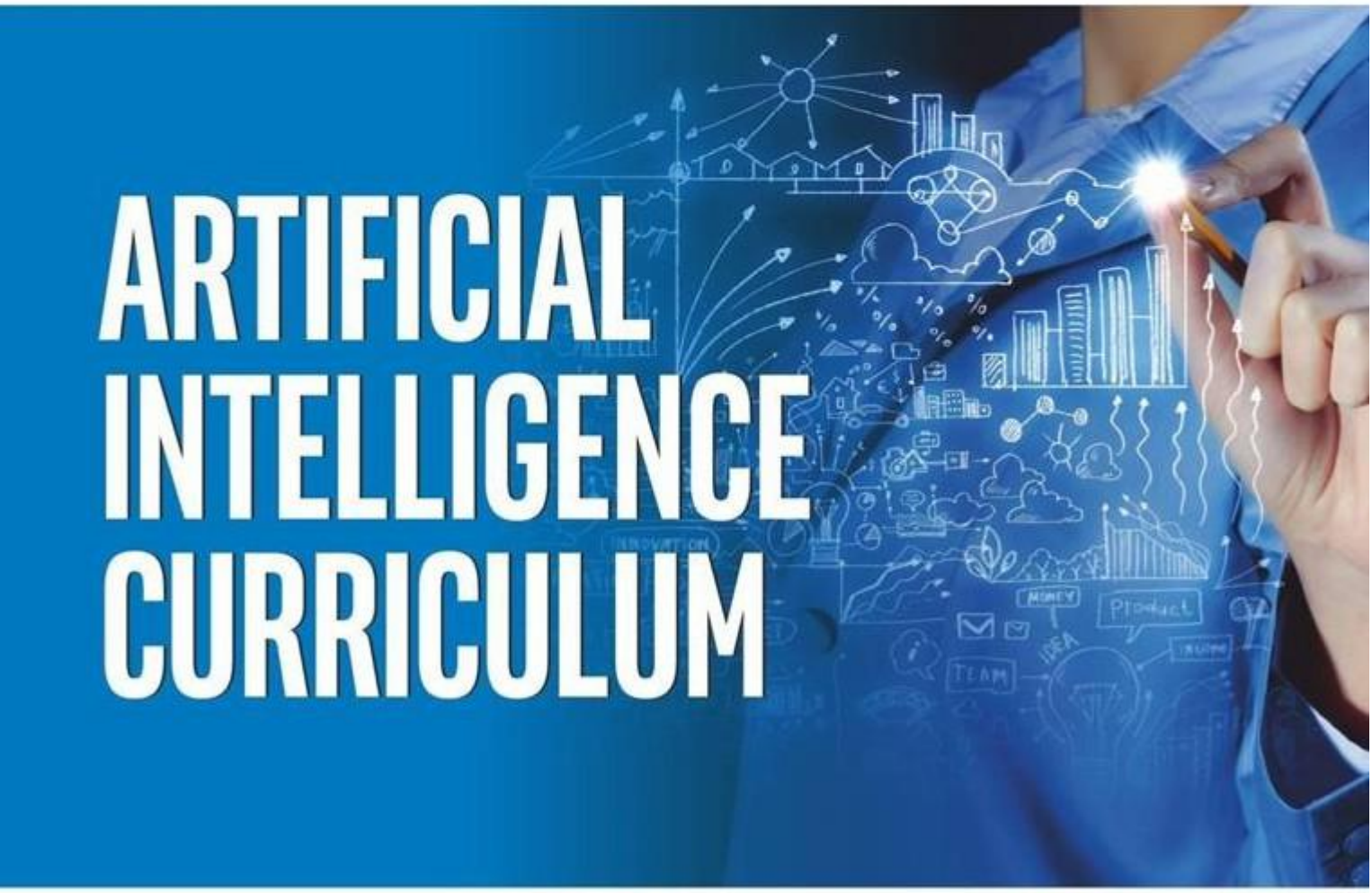

Class 7

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 VII. 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 tailored for AI teachers and students of Class VII and delves deeper into the fascinating world of Artificial Intelligence. It introduces students to AI domains such as Natural Language Processing and Statistical Data, exploring their real-world applications. Additionally, the book emphasizes the innovative role of AI in fostering sustainability and societal development, highlighting key concepts like Sustainable Development Goals (SDGs), system thinking, and system maps.

Through interactive content and relatable examples, students will develop a strong foundation in AI, strengthening their problem-solving, critical thinking, and creative abilities. This book aims to inspire learners to explore the potential of AI while understanding its importance in building a sustainable future.

Happy learning!

Module Name: Demystify		
TABLE OF CONTENTS		
Sessions	**Topics**	**Duration**
AI & Other Technologies Domains of AI	• Navigating AI Domains and Emerging Frontiers • Natural Language Processing • Applications of Natural Language Processing • Statistical data • Applications of Statistical Data	8 hrs
Artificial Intelligence: Exploring Innovations and Societal Sustainability	• Sustainability • Importance of sustainability for society • Sustainable Development Goals (SDGs) • System thinking and System maps • Purpose of System maps	7 hrs

Unit - 1

AI & Other Technologies-Domains of AI

AI & Other Technologies-Domains of AI	**Approach:** Session + Activity
• **Summary:** In this module, the students are introduced to the two major domains in AI- Natural Language Processing and Statistical Data. This module will also take youth deeper into the applications of the two domains within the broader topic of Artificial Intelligence	
Learning Objectives • To introduce AI Domains • To introduce and experience Natural Language Processing • To introduce and experience Statistical Data	
Learning Outcomes • Describe how AI plays a role and impacts their day-to-day activities • Identify the different domains of AI and describe their applications	
Key Concepts • Introduction to Natural Language Processing & its AI Use Cases in Everyday Life • Introduction to Statistical Data & its AI Use Cases in Everyday Life	

SESSION - 1

Domains of AI & NLP

1.1 Recap

Let's recall the three domains of AI.

Activity: Word Scramble

Purpose: Recall of domains

Say: Unscramble the phrases to discover the **domains of artificial intelligence**.

- TERPUCOM SIONVI
- TADA ENCESCI
- TURALNA GUAGELAN CESSPROING

Main areas in Artificial Intelligence

Just like us, we also want our machines to be able to see things, understand language, and make sense of numbers. This has resulted in 3 domains in AI or 3 broad fields where AI is being used.

Why are there different domains?

Depending on the type of data, we can divide AI into different domains.

COMPUTER VISION

- Uses cameras
- Contains images and videos
- Example – Images of cats, videos of moving vehicles on a road

NATURAL LANGUAGE PROCESSING

- Uses keyboards, mic and scanner
- Contains spoken or written language
- Example – Text messages, voice commands

STATISTICAL DATA

- Uses machines, sensors and people
- Contains numbers
- Example – Age of people in a city, marks scored in an exam

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.

Introspection Activity on how we speak:

Purpose : To introduce the concept of Natural Language Processing.

Say: Students need to introspect how they respond to a question posed to them and answer the questions given below.

Q1 How do we come up with an appropriate response when someone says "Thank you"?

_____

_____

_____

Q2 Can machines understand our language?

Q3 Have you ever talked to a computer or a robot?

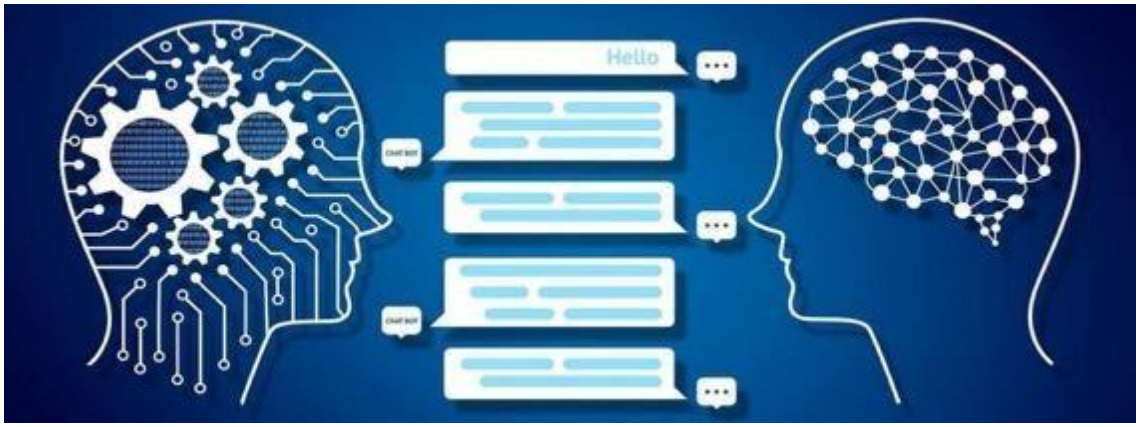
1.2 Natural Language Processing

What is 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.

It helps computers communicate with human beings in human language
With NLP, computers can read and write text, hear and understand speech, and provide a response. NLP can analyze a lot more text and speech than humans, without getting tired.

Let's understand how NLP works-



NLP processes human language to make sense of it, in a way a computer can understand. The input speech or text is cleaned to make it easier for the computer to process it. Computers use learning-based AI to process the input.

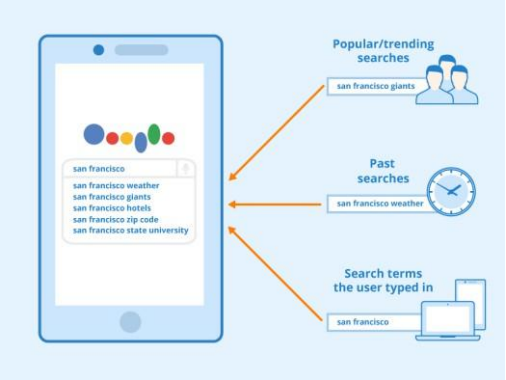
1.3 Applications of NLP around us

Grammar and spelling correction

Applications such as Grammarly use NLP to build typing assistants which can review spellings, grammar, and punctuations. It can also search for replacements for the identified errors, and to improve your overall writing.

Autocomplete and Text prediction.

Autocomplete and Text prediction features use NLP to complete the word that you are writing, or predict the next word that you might type, based on your typing habits.



Digital Assistants

Digital assistants like Apple's Siri, Amazon's Alexa, and Google Assistant can understand human languages and are able to answer many general questions and offer suggestions based on your past activity.

Watch the video on the short history of digital assistants.

https://www.youtube.com/watch?v=rkKSb5wAstg

Activity: Invitation Card

Purpose: To understand how a Grammar checker makes use of AI in editing .

Say: Make an invitation for their Environment club inauguration following the guidelines given below

Activity Introduction:

- In this activity, youth get to write an invitation for their Environment club inauguration with the help of AI.
- Grammar checker uses AI to detect any spelling mistakes and grammatical errors in our writing.

Activity Guidelines:

Step 1:

Go to https://writer.com/grammar-checker/

Step 2:

Write an 50-word invitation message

Step 3:

Paste the message in your invitation card and your card is ready.

Step 4:

Once completed, download your awesome invitation card

Activity Reflection

What did you notice while you were typing the message? Give reason.

List three more examples showing the usage of “Grammar checker”.

Activity: Say What You See (Google experiment)

Purpose: To experience how NLP works to generate images.

Say: Using the link provided open the Google experiment. Click on Launch experiment. Describe the image seen with suitable adjectives and submit it for AI to generate the image. Compare both the original image and the AI-generated image.

In this experiment created by Jack Wild, learn the art of the prompt and improve your image-reading skills by looking at Google AI-generated images and describing what you see.

Activity Guidelines:

Step 1:

Open a browser and go to https://experiments.withgoogle.com/say-what-you-see

Step 2:

Once the page loads, click on Launch Experiment at the top left side

Step 3:

Click on Launch Level 1 button on the bottom right corner

Step 4:

The tool will display an abstract or complex image. Your goal is to describe the image in the simplest words possible.

Step 5:

After submitting your description, the AI will provide feedback or insights about the object in the image.

Activity Reflection

- How accurate was the AI in identifying your descriptions?
- How could you improve your communication with AI systems?
- What did you learn about how AI interprets visual information?

SESSION - 2

1.4 Statistical Data

Let's try to answer these questions

- How many students are there in your class?
- How many members are there in your family?
- If you want to buy candies for your classmates, and chocolates for your family members, will you buy more candies or more chocolates?

What is the observation about the data?

Q1 Can machines also understand numbers?

Q2 Can machines also analyse numbers to predict?

What is Statistical Data?

- Statistical Data enables machines to understand large amount of numerical data –age, price of smartphones, temperature and humidity, etc.
- Computers use Statistical Data to analyse numbers and come up with meaningful information. For example – predicting hurricanes based on humidity, temperature, rainfall, etc.

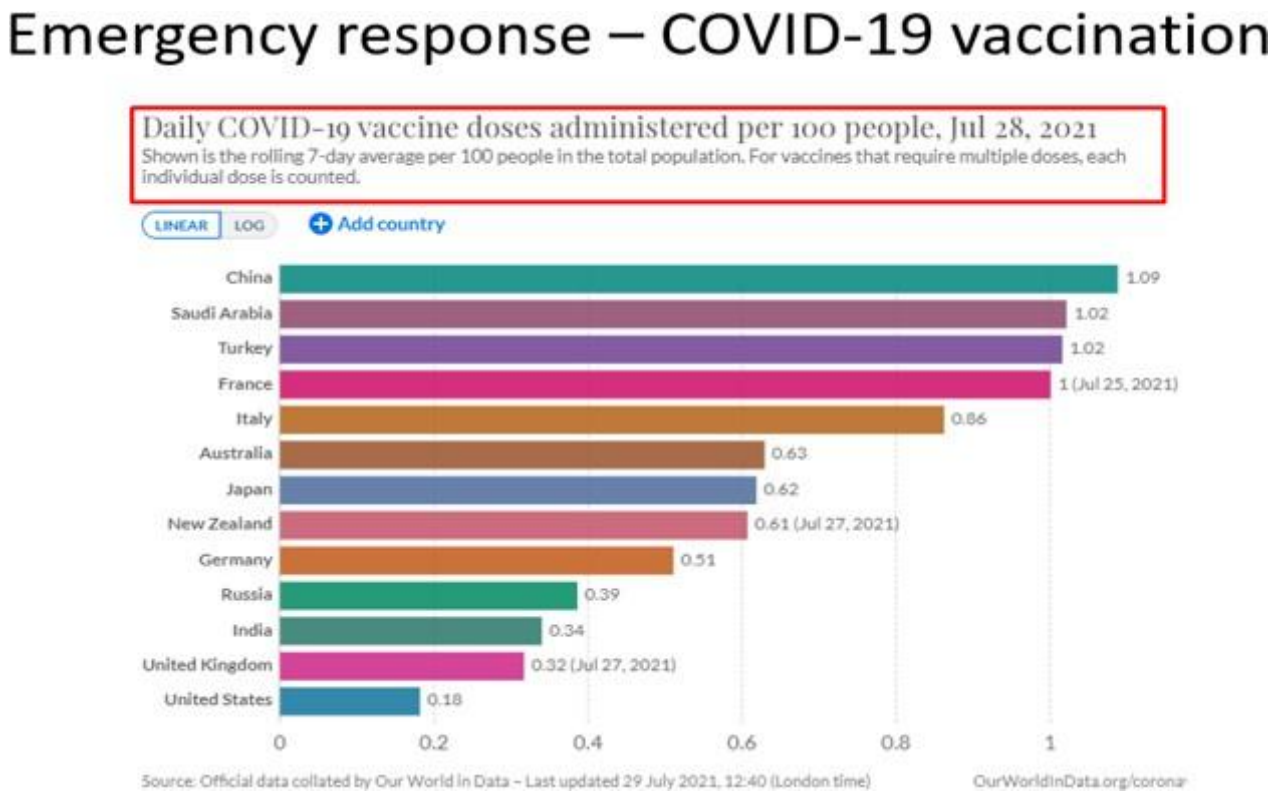
Why is Statistical Data important?

- It helps find out hidden and unexpected information from the data.
- Visual representation of data makes it easier to understand.
- Analysis of data helps in making decisions.

1.5 Applications of Statistical Data

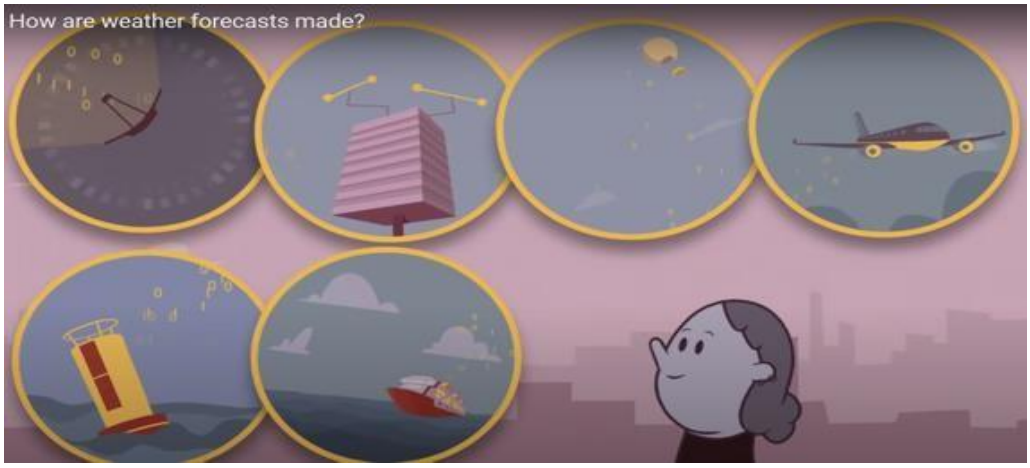
Emergency response – COVID-19 vaccination (Health care)

Authorities across the world used COVID-19 Statistical Data – number of cases, rate of spread, etc. – to prepare their healthcare systems for any emergency and to deliver COVID-19 vaccines as well.



Using data to help drive Tourism Growth. (2017, October 11). [Video]. YouTube. https://www.youtube.com/watch?v=c3Zdif9tmx8

Weather Prediction



Statistical Data can forecast the weather by analyzing data such as wind speed, temperature, humidity, etc. How are weather forecasts made? (2016, February 26). [Video]. YouTube. https://www.youtube.com/watch?v=fdErsR8_NaU

1.6 Ethical considerations in different domains of AI

Ethics in AI means thinking about what's right and fair when we create and use smart technologies to make sure they help everyone and don't cause harm.

1.6.1 Ethical Considerations in Computer Vision

Ethical considerations in computer vision are about making sure that smart cameras and image- recognition tools are used fairly and safely, without invading people's privacy or causing harm.

Broad strategies for using computer vision ethically:

1. Informed consent means that the person participating in the evaluation is fully informed about the evaluation being conducted. Participants need to be made aware of the purpose of the project, who or what group is funding it, how the findings will be used, if there are any potential adverse impacts of their participation and who will have access to the findings.
2. Voluntary participation means that people participate in the evaluation free from coercion. Participants are free to withdraw their participation at any time without negatively impacting on their involvement in future services or the current program.

3. Harm can be both physical and/or psychological and therefore can be in the form of: stress, pain, anxiety, diminishing self-esteem or an invasion of privacy.
4. Confidentiality means that any identifying information is not made available to, or accessed by anyone but the program coordinator.
5. Anonymity is a stricter form of privacy than confidentiality, as the identity of the participant remains unknown to the research team.
6. Only assess those components that are of relevance to the program/initiative being conducted.

1.6.2 Ethical considerations in Natural Language Processing

Ethics is about figuring out what is right and what is wrong, especially when it comes to how we treat each other and the world around us, People need to follow rules and make choice that are morally correct. Now, let's talk about AI ethics. AI also needs to follow certain rules and make good choices. This is where AI ethics comes in.

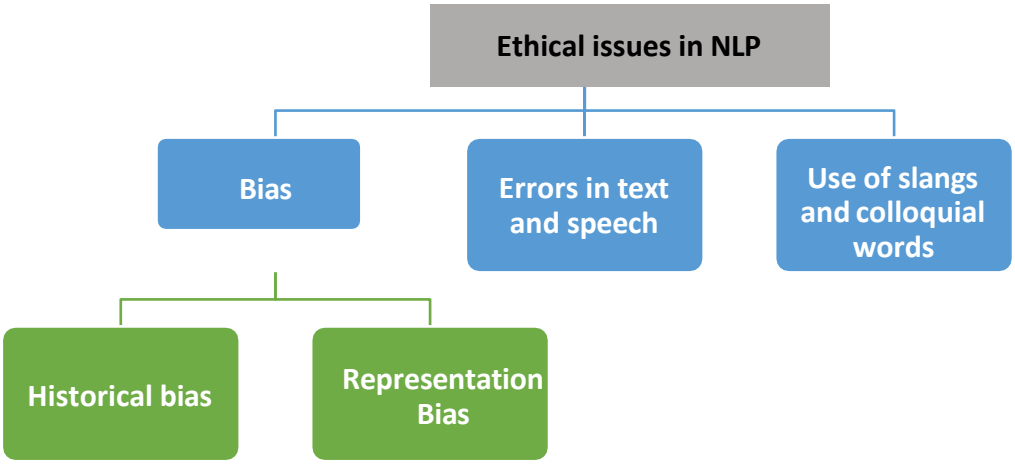
AI, can make decisions that aren't fair to everyone. This happens because the AI learns from information that might not show the whole picture. Following are some of the ethical issues in Natural language Processing-

1. **Bias:**

   A. Historical Bias: This is reflected by how the everyday generalizations and stereotypes crawl up in how the machine interprets the data. For instance, a word like a nurse is highly associated with women, signifying a discriminatory attitude towards a particular gender.

   B. Representation Bias: It occurs when some part of the population is either over-represented or highly neglected in the data. It leads to false generalizations and weak insights by the models.

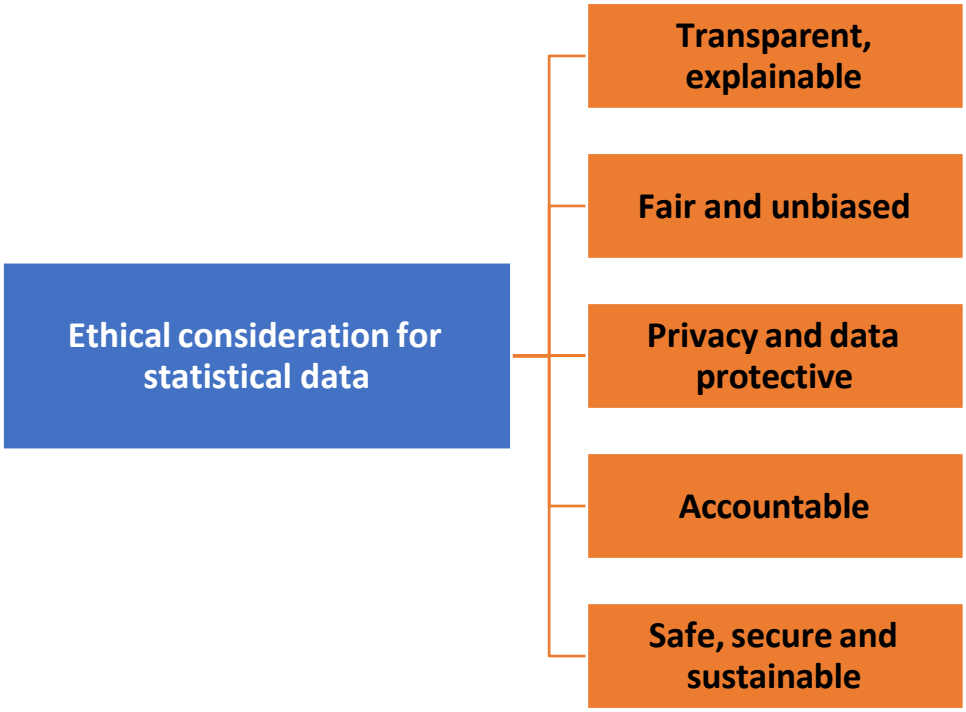
2. **Errors in text and speech:** Commonly used applications and assistants encounter a lack of efficiency when exposed to misspelled words, different accents etc.
3. **Usage of Slang and Colloquial words:** Slangs are formed on regular basis then and, it's hard to tap on every new phrase that gets popular within a short period. Similarly, colloquial words have no definite dictionary meaning and present a high chance of problems with the usage of NLP.



1.6.2 Statistical data:

Ethical considerations in using statistical data are essential to promote fairness, transparency, and responsible decision-making. Let us discuss ethical considerations while using statistical data-

1. **Fair and unbiased:** AI decisions should be tested for skewed results or biases that might have existed in the training data.
2. **Transparent, explainable:** A non-technical person can understand why our AI systems arrive at certain conclusions when it comes to determinations related to individuals. Volunteers and users should be informed how data are collected, stored, used and protected through clear privacy statements.
3. **Privacy and data protection:** The user privacy and data right should be respected. Minimum information absolutely necessary should be used for every step of development and encrypt or anonymise data where possible.
4. **Accountable:** AI solutions should be responsible enough to give the users confidence, and provide a point of contact for questions, directly or through our trusted partner network. User feedback should be continuously incorporated into the AI solutions, and any issues should be addressed promptly.
5. **Safe, secure and sustainable:** The AI solutions should be designed and deployed securely and robustly, and should be defended from adversarial attacks, to prevent misuse and reduce the risk of being compromised or causing harm.



Activity: Birthday Month

Purpose: To collect data, represent visually and analyse

Say: Collect the required data and follow the guidelines given below.

Activity Introduction

- This activity is about data collection and analysis
- In this activity, youth need to collect data from their friends about their birthdays
- They will then use Microsoft Excel (or any other similar tool) to create a graph for the birthday months

Follow the Guidelines and try to recreate the output:

Data collection

Collect the data from your friends about their birthday month

Data Visualization

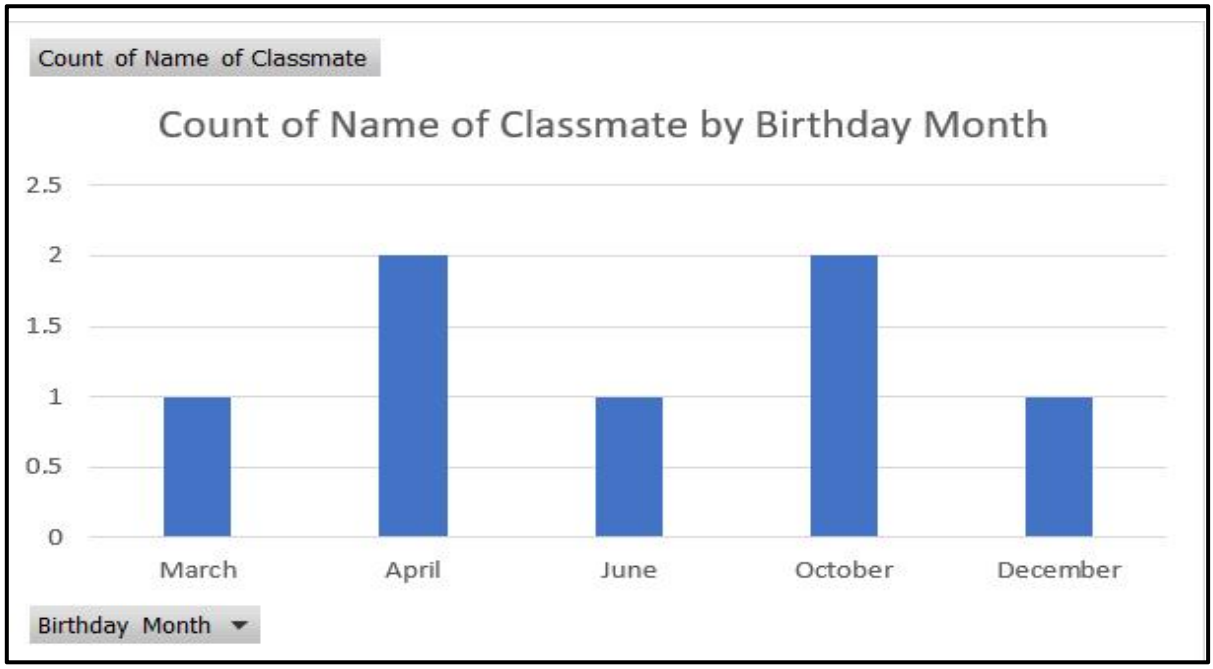
Data visualization is a way of showing information as pictures, like charts or graphs, so it's easier to understand.

- Open a Microsoft Excel Sheet
- Create 2 columns, one for Names and another for Birthday Month
- Ask your classmates for their names and birthday months (at least 15)

- Note it down in the columns you've created
- Click on the "Insert" tab at the top
- Next, select both the columns and click on "Recommended Charts" and choose an appropriate chart
- There you go, you've created your first statistical chart !

	A	B
1	**Name of Classmate**	**Birthday Month**
2	Seema	December
3	Arun	March
4	Sourabh	April
5	Varun	June
6	Reema	October
7	Manya	October
8	Komal	April

Activity reflection



- Did you end up with a chart like this?
- Let's interpret the graph
- We can easily conclude from the graph that "how many students have common birthday months"
- It will help class teacher to order the number of birthday gifts in a particular month

Learning Outcome:

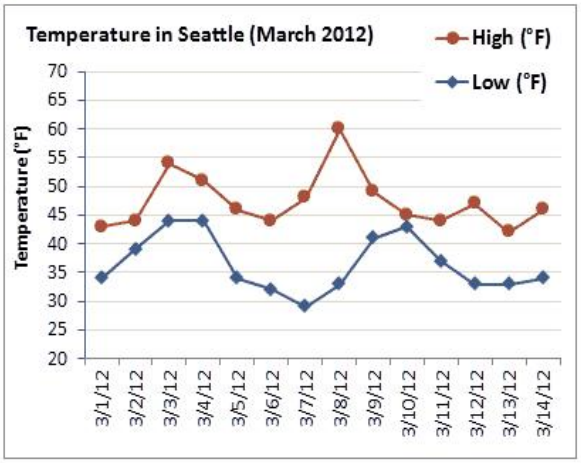
- Students can show accurate data collection and organization
- Students will demonstrate the ability to use Excel (or similar tools) to create an appropriate graph
- Students can interpret the graph to identify different trends

2.5 Examples of real-life data

Example 1

- The chart shows the pattern of Seattle's daily temperature.
- The data is displayed on a line which makes it easier for us to see the drop and rise in temperature.
- Can you make a similar chart for your city?

	A	B	C
1	Temperature Data for Seattle		
2	Date	High (°F)	Low (°F)
3	3/1/12	43	34
4	3/2/12	44	39
5	3/3/12	54	44
6	3/4/12	51	44
7	3/5/12	46	34
8	3/6/12	44	32
9	3/7/12	48	29
10	3/8/12	60	33
11	3/9/12	49	41
12	3/10/12	45	43
13	3/11/12	44	37
14	3/12/12	47	33
15	3/13/12	42	33
16	3/14/12	46	34
34			
35	Chart type in Excel:		
36			

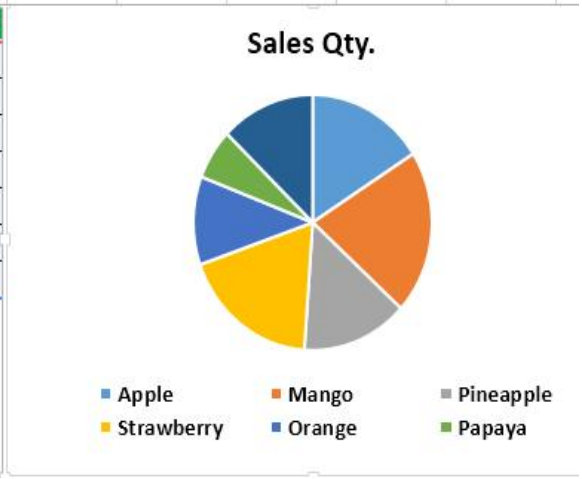


Example 2

- The chart shows the sale of each type of fruit
- Which fruit was sold the most? Which fruit was sold the least?
- Can you make a similar chart for the fruits eaten by students of your class?

To summarize, Statistical Data helps us to understand and see numerical data using charts, providing necessary information to make decisions.

	A	B
1	Flavor	Sales Qty.
2	Apple	500
3	Mango	650
4	Pineapple	450
5	Strawberry	580
6	Orange	350
7	Papaya	200
8	Grapes	400
9		
10		
11		
12		
13		



Unit 2

Artificial Intelligence: Exploring Innovations and Societal Sustainability

Lesson Title: Exploring Innovations and Societal Sustainability	**Approach:** Session + Activity
Summary: In this module, the students are familiarized with the topics of Sustainable Development Goals (SDGs) and Systems maps. They are also introduced on how to use AI as leverage to solve sustainable problems.	
Learning Objectives • Familiarizing the meaning of sustainability and concept of using resources responsibly. • Familiarizing with Sustainable development goals and how the SDGs are related to each other. • Understanding the importance and meaning of Systems Thinking. • Able to create system maps for any system and understanding leverage. • Understand how to use AI as leverage in a systems map	
Learning Outcomes • Identify the importance of sustainability and explain the possible ways AI can achieve sustainable development goals • Describe the role of AI and its impacts on society and sustainability • Describe systems, systems thinking, and leverage	
Key Concepts : 1. The relationship between society & sustainability 2. Sustainable Development Goals (SDGs) 3. Systems Thinking, Systems Map & Leverage	

SESSION 1 Sustainability

2.1 Natural Resources : We use energy to move cars on the road, bake a cake in the oven, light our homes, and for a lot of other things!

Natural resources are the raw materials and sources of energy – land, air, water, minerals, fossil fuels, etc. These resources provide us with energy in different forms- Light, Heat, Motion, Sound

Circle objects that burn fuel, and rectangle around the things that need people power to move



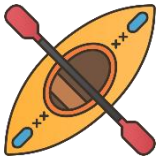



Answer:

Following are the things that burn fuel



Following are the things that need people power to move


Which of the following objects provides us with light energy ?






Answer: Following are the objects that provide us with light energy



Our natural resources are the key to sustainability.

2.2 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 natural resources on our planet can support future generations to come.

Let's understand what is meant by using resources responsibly.

Imagine that you want to make a sandwich!
To make your sandwich you need – bread, your favorite jam & butter. When you enter the kitchen, you realize that there is no jam! Your elder sister comes in and says the jam got finished when she had made her sandwich earlier. She further adds that if she knew that you would be making sandwiches later, she would have left some jam for you.

The concept of saving resources for future generations is similar. Our Earth has limited resources. The land, air, water, and food, that provide us with energy are not unlimited. If we use all of them or pollute them, coming generations might not be able to use them. 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 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.

Activity: Brainstorming

Purpose: Learners will be able to identify and develop awareness for Sustainable living.

Say: Think and answer the following questions.

Answer the following questions-

 Do you think you live a sustainable life?

 How can you become more sustainable?

 Which natural resources around you are threatened by wastage or pollution?

Learning Outcome :

- We must act responsibly to maintain the world we live in so that the natural resources on our planet can support future generations to come.
- Sustainability encourages everyone around us to use resources in a responsible manner by sharing resources equally and not being wasteful.

2.3 Sustainable Development Goals (SDGs)

For achieving sustainability at a global level, countries have come together to create goals called the Sustainable Development Goals (SDGs). There are 17 goals established by the United Nations in 2015. Each of these goals has several targets. Explore the website- https://sdgs.un.org/goals

SDGs were created to address challenges from different fields. They encourage countries, companies, and societies to be sustainable.

The purpose of the SDGs is to address global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice, to ensure a sustainable future for all. The target year for achieving the SDGs is 2030.

Who is responsible for implementing the SDGs?

Implementation of the SDGs is a shared responsibility among governments, the private sector, civil society, and individuals. Progress and success towards achieving the SDGs are measured through various indicators and targets set for each goal.

Developed countries are expected to provide financial resources, technology transfer, and capacity-building support to developing countries to help them achieve the SDGs. Individuals can contribute to the achievement of the SDGs by raising awareness, adopting sustainable lifestyles, volunteering, advocating for policy changes, and supporting organizations working towards the goals.

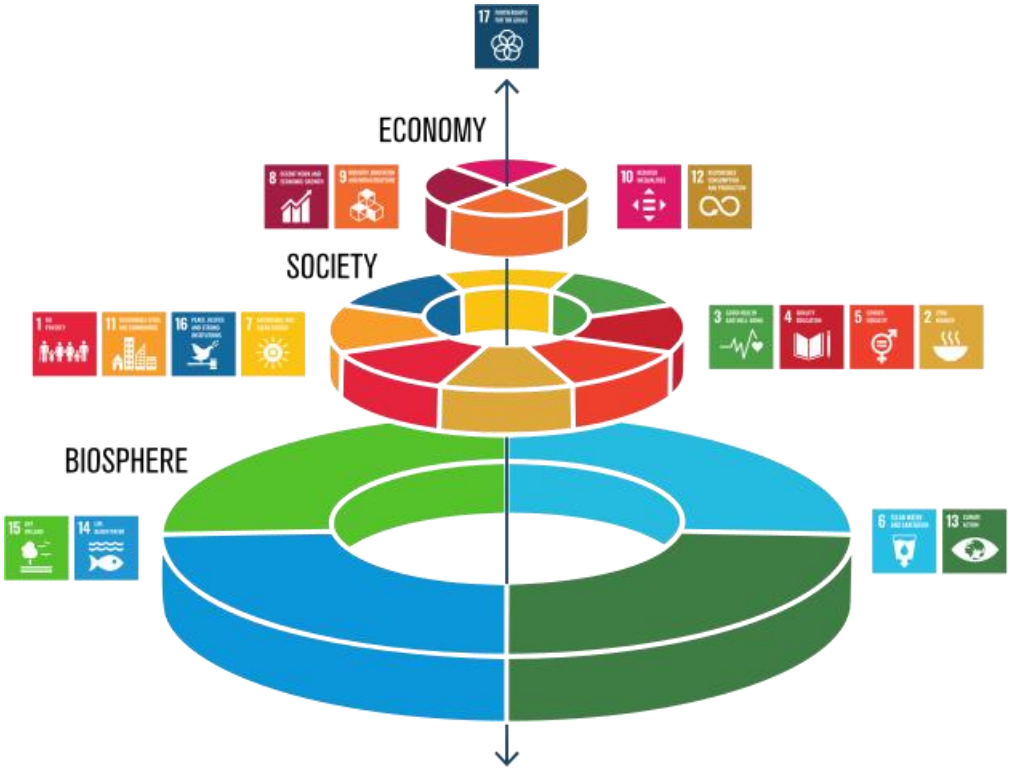
The 17 SDG Goals are

Which of these goals would you like to pursue? Why?

Did you notice that the SDGs relate to almost all aspects of our daily lives?

We may think that the goals are independent and don't affect each other. However, that is not true!

A useful concept known as the SDG wedding cake exists to show how the goals are related to each other (as shown below)



Watch the video for better understanding-

SDG Video link: Stockholm Resilience Centre TV. (2021, November 9). The SDGs "wedding cake" (animation) [Video]. YouTube.

https://www.youtube.com/watch?v=dcvz6Fv8DqU The goals are divided into

three broad categories:

- **Economy** – production, and consumption of goods and services, and management of resources
- **Society** – a group of people living together
- **Biosphere** – parts of Earth where life exists

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)"

Activity: Global Goals Quiz

Purpose: To gain understanding of the social issues through a quiz about the Sustainable Development Goals (SDGs).

Say: Think and answer the following questions.

Activity preparation:

Step 1:

Visit the link https://www.globalgoals.org/quiz/

Step 2:

Perform the quiz on the Global Goals!

THE GLOBAL GOALS

QUIZ TIME:

1. How many Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015?

a) 5 b) 10 c) 15 d) 17

2. Which SDG aims to "end poverty in all its forms everywhere"?

a) SDG 1 b) SDG 5 c) SDG 8 d) SDG 10

3. Which SDG focuses on "ensuring healthy lives and promoting well-being for all at all ages"?

a) SDG 2 b) SDG 3 c) SDG 6 d) SDG 12

4. Which SDG aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"?

a) SDG 4 b) SDG 7 c) SDG 9 d) SDG 13

5. What is the target year set for achieving the Sustainable Development Goals?

a) 2030 b) 2050 c) 2025 d) 2040

6. Which SDG focuses on "sustainable cities and communities"?

a) SDG 7 b) SDG 9 c) SDG 11 d) SDG 15

7. Which SDG aims to "take urgent action to combat climate change and its impacts"?

a) SDG 7 b) SDG 9 c) SDG 11 d) SDG 13

8. Which SDG focuses on "gender equality and empowering all women and girls"?

a) SDG 3 b) SDG 5 c) SDG 8 d) SDG 10

9. Which SDG aims to "promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"?

a) SDG 1 b) SDG 5 c) SDG 8 d) SDG 10

Answers:

1 d) 17 2 a) SDG 1 3 b) SDG 3 4 a) SDG 45 a) 2030 6 c) SDG 11 7 d) SDG 13 8 b) SDG 5 9 c) SDG 8

SESSION 3 Systems thinking and System Map

2.4 Systems thinking

In this section, we will see that a lot of problems which appear to be straightforward are not so straightforward.

Activity: Case study investigation

Purpose: To understand the concept of Systems thinking using a case study

Say: To understand this, let's look at an interesting problem which took place in Borneo (an island in Southeast Asia) and analyse the factors

Problem: Large outbreak of Malaria in Borneo in 1950s

The people of Borneo reached out to WHO (World Health Organization) for help
WHO sent in pesticides (DDT) to control the outbreak of malaria. This did control spread of malaria for a while However, the following happened as well

Outbreak of Plague

Roofs of huts breaking down!

You must be wondering; how can this happen! Watch the video to know more!

Watch the video Systems thinking: a cautionary tale (cats in Borneo) - YouTube. (n.d.). Retrieved October 5, 2022, from https://www.youtube.com/watch?v=17BP9n6g1F0.

A lot of times, straightforward solutions can lead to unintended consequences as we saw in the last example. To avoid such situations, we can use a style of thinking known as Systems Thinking

Systems thinking is a holistic approach to understanding and addressing complex problems. Rather than focusing on individual parts in isolation, systems thinking considers how various elements interact within a larger system to produce outcomes. It emphasizes the interconnectedness of components and recognizes that changes in one part can have ripple effects throughout the entire system.

- 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

2.5 Basics of System Map

System Maps are useful when there are multiple factors affecting an issue - we call these factors, "elements".

In a systems map, all elements are connected by relationships - we represent these by "arrowhead lines".

The loops indicate the direction and degree of feedback.

Changing elements or changing relationships between elements changes the system outcome.

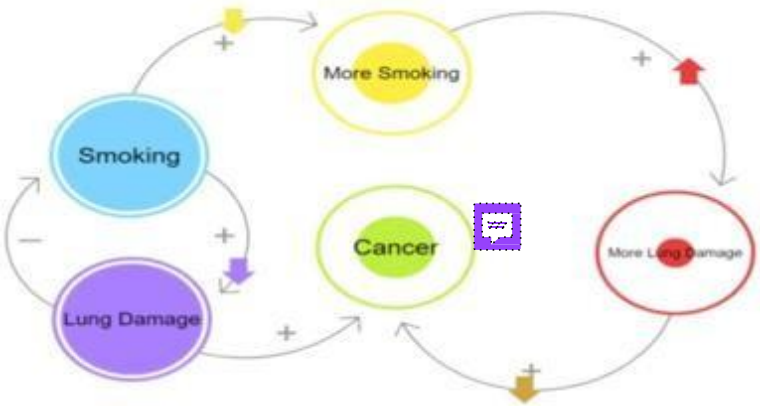
Positive Relationships (direct relation) are represented by a "+" sign

E.g., An increase in element "X" leads to an increase in element "Y"

Negative Relationships (inverse relation) are represented by a "-" sign

E.g., An increase in element "X" leads to a decrease in element "Y"

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.
Systems Mapping Provide participants with a complex system (e.g., a local ecosystem, a transportation network, a business organization). Have them create a visual representation of the system using a systems map. This exercise helps to identify the various components of the system and understand how they are interconnected. The system map given in the above figure demonstrates the relationship between smoking, lung damage and cancer.

Activity: Turn 'n' Design

Purpose: To understand the need of System Maps and be able to create system maps for any system and understanding leverage.

Say: Turn around and pair with a partner for discussion, using the loopy tool design

Activity Plan

Step 1:

Visit the link https://ncase.me/loopy/v1.1/

Step 2:

Click on the option 'Make a model from scratch'

Step 3:

Create a system map for the following problems

- Create a system map depicting the relation between the number of units of electricity consumed in a house and the electricity bill.
- Create a system map depicting the factors which affect the drying of wet clothes.
- Create a system map showing water cycle

Learning Outcome:

- Students an explain how various elements interact within a system
- Students will enhance their ability to analyze complex systems, identify influencing factors, and explain the interconnections and outcomes clearly

2.6 Using AI as leverage in a systems map

Leverage represents our best opportunity to affect a change in the system. The leverage we can use depends on our skills and ability to influence
For example, as youth, we are unlikely to effect changes on large issues like war, climate change etc., but we can influence it.
However, with AI skills (particularly in getting AI to predict), we might be able to help people in charge take informed decisions.

Let's look at a problem and then try to apply Systems Thinking to it.

What are Corals & Coral Reefs?

Let's look at video to learn what are corals and coral reefs!

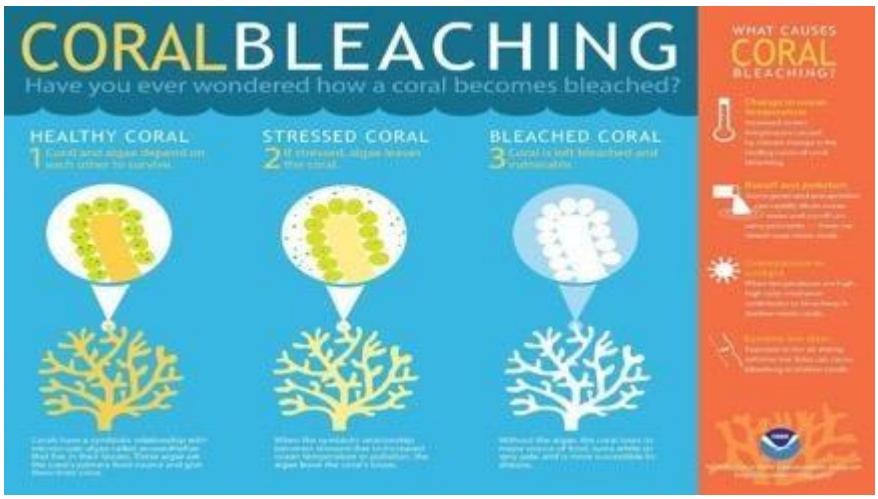
Link: Coral Reefs 101 | National Geographic (youtube.com)

Corals are tiny animals which do not have a backbone (invertebrate). Corals secrete a material called Calcium Carbonate, clusters of which form the bulk of coral reefs. Coral Reefs are essentially skeletons of large colonies of corals present on the outside. Even though coral reefs, cover less than 1% of the ocean floor, they are home to more than 25% of marine creatures.

What is Coral Bleaching?

- The exoskeletons of corals form the bulk of coral reefs
- Coral reefs also include tiny plants known as algae
- The reefs are sensitive to changes in temperature and pollution
- When temperatures rise or pollution increases, the algae expel themselves from the reefs causing the coral to turn white

This process is called coral bleaching.



Reference :What is coral bleaching? (n.d.). Retrieved October 5, 2022, from https://oceanservice.noaa.gov/facts/coral_bleach.html

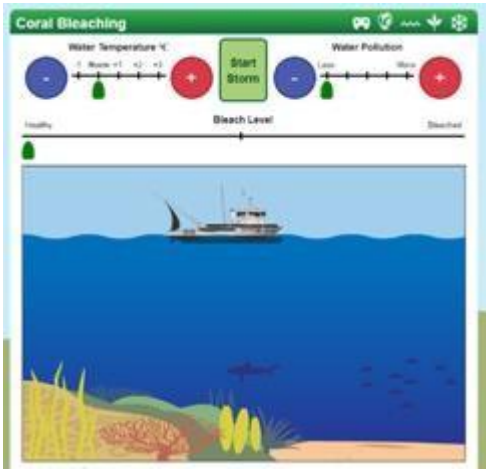
Let's try to understand the effect of pollution & temperature change on coral reefs through an activity

Activity : Coral Bleaching

Purpose : What is leverage and how AI could be used as leverage in a System Map

Say: Activity to illustrate the impact of different factors (temperature, pollution, etc.) on coral reefs using System Maps

Guidelines to the activity:



STEP 1:

- Go to the website – https://climatekids.nasa.gov/coral-bleaching/
- Press the '+' or '-' buttons to increase or decrease the water temperature or pollution levels
- You can also click on 'Start Storm' to see what happens when a storm occurs
- Notice how different variations in the factors stated above affect the coral reefs

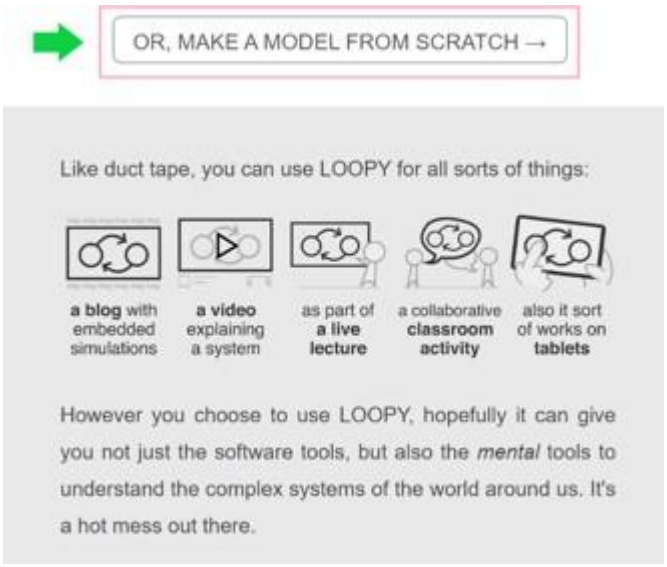
Note that the symbiotic relationships are relationships between two different organisms who stand to benefit by staying together. In the case of coral reefs, the algae get a home in the reefs, whereas corals receive nutrients from the algae. Corals can survive a bleaching event, but they are under more stress and are susceptible to diseases.

Step 2:

Draw a Systems Map

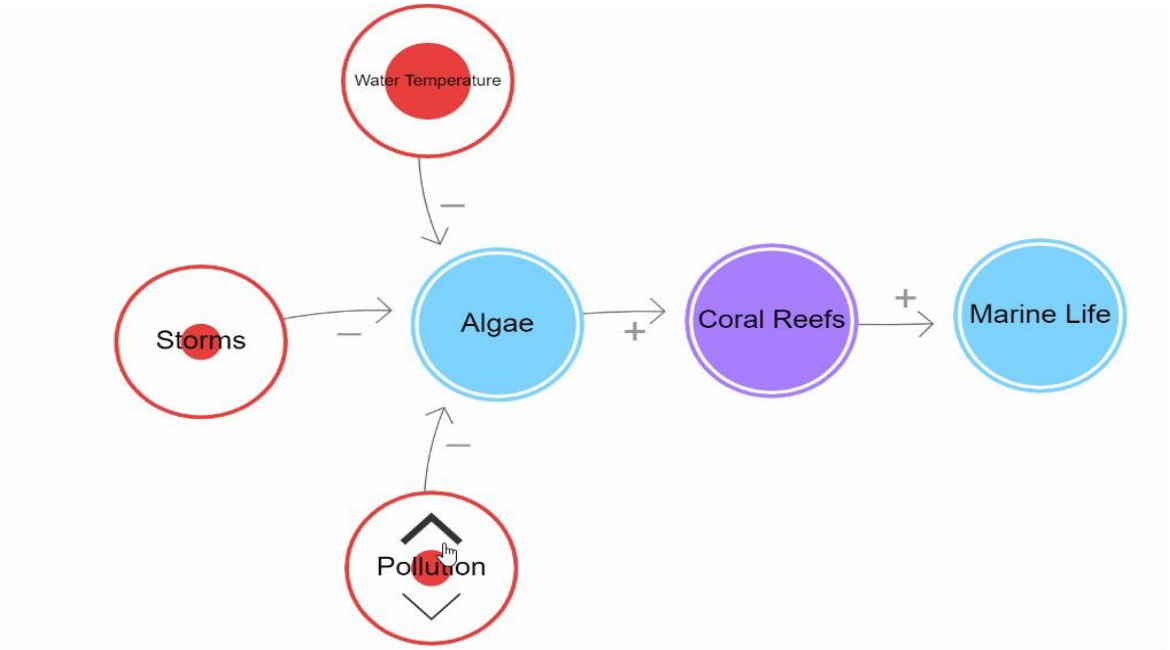
- Go to the website – https://ncase.me/loopy/

- Scroll down and select the 'Make a model from scratch option' (as shown in the image attached beside)
- List down the important elements that should be part of system map (The physical structure of the reef, water temperature, Extreme Weather Events etc)
- Based on how you think a particular component is related to another, draw a positive feedback loop or a negative feedback loop
- Remember, a component could affect one or more than one component



- Figure out where you could use AI as a leverage! Compare the system map drawn with the one below.

Systems Map



Can you see how the relationship between different components has been accurately represented?

- Coral Reefs
- Algae
- Pollution
- Water Temperature

- Storms
- Marine Life

How AI could be used as leverage in our systems map?

_____

_____

_____

_____

How can AI help the authorities responsible for protecting ?

_____

_____

_____

_____

Credits : https://ncase.me/loopy/

QUIZ TIME:

1. What is a system map?

   a. A graphical representation of the components and their interactions within a system
   b. A written description of a system's functions
   c. A mathematical equation representing system dynamics
   d. A timeline depicting the evolution of a system over time

2. What is the primary purpose of creating a system map?

   a. To visualize the hierarchy of organizational structure
   b. To illustrate the flow of energy and materials within a system
   c. To list all the possible outcomes of a system
   d. To identify stakeholders involved in the system

3. Which of the following elements is typically included in a system map?

   a. Decision trees
   b. Feedback loops
   c. Project timelines
   d. Cost-benefit analysis

4. In a system map, what does a feedback loop represent?

   a. One-way flow of information
   b. A recurring pattern of cause and effect within the system
   c. The distribution channels of a product
   d. The organizational hierarchy

5. What is the benefit of using a system map in problem-solving?

a. It simplifies complex problems by reducing them to linear processes.
b. It helps in identifying interconnected factors contributing to the issue.
c. It speeds up decision-making by eliminating the need for analysis.
d. It focuses solely on short-term solutions rather than long-term strategies.

6. What is the key characteristic of a system map that distinguishes it from other types of diagrams?

a. It provides a step-by-step guide for completing a task.
b. It focuses on illustrating the relationships between elements rather than their sequential order.
c. It emphasizes individual components without considering their interactions.
d. It primarily represents the physical layout of a system.

Answers:

1 A) A graphical representation of the components and their interactions within a system

2 B) To illustrate the flow of energy and materials within a system

3 B) Feedback loops

4 B) A recurring pattern of cause and effect within the system

5 B) It helps in identifying interconnected factors contributing to the issue.

6 B) It focuses on illustrating the relationships between elements rather than their sequential order.

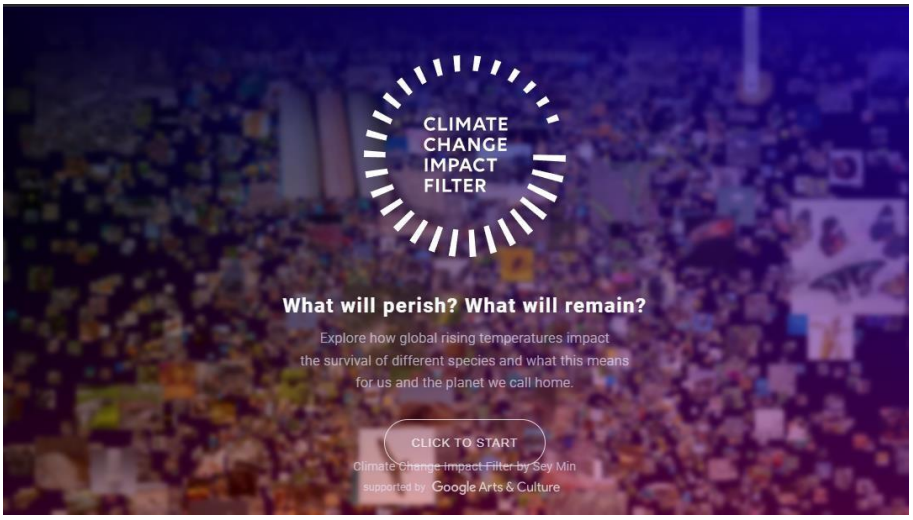
2.7 Fun 'n Learning session

Activity :Climate Change Impact Filter

Purpose: To experience how data changes scenario in real life situations

Say: Using the link below visit the Climate Change Impact Filter Google experiment website and launch the experiment

An interactive machine learning experiment by Sey Min that visualises what we might lose and what will remain with the rising global temperatures. She has trained a machine learning model on thousands of Google Search images, clustering by the type of species. As you increase the temperature, discover what happens to 62 different animal species - and reveal the new Anthropocene species, or waste, we leave.
Climate Change Impact Filter by Sey Min in collaboration with Google Arts & Culture Lab In the above link you can experiment with the Climate Change Impact Filter.



Activity Guidelines:

Step 1

Visit the link https://experiments.withgoogle.com/climate-impact-filter and click to start

Step 2

Choose the insect/bird/ mammal/marine for which you would like to visualise and change the temperature using the vertical scroll bar in the right.

You will see the result for Penguin as follows.

For Oysters under Marine the result is

Learning Outcome:

- Explore how rising global temperatures affect biodiversity, focusing on the potential loss of species and ecosystems.
- Interpret machine-learning visualizations of climate data to understand its impact on various species and environments.

2.9 Statistical Data Projects linked to SDG

Data visualization is the graphical representation of information and data, making complex datasets easier to understand and interpret. It helps uncover patterns, trends, and insights that are not immediately apparent in raw data. Let us visualize the data in the following scenarios-

1) Data Visualisation: (Small groups) AI for life forms
Purpose : Visualisation of SDG related Data and understand its significance.
Any of the topics related to population/economy/environment such as birth rate, death rate, infant mortality, life expectancy, food production, CO_2 emission, etc can be chosen from the below

website and the relevant data can be downloaded. Choosing this data, represent them visually using any data visualization tool and analyse the data with respect to the SDG goal related to it as to how the progress is.
Data can be accessed from WorldStat - statistics on global development and inequalities.

OR

2) Data Visualisation (Small groups) AI for Human services:
Purpose: Visualisation of SDG related Data and understand its significance.
Topics related to Digital users/Social media revenue etc can be chosen and the relevant data can be downloaded. Choosing the relevant data, represent them visually using any data visualising tool and analyse the data with respect to the SDG goal related to it.
Data can be accessed from Statista - The Statistics Portal for Market Data, Market Research and Market Studies

Learning Outcome:

- Develop the ability to connect real-world data with Sustainable Development Goals.
- Learn how to visually represent numerical data using data visualising tools to identify patterns and trends.