develop key skills that are essential for data-driven decision-making, whether you're working with numbers, text, or images.

Let's get started and unlock the power of data!

Activity Guidelines

Part 1: Acquisition

- Collect the following data from every student in the class:
    - Name, Height, Weight, Age, Residence, Favourite Hobby
- Create a table of the data with all the parameters given above as

columns Fill in the template given next

Name	Height	Weight	Age	Residence	Favourite Hobby
John Doe	5' 3"	56kg	13	123 Main Street, New York, NY 10030	Football
[Student 2]					
[Student 3]					
[Student 4]					
[Student 5]					
[...]					

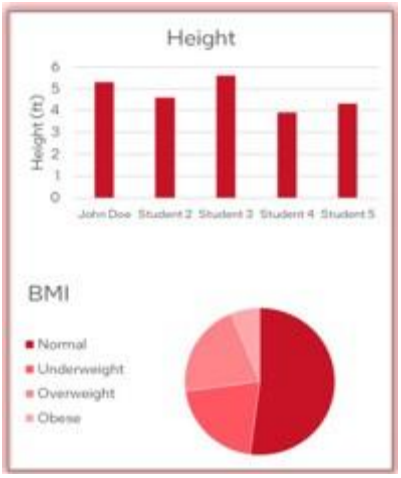
Activity Guidelines

Part 2: Exploration

- Now we have all the data we need to make a lot of inferences
- Now, let's calculate BMI for each student
- Next, create a pie chart of the BMI using these categories;
    - Under weight - Less than 18.5
    - Normal - 18.5 to 24.9
    - Pre-Obesity - 25 to 29.9
    - Obesity - above 30
- Create bar graphs for one of these pairs of parameters:

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2\,(\text{m}^2)}$$

- Student name vs BMI
- Student name vs Height
- Student name vs Age
- Create pie charts for one of these parameters
- BMI
- Hobby
- Residence



Activity Conclusion

- Now we can answer the following questions:
  - Who is the tallest student in the class?
  - Where does the shortest student in the class live?
  - How many students come in the fit category according to their BMI?
  - What is the most loved hobby of the class?
- This demonstrates that data exploration helps us derive meaningful conclusions easily

Test Yourself:

Choose the correct answer!
What does data exploration mean?

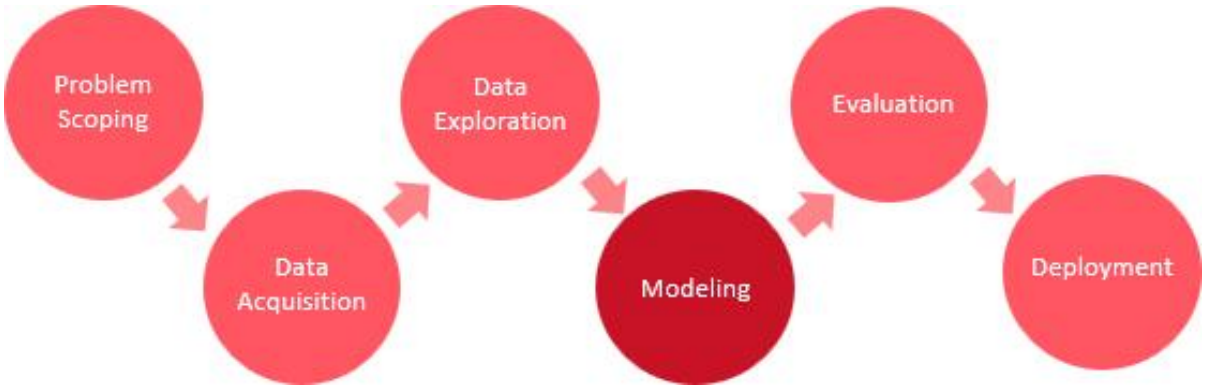
Finding the solution of the AI problem.	Collecting data.
Finding useful trends in the data using charts and graphs.	Creating a website for the AI solution.

Ans: Finding useful trends in the data using charts and graphs

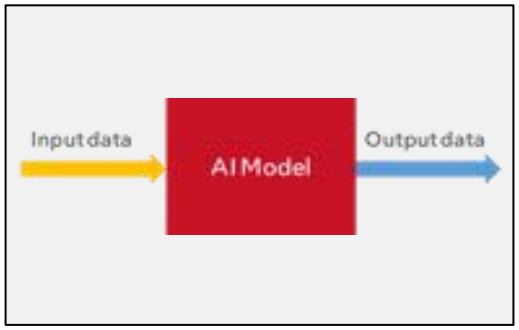
After acquiring and exploring data, we use it to create and train an AI model.

1.5.4 Modelling

In Stage 4, we have Modeling, the main objective of modeling is to create a model for AI which can help us solve the identified problem.

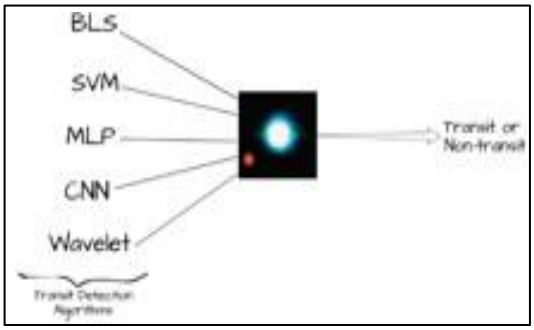


- An AI model is needed for the functioning of AI.
- An AI model learns from the data collected in the Data Acquisition stage.
- We provide input to the AI, and it gives an output based on the AI model we have chosen. The input data is processed through the AI model, which applies the learned patterns and algorithms to generate predictions or decisions. This output data is a direct result of how well the model was trained on the given dataset. The entire process demonstrates how AI models transform raw input into actionable insights or results.



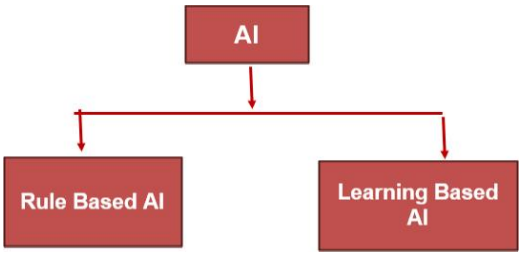
Modeling– Exoplanet Use case

- In this problem, we need to detect the light curve in the data to confirm whether it is transit or non-transit for detecting an exoplanet.
- Several ML/DL algorithms can be used to do the detection.



Types of Models:

Models help us understand and solve problems by showing how things work, like weather predictions, making decisions, or creating designs. Below are the broad classification of models



Rule-Based AI

Let's watch a quick video to understand Rule-Based AI
https://www.youtube.com/watch?v=fLcZRDiQyNY

- The video shows two characters trying to reach a destination.
- The characters are introduced to the different colors that represent different directions.
- By following the hints from the colors shown to the characters, they can reach their destination.
- This demonstrates that the characters learned which directions to take based on some predefined rules.

Rule-Based AI Example

IF X happens THEN do Y

- Example 1: IF LUNCH BREAK happens THEN do EAT LUNCH
- Example 2: IF FLOOR DIRTY happens THEN do CLEANING
- Rule-based AI are NOT used at a lot of places now a days

Discussion

- What are some rules that you follow in school?
- Who made these rules?
- How do we do things for which there are no rules – how to wash our hands, chew our food, shake hands with our friends, treat animals, etc.?
- How do we learn these things?

Based on different rules, we were able to take different decisions

Let's look into the other type of learning

Instead of setting the rules like if this then that, we were able to figure out a rule that solved our problem

How do humans take decisions?

- Let's say we are making a cup of coffee
- And we are not sure about how much sugar to add

Time of coffee making	Number of sugar spoons added	Taste of coffee
First time	Half a spoon	Not sweet enough
Second time	One and a half spoon	Too sweet
Third time	One spoon	Right amount of sweetness
Fourth time	One spoon	Right amount of sweetness

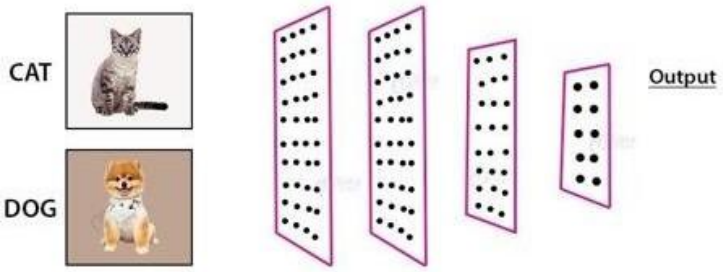
Learning-Based AI

In learning-based AI, there is no need for a human being to write a set ofrules or instructions for it.

This type of AI learns from experience – past information or data.

From the data, it can figure out the set of rules on its own!

> If you show 100 images of dogs and 100 images of cats to AI, it can learn to identify dogs and cats based on the shape of their eyes, ears, nose, length of their tails,body shape, etc

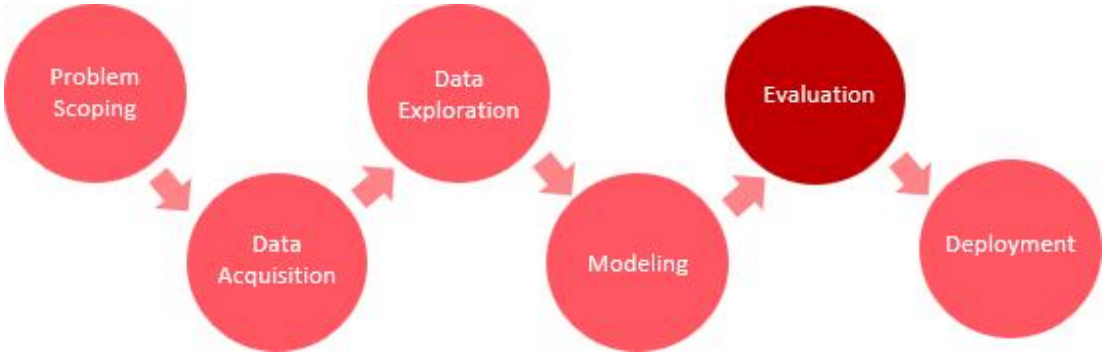


Discussion

1. Do you think creating machines that can learn independently is okay?
2. How will that affect our everyday life? Will it be beneficial or harmful for our future?

1.5.5 Evaluation

In Stage 5, we have Evaluation, the main objective of this stage is to test different models and choose the best model.



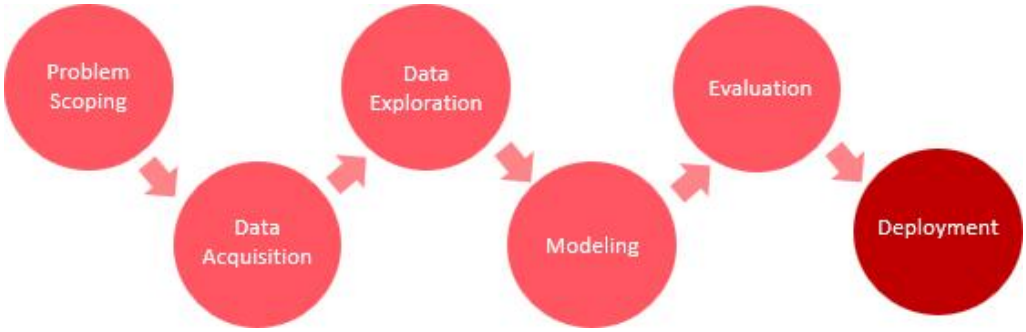
- We test our models to check their performance and improve our models for best performance.
- The model is tested with collected data.

Evaluation – Exoplanet Use case

At this particular stage, we may need to evaluate the model to find out which algorithm makes the best prediction.

1.5.6 Deployment

In Stage 6, we have Deployment, the main objective of this stage is to make our solution ready to be used.



- In this stage, we make our solution available to users who can benefit from it.
- AI can be used on Mobile Apps, Website Apps, etc.

Mobile Application

Website Application

How do you think that finding an Earth like exoplanet solution can be deployed?

Try Yourself

Choose the correct answer!

Q1. Does modeling mean creating an AI model?

Ans: Yes, in modeling, we select and train the appropriate AI model depending upon our problem statement.

Q2. Can we use AI on mobile phones?

Ans: Yes, we can use AI on mobile phones as well!

AI Project Cycle Quiz (8 Questions)

Instructions: Choose the best answer for each question.

1. The AI project cycle is a:
   a) Linear process for developing AI projects.
   b) Cyclical process guiding AI development from start to finish.
   c) Random approach to building AI models.
   d) One-time evaluation method for AI projects.

2. What is the primary goal of problem scoping in the AI project cycle?
   a) To define the specific problem the AI will address.
   b) To gather data for training the AI model.
   c) To choose an AI algorithm for model building.
   d) To evaluate the performance of the AI model.

3. The 4W Canva (Who, What, When, Where) is a helpful tool for:
   a) Selecting data visualization techniques.
   b) Defining clear objectives in problem scoping.
   c) Evaluating the accuracy of the AI model.

d) Implementing the chosen AI algorithm.

4. In the context of AI projects, data acquisition refers to:
   a) The amount of data collected.
   b) The format of the data (e.g., numbers, text).
   c) How well the data relates to the problem being solved.
   d) The source from which the data is collected.

5. Which of the following is NOT a benefit of data exploration in the AI project cycle?
   a) Makes it difficult to identify patterns and trends in data.
   b) Improves communication and understanding of data insights.
   c) Simplifies the process of choosing an AI algorithm.
   d) Reduces the time required for data exploration.

6. What is the main purpose of the modeling stage in the AI project cycle?
   a) To refine the problem definition based on data analysis.
   b) To build a computer program that can solve the identified problem.
   c) To test the performance of the AI model in real-world situations.
   d) To gather additional data if needed.

7. Which of the following statements about the AI project cycle is FALSE?
   a) It helps ensure teams stay organized and focused on key tasks.
   b) It promotes collaboration among different specialists working on the project.
   c) It is a rigid, inflexible process that cannot be adapted to different situations.
   d) It defines clear deliverables for each stage, guiding project progress.

8. Imagine you're building an AI system to predict flight delays. During data acquisition, what type of data would be most relevant?
   a) User reviews of airline companies.
   b) Weather forecasts for different destinations.
   c) Images of airplanes taking off and landing.
   d) Historical data on flight delays and cancellations.

Answer the following:

1. What is the AI project cycle?

   _____

   _____

2. What are the different stages of the AI project cycle? What is the importance of each stage?

   _____

   _____

Session – 2

AI Ethics

Lesson Title: AI Ethics	**Approach:** Discussion + Activity
Summary: Students will be introduced to the concept of ethics in day-to-day activities. They will gain awareness of the ethical concerns regarding Artificial Intelligence (AI).	
Learning Objectives: 1. Gain awareness of ethical concerns about AI. 2. Critically think about the importance of AI Ethics.	
Learning Outcomes: 1. Explain the concept of Ethics in AI. 2. Describe the importance of integrating ethics into AI.	
Key-concepts: 1. Students will be able to define ethics and explain its role in guiding human behaviour. 2. Students will be able to analyse why ethical considerations are essential in designing and applying AI systems. 3. Students will develop the ability to assess the importance of AI Ethics	

1.13 Introduction:

Scenario:

Imagine a situation where you oversee burgers at a fast-food restaurant. It is a busy day with a lot of orders coming in fast. While cooking, you drop a burger on the dirty floor! Your boss passes by and says, "Just pick it up and serve it!"

What would you do in this situation? Will you serve the fallen burger or not?

Why would you do that?

What can be the result of your choice?

Let's try to answer a few more questions!

Is it OK to lie? If so, under what circumstances?

If a family is hungry and has no other way to get food, is it OK to steal food from a rich store owner? Why or why not?

Is what most people decide, always right, or can it be wrong?

Now that we have answered these questions, let's try to define 'Ethics'.

Ethics deals with the external rules of conduct of a particular group or culture of people. It is the moral compass that guides us in daily life. These are the guiding principles to decide what is good or bad and fair or unfair. These are values that a person chooses for their life.

Ethics attempt to answer questions like:

- What is the difference between good and evil?
- Is good and evil the same for everyone?
- How do we make decisions that might have an impact on others?
- Are we responsible for how our AI solutions may be used by different people?

1.14 AI Ethics

AI Ethics is a system of moral principles intended to inform the responsible development and use of AI. It acts as a guide on how your data will be collected and managed, along with the ethical issues arising out of its usage.

There are multiple advantages of AI, but these technologies can also have a downside to it, creating risks, inequalities and divides. Therefore, we need policies and regulatory frameworks to ensure ethics in AI which will benefit humanity as a whole.

Activity 1: Watch the video "AI Ethics: Why It Matters?"

Purpose: To introduce the concept of AI Ethics.

Say: "Let's learn more about AI Ethics by exploring the video on AI Ethics: Why It Matters?"

Reference video:

https://www.youtube.com/watch?v=C2MWrCdGG0Q

Watch the video and answer the following questions:

How has AI impacted our daily lives?

_____

_____

_____

_____

When does AI become a concern?

_____

_____

_____

_____

How can people and organizations be accountable for building responsible AI applications?

_____

_____

It is important to understand the ethical concerns it brings to ensure it benefits everyone fairly and responsibly. Some of the ethical concerns are-

- **AI Bias**: AI systems can sometimes treat people unfairly if they are trained on biased data, like preferring one group over another.
- **Privacy Issues**: AI might collect and use personal data without proper permission, which can invade someone's privacy.
- **Job Replacement**: AI can do some jobs faster than humans, which might lead to fewer job opportunities for people.
- **Misinformation**: AI can create fake news or images that look real, making it hard to know what's true or false.

1.15 Importance of AI Ethics

There are instances of AI technology that show racial, gender or socio-economic bias. Being biased means to unfairly oppose or support someone or something. AI bias is when an AI model gives biased results. An AI model can get biased if it learns from biased data.

Let us look at some of the examples:

1. Majorly, all the virtual assistants have a female voice. It is only now that some companies have understood this bias and have started giving options for male voices but since the virtual assistants came into practice, female voices are always preferred for them over any other voice. Can you think of some reasons for this?

2. If you search on Google for salons, the first few searches are mostly for female salons. This is based on the assumption that if a person is searching for a salon, in all probability it would be a female. Do you think this is a bias? If yes, then is it a Negative bias or a Positive one?

Various other biases are also found in various systems which are not thought up by the machine but have been transferred from the developer intentionally or unintentionally. To make AI better, we need to identify the factors responsible for it. So, integrating ethics into AI will ensure-

- Human-centric
- Unbiased
- Data Protective
- Sustainable AI Solutions.

- Let's understand in detail:

Human-centric: Integrating ethics into AI prioritizes human well-being and values, designing systems to serve human interests and needs while enhancing user experiences and societal benefits.

Unbiased: Ethical AI aims to mitigate biases in algorithms and decision-making processes, promoting fairness and equity by avoiding the perpetuation of biases based on race, gender, or socioeconomic status.

Data Protective: Ethical AI prioritizes data privacy and security, ensuring responsible data collection, storage, and usage practices to protect individuals' sensitive information and build trust among users.

Sustainable AI Solutions: Ethical AI encourages the development of environmentally and socially sustainable AI systems, balancing technological advancement with considerations for energy efficiency, resource consumption, and social implications.

In conclusion, ethical integration in AI fosters trust, fairness, and accountability while ensuring the development and deployment of AI technologies that serve human interests, avoid biases, protect data, and promote sustainability.

BALLOON DEBATE: Session Preparation: Logistics: For a class of 40 students [group activity – groups of 4]

Purpose: To introduce the concept of ethics (bias, access, privacy) in AI and its complexity.

Say: "We are going to debate about the boon and bane of various AI applications in the different industries you researched about. This will be a 4 v 4 debate. As you know, each theme has been given to two different teams. Now one team out of these two with be in affirmation with AI applications in their theme while the other one will be against AI applications in the same theme. The debate will go theme by theme where in each member of the team will get a minute to speak. The first speaker of the affirmative team will start the debate after which the first speaker of the rebuttal team will put their points. In this manner, each speaker will get a minute to speak and finally one team will be chosen to be thrown out of the balloon debate depending upon how convincing their points were. The speaker who speaks more than a minute will get his team disqualified. You will get 15 minutes to prepare your points. And your time starts now!"

Activity Guidelines:

Step 1:

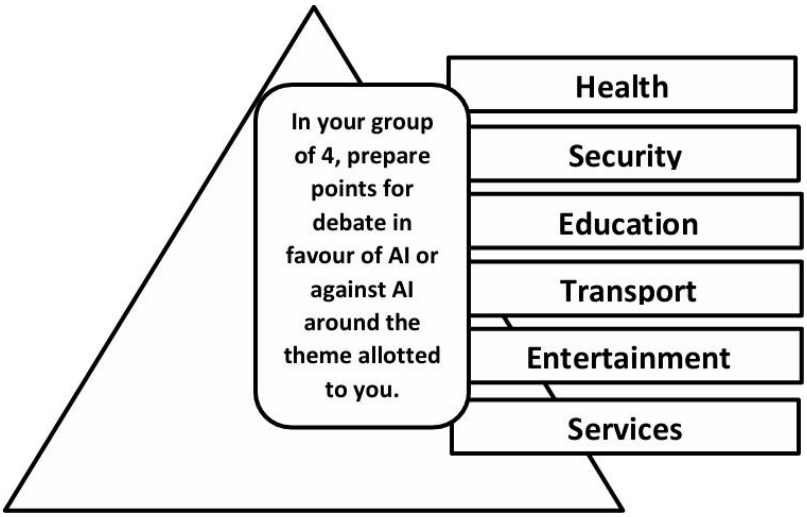
Organize the class into multiple teams, each consisting of four students.

Step 2:

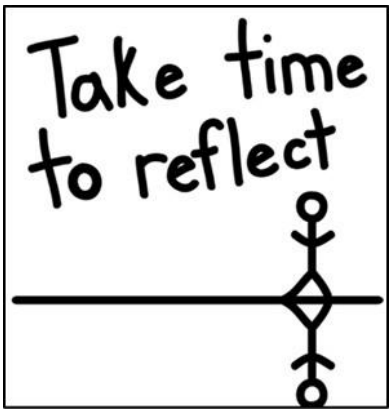
Assign the same theme to two teams and give them 15 minutes to prepare.

Step 3:

Begin the debate between two teams, one in favour of AI and other against AI applications.



Reflect and Discuss:



- With the increase in AI applications leading to replacing human workforce, do you consider it ethical to incorporate the use of AI for various jobs?
- How do you think income would be shared if Ai is used in place of Human Workforce?
- AI will probably bring with it many Health benefits. How will these Health benefits be made accessible and available to all the people in society?
- AI is a powerful tool in various fields, however depending on how it is used, it can either be a boon or a bane. Discuss.
- How can learning opportunities for AI be extended to all?

- How will human beings ensure that they stay ahead of Artificial Intelligence? Discuss this with your peers and write your views:

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"The important thing to remember is the consequences of your actions while applying AI"

Test Yourself:

1. What does ethics primarily deal with?

a) Internal beliefs and values
b) External rules of conduct
c) Personal preferences
d) Economic principles

2. What does ethics serve as in daily life?

a) Legal framework
b) Moral compass

c) Social hierarchy
d) Religious doctrine

3. What questions does ethics address?

a) How to maximize profit
b) What is right or wrong
c) Which political party to support
d) How to gain power

4. What is one of the questions ethics attempts to answer regarding decision-making?

a) How to maximize profits
b) How to gain power
c) How decisions impact others
d) How to manipulate outcomes

5. What is the primary purpose of AI Ethics?

a) To maximize profits
b) To inform responsible development and use of AI
c) To create risks and inequalities
d) To avoid regulatory frameworks

6. Why do we need policies and regulatory frameworks for ethics in AI?

a) To maximize risks and inequalities
b) To benefit only a select few individuals
c) To ensure responsible development and use of AI
d) To avoid any benefits to humanity

7. What is one of the key features of integrating ethics into AI solutions?

a) Ignoring human concerns
b) Unintended consequences
c) Creating biases
d) Ensuring human-centric AI solutions

8. Why is it important to integrate ethics into AI?

a) To maximize profits
b) To create biased solutions
c) To ensure sustainable AI solutions
d) To avoid regulatory scrutiny

Reflection Time

1. What is the significance of ethics in shaping individual conduct and moral decision-making?
2. Why are policies and regulatory frameworks needed to ensure ethics in AI?
3. What are the parameters to ensure Ethical Integration in AI?
4. How does Ethical AI contribute to safeguarding individuals' sensitive information and fostering trust among users?
5. What is the need for creating sustainable AI solutions?

Unit – 2

Project 0: Presentation

Lesson Title: Project 0: Presentation	**Approach:** Discussion + Activity
Summary: Students will summarize their previous learnings. They will then engage in a dialogic conversation on AI and its use cases using the project template.	
Learning Objectives: 1. Recapitulate the previous learning. 2. To use a project template to structure the module presentation. 3. To present a structured and informed conversation around AI and its use cases.	
Learning Outcomes: Students will be able to: 1. Summarize the topics learned previously. 2. Illustrate and map a given use case with the AI project cycle. 3. Identify the AI domain of a given use case.	
Key-concepts: 1. Students will be able to define artificial intelligence 2. Students will identify and describe the key domains of AI 3. Students will explore and analyse real-world applications of AI across various industries. 4. Students will understand the stages of the AI project cycle 5. Students will recognise the importance of ethical considerations in AI	

2.1 Concepts at a glance

Let us Recap!

Purpose: To reflect on learnings from the previous modules and apply them to create your project.

Say: "Before we start our lesson, let us recap what we have learned in the previous module."

Artificial Intelligence and its applications

Human Intelligence vs Artificial Intelligence

Human Intelligence is our mental ability to make decisions, solve problems, and learn new things.

Similarly, Artificial intelligence (AI) is a machine's ability to make decisions, solve problems, and learn (like a human being).

Automation Vs Artificial Intelligence

Explain the difference between Automation and AI.

Automation	Artificial Intelligence
Automation is a way to make machines work on their own. 	AI is a way to make machines think on their own. 
Automation makes physical work easy for humans – lifting, folding, moving, etc.	AI makes mental work easy for humans – predicting rainy weather, suggesting tasty dishes, etc.
Examples: Washing Machine, Shirt folding machine, Printer.	Examples: Face unlock, Self-driving cars, Siri and Alexa.

Interesting AI Applications:

AI is being used all around us.

- YouTube Video Suggestions
- Google Maps navigation
- Digital assistants – Alexa, Siri, Google Assistant, etc.
- Self-Driving Cars
- AI fitness apps
- AI in Music and Arts

Activity: Match the following

Match the everyday uses of AI with its correct name.

1. 

2. 

3. 

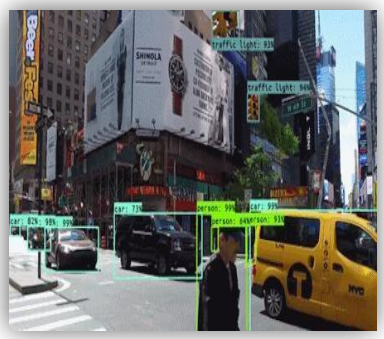
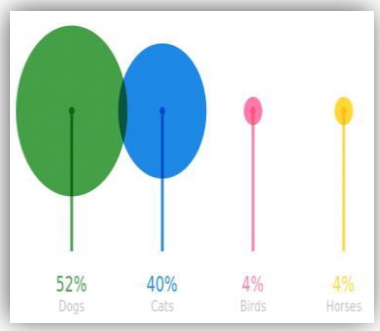
A. Recommendation System – YouTube video suggestions

B. Digital Assistants – Alexa, Siri, etc.

C. Navigation – Google Maps

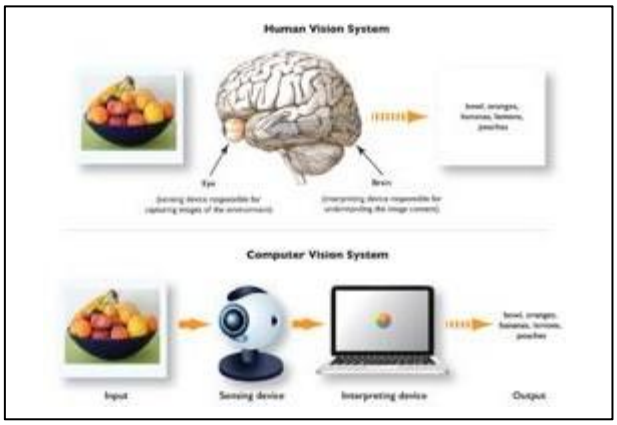
Three domains in AI

The main areas in Artificial Intelligence are:

		
Computer vision The ability of machines to see the world.	**Natural Language Processing** The ability of machines to understand human language.	**Statistical Data** The ability of machines to understand numbers.

Computer Vision

Computer Vision is a domain of AI that lets machines see and understand images and videos, the same way a human being does.



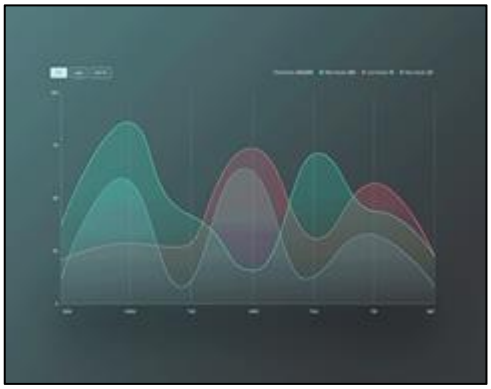
Natural Language Processing

Natural Language Processing or NLP enables machines to understand language, as human beings do. Computers and robots use NLP to process real-world language, spoken or written, and make sense of it.

Statistical Data

Statistical Data enables machines to understand large amounts of numerical data such as age, price of
smartphones, temperature and humidity, etc.

Computers and robots use Statistical Data to analyze numbers and come up with meaningful information. For example – predicting hurricanes based on humidity, temperature, rainfall, etc.



AI and the society

Sustainability

The word "Sustainability" comes from the word "Sustain".

Do you know what "Sustain" means?

It means to maintain, support, withstand or endure.
Thus, sustainability means, maintaining the world we live in.

The key idea is – we must act responsibly so that the resources on our planet can support future generations to come.

Sustainability

We should save resources for future generations because,

- Our Earth has limited resources.
- The land, air, water and food we have is not unlimited.
- If we use all of it or pollute it, we may affect the ability of the coming generations to use it. Hence, sustainability tries to solve this problem.

Sustainability encourages everyone around us to use resources in a responsible manner by sharing resources equally and not being wasteful.

Society & Sustainability

Society basically refers to people around us.

To be truly sustainable, we need everyone in our society to follow sustainability. Imagine if some segments of society are not sustainable, can we truly achieve full sustainability?

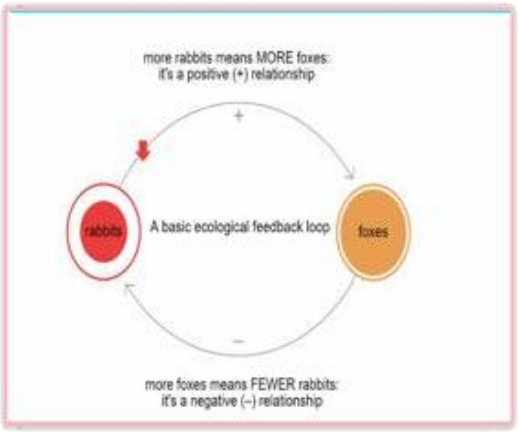
No, that would not be possible. Hence, we need to think of sustainability from a societal point of view.

Sustainable Development Goals (SDGs)

These are 17 goals established by the United Nations in 2015.

Each of these goals has several targets.

You can explore the given link to identify which of the goals or specific targets appeals the most to you, https://sdgs.un.org/goals



Systems Thinking

A system is simply a group of interconnected things. Systems behave differently from their individual components.

Systems are represented visually using a Systems Map. This simply means that its components interact and affect each other. This feature of systems is known as interconnectedness.

Examples: Water Cycle, School, the Digestive System, food chains, etc.

AI Project Cycle

AI project cycle is the cyclical process followed to complete an AI

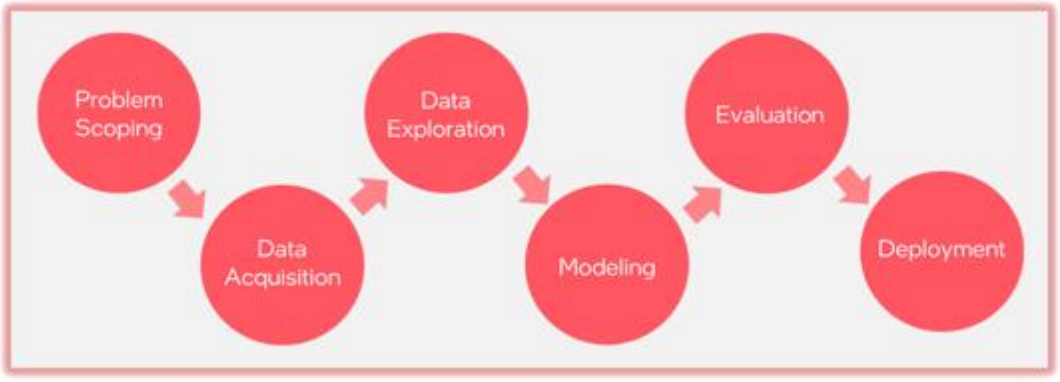
project. AI project cycle takes us through different steps involved in a

project.

AI project cycle helps us:

- to create better AI projects easily.
- to create AI projects faster.
- to understand the process.

AI project cycle contains 6 different stages.



AI Ethics

AI Ethics is a system of moral principles intended to inform the responsible development and use of AI.

Integrating ethics into AI will ensure

- Human-centric
- Unbiased
- Data Protective
- Sustainable AI Solutions.

Let's Reflect:

1. What is Human Intelligence primarily concerned with?

a) Physical strength
b) Mental ability to make decisions, solve problems, and learn
c) Emotional intelligence
d) Social interactions

2. What is Artificial Intelligence (AI) defined as?

a) Human-like appearance
b) Machine's ability to mimic human emotions
c) Machine's ability to make decisions, solve problems, and learn
d) Machine's physical strength

3. What is the primary purpose of automation?

a) To make machines think on their own
b) To make machines work on their own
c) To create physical work for humans
d) To increase manual labour

4. What is the primary purpose of Artificial Intelligence (AI)?

a) To make machines work on their own
b) To make machines think on their own
c) To perform physical tasks
d) To replace human intelligence

5. Which domain of AI is focused on enabling machines to understand language?

a) Computer Vision
b) Natural Language Processing (NLP)
c) Statistical Data
d) Predicting hurricanes

6. What does Statistical Data enable machines to understand?

a) Images and videos
b) Numerical data such as age, price of smartphones, temperature, and humidity
c) Human language
d) Real-world objects

7. What is the primary purpose of Computer Vision?

a) To enable machines to understand language
b) To enable machines to see and understand images and videos
c) To analyse statistical data
d) To predict hurricanes based on weather patterns

8. What is the primary meaning of the word "Sustain"?

a) To destroy
b) To maintain, support, withstand, or endure
c) To consume rapidly
d) To pollute

9. What does sustainability aim to solve?

a) Rapid consumption of resources
b) Pollution of the environment
c) Limited resources for future generations
d) Unlimited resources for future generations

10. What is the AI Project Cycle?

a) A linear process
b) A cyclical process followed to complete an AI project
c) A random set of steps
d) A one-time activity

2.2 Dialogue on the AI Project Template

Activity: [Activity Template] Project Presentation Template

Purpose: To use a project template to structure the module presentation.

Say: "Fill project template for Dialogue on AI. After completing this activity, you will be able to do a presentation on AI. Fill the given conversation templates one by one."

This activity aims to construct a dialogic presentation using the project template. Follow the instructions as given in the activity template.

Step 0 - Friends Forever!

Who is your Best Friend? Write their name. Draw a cartoon of you and your best friend together!

Step 1 – Defining Artificial Intelligence

Best Friend: "Hey! Can you tell me what is AI?"

Step 2 – Applications of Artificial Intelligence

Best Friend: "That is very interesting! I read that AI is used in YouTube video suggestions, Google Maps navigation, and our digital assistants like Alexa! Have you also used AI anywhere?"

Step 3 – Domains in Artificial Intelligence

Best Friend: "Artificial Intelligence is being used in so many places now! Can we classify these AI uses in different domains? What are some examples of each of these domains?"

Step 4 – AI use case

Best Friend: "Wow! I wonder how I would use AI to help others! Do you have any ideas on where can we use AI?"

Step 5 – AI use case – Domain

Best Friend: "I like this idea! But I am confused about which AI domain this belongs to. How do we decide that?"

Step 6 – AI use case Project Cycle

Best Friend: "Now, if we were to create an AI solution on this exciting idea, we would have to follow the AI project cycle. Do you know what the AI project cycle is and why do we need it?"

Step 6.1 – AI use case – Problem Scoping

Best friend: "I am excited to map this project with the AI project cycle! Let's start with identifying the problem we are going to solve using the 4Ws method – What, Who, Where, Why."

Step 6.2 – AI use case – Data Acquisition

Best Friend: "Now that we have identified the problem, we have to start thinking about the data that we need. Where will we get this data from?"

Step 6.3 – AI use case – Data Exploration

Best Friend: "I can play around and explore this data a little bit. Can we represent this data visually? What kind of information can we get from this data?"

Step 6.4 – AI use case – Modelling

Best Friend: "My favourite part is creating the AI model! For our AI model, what will be the input data? What will we get as output?"

Step 6.5 – AI use case – Evaluation

Best Friend: "I am sure we will need to test our AI model. How do we do that? And how will we improve our AI model, if needed?"

Step 6.6 – AI use case – Deployment

Best Friend: "After we have our AI model ready, we will need to give it to people who are facing the problem. How can we do that? Let us also think how will it be used!"

Step 7 – AI Ethics

Best Friend: "So now that we have mapped our idea to the AI project cycle, we must also talk about AI Ethics! Thought I am not sure what it is and its importance! Do you know?"

Step 7.1 – AI Ethics

Best Friend: "Ahh! I get it! Do you think there will be any ethical concerns with our idea? How will we overcome these ethical challenges?

Now present your 'Dialogue on AI' with your Best Friend in front of your class.

GROUP PROJECT-1

Create eight groups, each consisting of five to six students. Each group will select a theme from the provided list. Subsequently, each group will generate a problem related to their chosen theme. Afterwards, they will develop a Problem Statement Template utilizing the 4W Problem Canvas to define the problem effectively. Additionally, they will explore how AI-enabled systems can provide an effective solution while addressing the problem.

Themes:

a) Agriculture
b) Food Processing
c) Dairy Farming
d) Healthcare
e) Retail
f) Banking and Financial Services
g) Tourism/Hospitality

GROUP PROJECT - 2

Create several groups, ensuring each consists of at least 5 students. Each group can choose a theme/field from the provided list, or the teacher can randomly assign a theme to each group using dice. Within their selected field, each group should devise five effective AI-based tools/solutions and provide a brief explanation of their functions.

Themes:

a) Agriculture
b) Food Processing
c) Dairy Farming
d) Healthcare
e) Retail
f) Banking