

ARTIFICIAL INTELLIGENCE

Classes XI & XII

AI PROJECTS COOKBOOK



Subject Code:843

Foreword

“Harnessing the power of AI to solve world problems is not just a choice; it’s a responsibility we owe to humanity’s future, a beacon of innovation, guiding us towards a brighter, more sustainable world.”

Welcome to our AI Cookbook! In this collection, we present an assortment of AI projects spanning across various complexity levels, from low-code and no-code solutions to high-level coding endeavours. Our aim with this cookbook is to showcase the versatility and practicality of artificial intelligence in addressing real-world challenges, particularly those aligned with the Sustainable Development Goals (SDGs).

Within these pages, you will find an array of projects ranging from applications designed to tackle pressing issues impacting our society to innovative chatbots and mobile apps that enhance user experiences. Whether you're a novice enthusiast or an experienced developer, there's something for everyone to explore and learn from.

We hope this cookbook inspires you to delve into the realm of AI, experiment with different tools and techniques, and ultimately contribute towards building a better and more sustainable future for all.

Happy cooking!

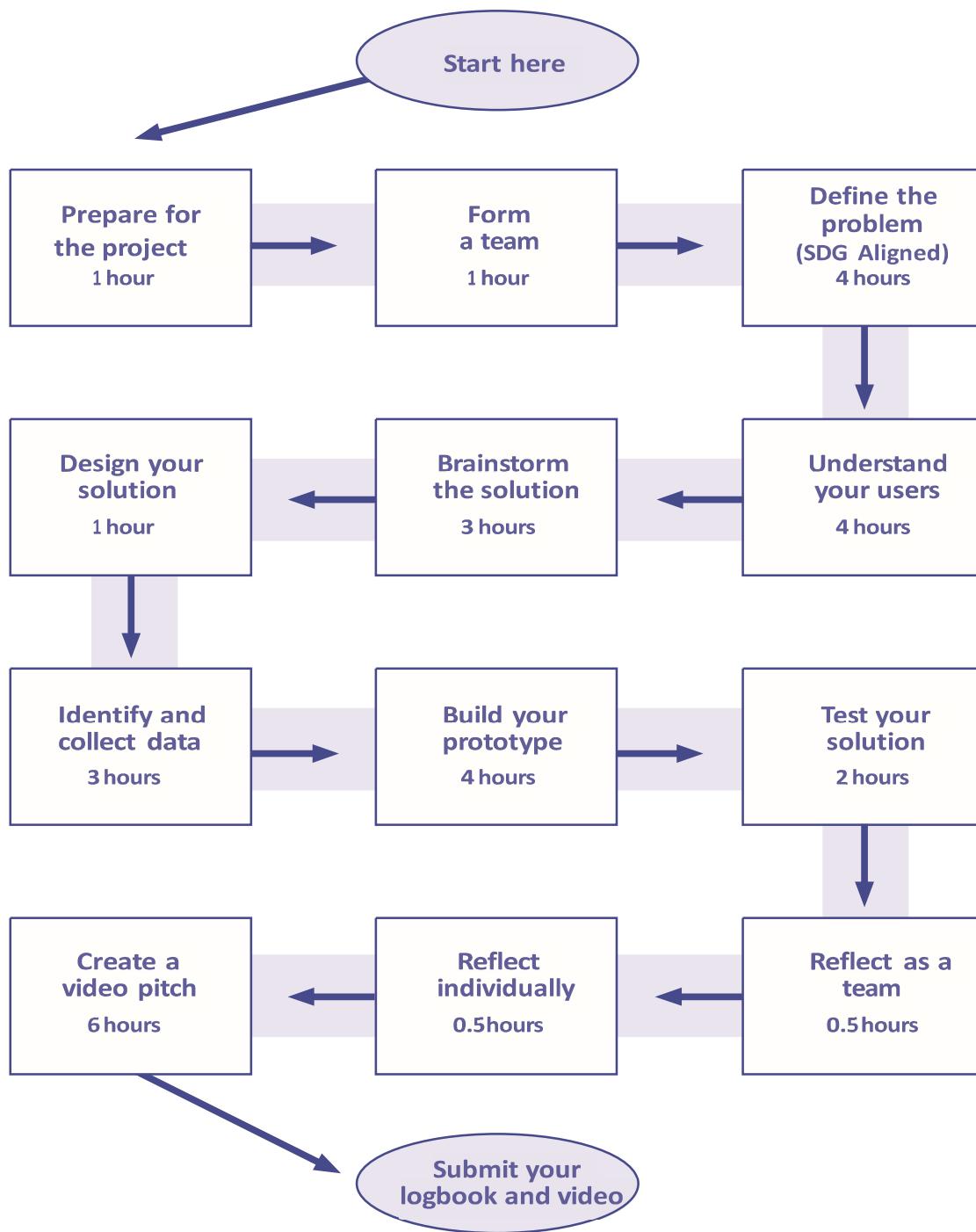
AI Cookbook

"Unleash the Power of AI: Your Recipe Book for Intelligent Solutions"

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Project Guidelines



Students can submit their projects on
<https://flaunch.io> or mail to contact@flaunch.io
for Future opportunities like the 1M1B India AI Youth Awards

1. Prepare for the Project

Identify a local issue affecting your school or community and that could be solved using artificial intelligence (AI).

While doing this, you will learn more about problems you can solve to improve lives and make the world a better place. You will also learn many important skills including:

- how to work as a team member
- how to clearly **identify** an issue and who it is affecting (the user)
- how to **brainstorm** solutions and select the best one
- how to decide which **type of AI** may be useful for your proposed solution
- how to ethically gather and use **data** to **train** a computer to help solve the issue
- how to **test** the prototype with users and use their **feedback** to improve your solution
- how to pitch your solution to people who will be able to help you take action

2. Form a team

Getting to know the people in your team

Introduce yourselves within your team and find out:

- What each person loves doing
- What each person is good at
- What each person would like to get better at
- What each person knows and thinks about AI

AI project team roles

There are several roles team members can take on when working on an AI project. Below are a few examples of roles and tasks. If you are forming a smaller team, members may have to take on multiple roles.

Project leader	<ul style="list-style-type: none"> • Schedules and allocates tasks among the team • Ensures tasks are completed on time • Acts as the point of contact between the team and the teacher, users and stakeholders • Resolves team issues
Data expert	<ul style="list-style-type: none"> • Decides on type of data needed to train an AI model • Collects data • Ensures data is in a format that the team can work with • Ensures data is ethically sourced and unfair bias is eliminated • Works with prototype builder to train the AI model
Information researcher	<ul style="list-style-type: none"> • Collects questions from the team that need answers • Identifies where answers can be located (source) • Searches for answers, writes up a report and passes information to the project reporter
Designer	<ul style="list-style-type: none"> • Works with the team and the user to create a process flow for the new user experience • Plans the user interface for the prototype
Prototype builder/coder	<ul style="list-style-type: none"> • Works with data expert to train/teach computer • Creates the prototype and codes if necessary
Tester	<ul style="list-style-type: none"> • Works with users to tests the prototype • Gets feedback from users and user sign-off when the prototype has met user requirements • Creates an action plan on what needs to be fixed and prioritises requests for future improvements
Marketing/Communications leader	<ul style="list-style-type: none"> • Collates the team Project Logbook submission and creates the content for the video pitch • Selects spokespeople within the team for various matters relating to the project
Video producer	Films the activities of the team and edits these into a presentation for submission

Tasks are not solely the responsibility of those who are assigned to the specific role. Each team member should involve other team members, users or stakeholders in order to achieve their goals. Team members may also have more than one role. The project is a team effort and requires collaboration and communication.

Team collaboration and communication

Collaboration is actively working with others with an open mind to the ideas of others to accomplish your goal. As a team member, you need to be able to share your ideas and ask questions so that your team and teacher understand your thinking.

A project plan will help you get started. Here are some tips:

- Add start and end dates for the project phases –background reading and learning about AI and AI tools, forming a team, problem definition, understanding users, brainstorming a solution, designing a solution, collecting and preparing data, training your model, building your prototype, testing your solution, refining your solution, preparing your submissions
- It is important to have a clear plan of how you will communicate with each other to help you work more effectively as a team and resolve issues more easily so that you can achieve your goal.
- List tasks for each project phase and assign these to the team members with start and end dates.

Here are some tips on to get you started with a communications plan:

- Will you meet face-to-face, online or a mixture of each to communicate?
- How often will you come together to share your progress?
- Who will set up online documents and ensure that everyone is contributing?
- What tools will you use for communication?

During the project, it is also helpful to create minutes for team meetings, where you log the date the meeting took place, who attended the meeting, who was invited but unable to attend the meeting, the purpose of the meeting, the items discussed and the items that need to be done as a result of the discussion.

3. Define the Problem

Discuss each issue in your list among your team and arrange the ideas so that similar issues are grouped together. Here are some questions you can use to guide your discussion...

- Which of these issues really matter to you and which ones would you like to tackle?
- Why would you want to solve these problems?
- What are likely solutions for each problem?
- What impact will solving the problem have on the community?

- Have other people already come up with solutions to this problem?
- Do these solutions require AI?

Consider whether AI would be a good fit for the solution

AI mimics the way the human brain works. It learns through experience by accumulating data and insights from every interaction, getting better all the time, rather than being programmed to perform a logical set of rules.

When humans use AI to help them solve problems, the overall effect is greater efficiency, better decision making and quicker implementation of solutions.

AI may be a good fit to your solution if it requires one of the following:

- Recognising digital images, videos and other visual inputs (image recognition)
- Recognising speech, tone of voice, words spoken, heart rate, gestures and responding to these (natural interaction)
- Looking for patterns in large amounts of data and using these patterns to reason or make decisions (recommender systems)
- Use of smart sensors to gather information about the environment (machine perception and autonomous systems)

If you think your solution does not meet any of the above criteria, it probably will not benefit from using AI. Discuss this with your teacher and try to find an alternative problem requires an AI solution.

Narrow down your list of issues to those that matter most to you and that you think you can solve using AI.

- Vote on one problem that all or most of you would like to tackle, taking into consideration the impact you are likely to make.
- Now breakdown the problem and think of the people affected (your users), what they need and what you can do for them. Make sure that what you can do to help them is something that can be measured. You should be able to express the users' problem in one sentence:

How can we help _____ [a specific user or group of users] find a way to _____
[do what] so that they can do _____ [something not done before that can be measured].

This is your **problem statement**.

4. Understand your users

Before developing a solution, it is important to thoroughly understand both the problem and your users. Understanding your users involves empathy - putting yourself in their shoes and connecting with how they might be feeling about their problem, circumstance, or situation.

Who are your users?

- Who is the hero of your story? Hint: This is the user.
- What is their current struggle today?
- What problems do they face?
- What is one idea you have to solve their problem?
- How would that idea improve the user's experience?

Observe

You can get to know your users better by actually meeting with them and observing them as they carry out their tasks and as they interact with the people and tools in their environment.

Conducting interviews

You can conduct interviews with a number of users to find out more about their needs. Ask open-ended questions about how they live and work. Listen to their stories to understand their hopes, fears, and goals that motivate them.

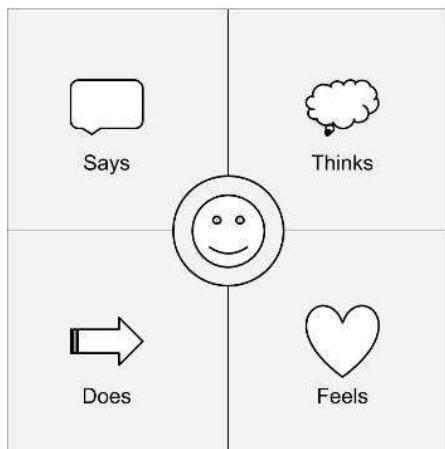
Here are some questions you can ask:

- What's their story?
- What is their experience and what they do, think and feel throughout their experience?
- What are the highs and lows of their experience?
- Whom do they work with?
- Who do they rely on and who relies on them?
- What's expected of them?
- What are their needs?
- What problem are they solving?
- How do they define success?

Create an empathy map

Select a scenario and a user to focus on for your empathy map. You can create more than one empathy map for different types of users.

Think about the perspective of the user. Write the name of your persona in the middle of the map. Using the information from the scenario, add observations to the appropriate section of the map.



You can share your Empathy Maps with your user(s) to double check your observations and assumptions.

Refine your Problem Statement

With a better understanding of your user, review your problem statement. Re-state this as follows:

_____ [a specific user or group of users] are experiencing issues with _____ [problem] today because of _____ [cause].

5. Brainstorm the solution

Generate ideas

Once your team has a clear understanding of your user's problems and challenges, it is time to brainstorm a few possible ideas for solutions.

As you generate ideas keep your problem statement in mind and respond to the challenge question:

How might we use the power of machine learning to help people increase their knowledge or improve their skills?

Individually write down or draw your ideas for a solution. Set a timer for five minutes and come up with as many ideas as you can.

Combine everyone's ideas and group similar ideas together.

- Vote on the best ideas. Each participant should have 2 to 3 votes.

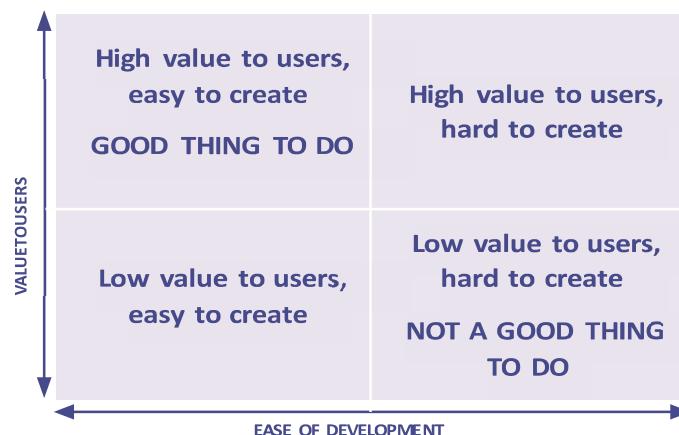
- Listen to each team member's reasoning behind their votes. This is more important than the votes themselves.
- Which idea would be best for the user and why?
- Can you get your user to tell you directly what it is they need or want most?
- Is there any other information that is needed?

Prioritise your ideas

When many ideas are being considered, it helps to put your ideas in a priority grid focusing on importance to the user and on how easy it will be for the team to develop.

Value to the user = low to high

Ease of development by the team = easy to hard



Plot your ideas on the graph.

Focus on what is valuable to the user and easy to develop and implement. Avoid ideas down in the 'NOT A GOOD THING TO DO' section.

Choose an idea

Take another five minutes to refine ideas for your solution. Think of the solutions that can be designed within a short timeframe (about one hour total) using one of the AI tools that you are comfortable with. Pick the best idea.

Example:

My AI solution will help someone learn yoga poses. I will train a ML model using Teachable Machine to recognize different yoga poses. The tool's confidence level at identifying the pose will help the person know if they have done the pose correctly and how they can adjust their position to increase the machine's confidence level. A high confidence level means that the person is doing the pose correctly.

6. Design your solution

Document the steps that your users will now do using your AI tool. Describe what the user does first, what happens next, and so on. You may also represent the steps as sketches or a storyboard.

Example

The user does a yoga pose in front of the computer webcam.

The program indicates the name of the pose and the confidence level that the name of the pose is correct.

The user keeps practicing the pose until the confidence level is high and they are satisfied that they have done the pose correctly.

The user repeats this process with another pose.

7. Identify and collect data

Decide what type of data you need for your AI solution, such as images, sounds, text. Decide what labels you would like the computer to assign to the images, sounds or text when the computer recognises them. For instance, you could have the labels, 'happy', 'sad' and 'neutral' which the computer can output when you show it images of people's faces

Collecting data

Data such as images, audio, video, statistics, can be collected using recording devices or sensors.

You can also create your own data set by observing behaviours and logging your observations and information about your subjects in a table or spreadsheet. For instance, you might want to log data about your run daily – start time, end time, distance covered, location, etc.

You can also find data sets online, but you need to ensure that the data from a credible source and that you have permission from the owner to use these for your AI solution. You can find some data sets from sites such as Kaggle, Google Data or the Atlas of Living Australia.

Think of ethical considerations when collecting data. Will the process of collecting data harm anything or anyone? For instance, when you capture photos of animals in the wild, will this process endanger them or their habitats?

If you collect images of people, will this put their privacy at risk or damage their reputation? How will you ensure privacy?

Other Considerations when working with data

- Is the data accurate and recent?

- Do you have a representative sample that is diverse enough to represent the population you are examining?
- De-identifying - which features must be removed to safeguard privacy of people's data?
- Are you taking care to avoid unfair bias?

8. Build your prototype

For teams who will not be building a working prototype, you may simply create a concept of your prototype in this section.

Creating a concept of your prototype

Develop a concept of your prototype. Take your user experience design in Section 6 and expand on it to include a sketch of each screen that is part of your solution with details of what the users will do as they interact with your solution. Show how users will transition from one step to the next and include features of how your solution will work (screens, buttons, overall layout, etc).

Document your prototype concept.

Provide a brief description that explains each step in the user's experience. Include information about how the solution uses data, makes decisions, and the final output or action.

Choose your AI tools to build your solution

Solving a real-world problem with AI will typically require you to train AI models to recognise and classify images, sound, text, numbers. There are also pre-trained models that have been trained to classify particular data. The models can then be used to initiate a set of actions which can be coded into programs.

There are a number of tools you could use to create and train your AI models as well as build programs. You will encounter the tools listed below in the AI Foundations course by IBM and ISTE. These tools do not require any prior coding knowledge and their web sites come with good support materials for students and teachers.

Machine Learning for Kids (beginner, intermediate, advanced) Machine Learning for Kids is an easy-to-use platform that you can use to create and train your own model. You can collect and classify your data, or you can use several pretrained models. While doing so, you will also learn about AI concepts and what goes on under the covers, such as how the model was trained.

To build a program using your model, you have access to coding platforms from within the Machine Learning for Kids site. These include Scratch, App Inventor and Python. The platform also provides access to pre-trained models and can import TensorFlow models, such as those created using Teachable Machine.

Machine Learning for Kids requires you to register an account on the IBM cloud so that you can have free access to IBM Watson AI and work as a team on the project.

Teachable Machine (beginner)

Teachable Machine is a web-based tool for creating machine learning models. You can easily train a computer to recognize your images and sounds without writing any machine learning code. However, to create an application that uses your model, you would need to do so in a separate coding platform capable of handling your model's TensorFlow format.

MIT App Inventor (beginner/intermediate)

MIT App Inventor is a visual coding tool, similar to Scratch for creating fully functional apps for Android smartphones and tablets. For those without Android smartphones, there is an online emulator for Windows, Mac OS X and Linux machines. To enable machine learning, you will need to import some AI extensions for MIT App Inventor.

IBM Watson Assistant (advanced)

IBM Watson Assistant is an AI product that lets you build intelligent chatbots that handle conversational interactions with users on any topic. The chatbot can be integrated into a web site, an app or a messaging channel.

Write down which AI tool(s) you will use to build your solution.

Creating your working prototype

- Gather the training data you need to train your model. If you are generating data in real-time, for example, posing in front of a webcam, list the actions or items you will show.
- Follow the instructions for the tool you are using and train your model.
- Test your model using new data to see how well it recognizes or responds to the information.
- Add more training data as needed to increase the tool's accuracy.

Write down what decisions or outputs will your tool generate and what further action needs to be taken after a decision is made.

9. Test your prototype

When your prototype is ready, it is time to get some users involved in testing your solution.

For teams who are not building a working prototype at this time, you can still get users to review your concept. Show your users your concept and get feedback about whether they think this would solve their problems if developed. Ask them for improvements they would like to see.

For teams with a working prototype, your goal is to find out the following:

- How well does the prototype work and solve the users' problem?
- What needs to change now to meet the minimum user requirements?
- What improvements can be made later?

As you can see, you can keep refining your prototype until it gets better and better and it is up to you and your users to decide how many more improvements should be done based on your available time and the cost of doing so.

Selecting test users/data

Describe which users/data will you select to test your solution, why they are the right ones and whether they are representative of your subjects.

Observe your users during testing

Tips for testing your solution with your users:

- Take detailed notes as you observe your users.
- Allow your users to experience the solution without explaining it. Give only basic information to get them started but let them explore how it functions. If you are testing a prototype concept rather than a built prototype, allow your users to examine the visual representations and read the explanations for each step.
- Allow your users to make mistakes while testing your prototype. Don't correct them right away if they do something wrong. This is valuable information that you can use to determine if something is unclear about your solution or how users might interpret it in a different way.
- Take note of their questions. These questions provide insight into areas that are not clear in your design and can also provide inspiration for new features.

List your observations of your users as they tested your solution.

Ask users for feedback after testing

Ask your users about their experience or impressions as they are exploring the prototype. You might ask the following questions or come up with your own:

- What were you thinking as you used this tool?
- How did this solution make you feel?
- What confused you?
- What surprised you?
- What do you wish the tool would do? Why?

Refining the prototype

Based on user testing, write down what recommendations you can act on now so that the prototype can be used. Write down what recommendations you can leave for later. After making changes to refine your prototype, iterate and test once again.

10. Reflect as a team

Take a moment to reflect on how team members collaborated with each other during the project.

How did you actively work with each other and with your users and stakeholders? If you were keeping a diary or log of your team meetings and to-do lists, you may include those in this section too.

11. Reflect individually

A good way to identify what you have learned is to ask yourself what surprised you during the project. List the things that surprised you and any other thoughts you might have on the issue(s) in your local community or on what you have learned about AI.

Each team member should write their own individual reflection in this section.

12. Create a video pitch

Write your script

Imagine you are seeking media, support or funding for your solution. Your video pitch is your chance to highlight the issue you want to solve and why it matters to you, to your stakeholders and to your community or the world.

Start by writing a script for your video.

Introduce your team:

Talk about your team, how you came up with the idea and why the issue is really important to you.

Introduce the problem and your solution: What is the problem you are trying to solve? Who is affected? Who will be using your solution to help those affected by the problem?

Include sketches of your ideas from your brainstorming, clips of you training your model, evidence of your users testing the solution, screenshots of the solution, the solution in use and the impact it has made.

Why are you the best people to deliver a solution:

Show your understanding of AI and of your users' needs. Talk about the roles of the team members, your commitment to the project, how you collaborated effectively and how you have acted ethically and responsibly in developing the solution.

The plan ahead:

Talk about what further improvements you would like to do with your solution, how far you would like to take it, what you need to achieve this and how passionate you are about making this happen.

Start filming and your video

You can find tips and ideas on how to develop a pitch video here.

Here are some tips to consider when creating your video:

***PRES*ENTATION**

- Ensure your video follows a clear and logical sequence and is well-paced and clearly communicated.
- Be illustrative. Use demonstrations of your prototype and/or visuals where appropriate to illustrate examples.
- Present accurate science and technology and use appropriate language.
- Let your passion for your chosen topic/idea show through when presenting.
- Ensure your video has good sound and image quality.
- Keep your videos no longer than 3 minutes.

***C*ONTENT**

- Show how well your solution addresses the defined problem.
- Show how your solution meets user needs and provides a better user experience. You can ask users to speak about the solution and how it will improve their experience.
- Demonstrate the originality and creativity in your proposed problem and solution.
- Provide insight into how well the team collaborated. Showcase team members clearly illustrating their role in the project.
- Provide insight into the team members' learning journey through the challenge and how your AI knowledge and design thinking skills have developed.

Submitting your video

Upload your video to YouTube or Vimeo and share the URL in your Project Logbook. If the video is private, please include the password with the link.

Sample Projects

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Project 1: AI-Enabled Attendance System

1. Problem Statement: 	Current transportation systems lack efficient means of notifying parents of their child's safe arrival home from school. Manual methods of ensuring child safety post-school hours are unreliable and prone to human error.
2. Users/Stakeholders: 	<ul style="list-style-type: none">Parents seeking reassurance of their child's safety.Developers creating the facial attendance system.Schools or organizations implementing the technology.
3. Objectives: 	<ul style="list-style-type: none">To provide parents with real-time notifications upon their child's arrival.Enhance child safety and provide peace of mind to parents.
4. Features: 	<ul style="list-style-type: none">Facial recognition technology for accurate child identification.Automatic email notifications to parents upon detection.User-friendly interface for easy setup and monitoring.
5. AI Used: 	<ul style="list-style-type: none">Computer vision algorithms for facial recognition.Machine learning for improving detection accuracy over time.
6. Data Used: 	<ul style="list-style-type: none">Facial data of registered children for identification.Historical data for algorithm training and optimization.

7. Solution:	<ul style="list-style-type: none"> Develop a comprehensive facial attendance system integrating advanced computer vision technology. Implement a secure database of registered children's facial data for accurate identification. Design an intuitive user interface allowing parents to easily register their child's face and receive notifications. Integrate automatic email notification functionality to alert parents in real-time upon their child's safe arrival home. Provide robust security measures to protect sensitive data and ensure system reliability. 
8. SDG Involved:	<ul style="list-style-type: none"> Supports SDG 3 (Good Health and Well-being) by enhancing child safety. Contributes to SDG 4 (Quality Education) by promoting secure school-to-home transitions. 
9. Future Scope:	<ul style="list-style-type: none"> Expansion to include additional features such as geolocation tracking. Integration with smart home systems for enhanced security measures. 

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%201-%20AI-Enabled%20Attendance%20System>

Project 2: Breast Cancer Detection Model

1. Problem Statement: 	The early detection of breast cancer is crucial for effective treatment and improved survival rates. However, traditional methods of diagnosis may be time-consuming, expensive, and prone to human error. Developing an accurate and efficient breast cancer detection model using artificial intelligence (AI) can help address these challenges.
2. Users/Stakeholders: 	<ul style="list-style-type: none">Patients: Individuals concerned about their breast health.Healthcare Professionals: Doctors, radiologists, and medical staff involved in breast cancer diagnosis and treatment.Researchers: Professionals working in the field of medical imaging and AI.Policy Makers: Government bodies and organizations responsible for healthcare policy and funding.
3. Objectives: 	<ul style="list-style-type: none">Develop an AI-powered breast cancer detection model capable of accurately analysing medical images (e.g., mammograms, ultrasounds).Improve early detection rates and reduce false positives/negatives.Provide a user-friendly interface for healthcare professionals to interpret model results.Enhance the efficiency and accuracy of breast cancer diagnosis.Contribute to the advancement of medical AI research and technology.
4. Features: 	<ul style="list-style-type: none">AI Algorithm: Implementation of machine learning for diagnosis.User Interface: A user-friendly interface for healthcare professionals to input data and interpret model results.Real-time Analysis: Capability to analyse medical data in real-time for timely diagnosis.Performance Metrics: Evaluation of model performance using metrics such as sensitivity, specificity, and accuracy.
5. AI Used: 	Machine Learning: Supervised learning algorithms (e.g., logistic regression, support vector machines) for classification tasks.

6. Data Used: 	Labelled Datasets: Annotated datasets with labels indicating the presence or absence of breast cancer.
7. Solution: 	<ul style="list-style-type: none"> • Development of a breast cancer detection model using AI algorithms trained on medical imaging data. • Implementation of a user-friendly interface for healthcare professionals to upload medical images and receive model predictions. • Integration with existing healthcare systems for seamless adoption and use in clinical settings.
8. SDG Involved: 	Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages. By improving early detection rates and accuracy in breast cancer diagnosis, the project contributes to achieving this goal.
9. Future Scope: 	<ul style="list-style-type: none"> • Expansion to Other Modalities: Extend the model to analyse medical imaging modalities (e.g., MRI scans) for comprehensive breast cancer diagnosis. • Integration with Electronic Health Records (EHR): Integrate the model with EHR systems to streamline patient data management and improve healthcare workflows. • Continuous Improvement: Continuously update and refine the model using new data and advancements in AI technology to enhance performance and accuracy over time.

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%202-%20Breast%20Cancer%20Detection%20Model>

Project 3: AI Voice Assistant for People with Disabilities

1. Problem Statement: 	<p>Many individuals with disabilities face challenges in accessing and utilizing technology due to physical limitations or barriers. Traditional voice assistants may not adequately cater to their specific needs, leading to difficulties in communication, accessing information, and performing tasks independently.</p>
2. Users/Stakeholders: 	<ul style="list-style-type: none"> • Individuals with disabilities (visual impairment, mobility impairment, etc.) • Caregivers and family members • Developers and designers of the AI voice assistant • Disability advocacy groups and organizations
3. Objectives: 	<ul style="list-style-type: none"> • To develop an AI voice assistant tailored to the needs of people with disabilities. • To improve accessibility and usability for individuals with disabilities in utilizing technology. • To enhance independence, productivity, and quality of life for users with disabilities.
4. Features: 	<ul style="list-style-type: none"> • Natural language processing capabilities to understand and respond to user queries effectively.
5. AI Used: 	<p>The model incorporates several NLP-related functionalities such as:</p> <ul style="list-style-type: none"> • Speech Recognition: The code uses the speech recognition library to recognize spoken commands. • Language Understanding: It interprets user queries and commands to perform various actions, such as opening websites or sending WhatsApp messages. • Text Generation: The code utilizes the OpenAI API for text generation, allowing the voice assistant to provide responses to user queries and engage in conversation. • Text Manipulation: It includes functionalities for extracting relevant information from user messages, such as phone numbers or specific message content. • Text-to-Speech: The code utilizes the win32com.client library to enable the voice assistant to speak responses to the user.

6. Data Used: 	Speech recognition: Audio recordings paired with transcriptions. Open AI Chat GPT: Large corpus of text conversations and corresponding responses for training.
7. Solution: 	<p>AI Voice assistant, will greatly benefit individuals with disabilities, particularly those with mobility impairments or visual impairments. Here's how:</p> <ol style="list-style-type: none"> 1. Accessibility: People with mobility impairments may find it challenging to interact with traditional input devices like keyboards or mice. A voice assistant allows them to control devices and access information using voice commands, making technology more accessible. 2. Hands-free Operation: For individuals with mobility impairments who have limited or no use of their hands, a voice assistant enables hands-free operation of devices, allowing them to perform tasks such as browsing the internet, sending messages, or controlling smart home devices. 3. Assistive Technology: Voice assistants can serve as assistive technology tools for individuals with visual impairments by providing auditory feedback and enabling voice-controlled navigation of digital content, including websites and applications. 4. Communication Aid: For individuals with speech impairments, voice assistants can act as communication aids, allowing them to generate spoken output by typing text input or selecting predefined phrases using their voice. <p>Overall, the voice assistant implemented in the code contributes to enhancing the accessibility and usability of technology for people with disabilities, empowering them to navigate digital environments and perform various tasks more independently.</p>
8. SDG Involved: 	<p>Goal 3: Good Health and Well-being – By enhancing accessibility to technology, the project contributes to improving the quality of life and well-being of individuals with disabilities.</p> <p>Goal 10: Reduced Inequalities – The AI voice assistant aims to reduce inequalities by providing equal access to information and resources for people with disabilities.</p>

9. Future Scope:



- Expansion to support additional languages and dialects.
- Integration with wearable devices for hands-free operation.
- Continuous updates and improvements based on user feedback and technological advancements.
- Collaboration with healthcare providers and assistive technology experts to address specific needs and challenges of different disability groups.

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%203-%20AI%20Voice%20Assistant%20for%20People%20with%20Disabilities>

Project 4: Hate Speech Detection Model

<p>1. Problem Statement:</p> 	<p>Hate speech perpetuates discrimination and prejudice, which can result in unequal treatment and opportunities based on factors like race, ethnicity, religion, gender, or sexual orientation. It can lead to increased stress, anxiety, depression, and reduced overall well-being for those who are targeted by it.</p>
<p>2. Users/Stakeholders:</p> 	<ul style="list-style-type: none"> General Public using social media platform like Twitter, Facebook, LinkedIn etc.
<p>3. Objectives:</p> 	<ul style="list-style-type: none"> Addressing the issue of hate speech often involves efforts to educate and raise awareness, promote tolerance and inclusivity. Creating Public awareness and reporting mechanisms for combating hate speech and its effects. Contribute to the advancement of AI research and technology.
<p>4. Features:</p> 	<ol style="list-style-type: none"> Accessing the Tool Customizing Preferences Real-Time Monitoring Receiving Alerts Reviewing Detected Content Decision-Making User Feedback Settings Adjustment Educational Resources Advocacy and Reporting
<p>5. AI Used:</p> 	<p>Machine Learning: Supervised learning algorithms (Decision Tree Classifier) for classification tasks.</p>
<p>6. Data Used:</p> 	<p>Labeled Datasets: Annotated datasets with labels indicating hate speech or neutral text.</p>
<p>7. Solution:</p> 	<p>Development of hate speech detection model using AI algorithms trained on data.</p>

8. SDG Involved:	 <p>Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages. By improving mental health of people, the project contributes to achieving this goal.</p>
9. Future Scope:	 <ul style="list-style-type: none"> Continuous Improvement: Continuously update and refine the model using new data and advancements in AI technology to enhance performance and accuracy over time.

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%204-%20Hate%20Speech%20Detection%20Model>

Project 5: School Surveillance System

<p>1. Problem Statement:</p> 	<p>The problem statement revolves around ensuring the safety and security of students and staff within the school campus by detecting the entry of unknown individuals.</p>
<p>2. Users/Stakeholders:</p> 	<ul style="list-style-type: none"> • School administrators • Teachers • Students • Parents • Security personnel
<p>3. Objectives:</p> 	<ul style="list-style-type: none"> • Enhance security within the school premises. • Detect unauthorized entry promptly. • Ensure the safety of students and staff. • Provide peace of mind to parents and guardians. • Implement an efficient surveillance system without compromising privacy.
<p>4. Features:</p> 	<ul style="list-style-type: none"> • Facial Recognition: Identify known individuals such as students, teachers, and staff. • Unknown Person Detection: Detect and alert security personnel about the presence of unknown individuals. • Database Management: Manage a database of known faces and individuals associated with the school. • User-Friendly Interface: Easy-to-use interface for administrators and security personnel.
<p>5. AI Used:</p> 	<ul style="list-style-type: none"> • Facial Recognition: Deep learning algorithms for accurate facial recognition. • Object Detection: AI-based algorithms for detecting and tracking individuals.
<p>6. Data Used:</p> 	<p>Facial Data: Images of students, teachers, and staff for training the facial recognition model.</p>
<p>7. Solution:</p>	<p>Implement a comprehensive surveillance system equipped with AI-based facial recognition and object detection algorithms.</p>

	<p>Cameras strategically placed at school entrances and exits continuously monitor the surroundings. The system compares the detected faces with a database of known individuals.</p>
8. SDG Involved: 	<ul style="list-style-type: none"> • SDG 4: Quality Education: Ensure a safe and secure learning environment for students and staff. • SDG 9: Industry, Innovation, and Infrastructure: Utilize technology innovation for enhancing security infrastructure. • SDG 16: Peace, Justice, and Strong Institutions: Strengthen security measures to promote safety and justice within the school community.
9. Future Scope: 	<ul style="list-style-type: none"> • Enhanced Accuracy: Continuously improve the accuracy of facial recognition algorithms to minimize false positives and negatives. • Integration with Other Systems: Integrate the surveillance system with other security systems and school management software for better coordination and efficiency.

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%205-%20School%20Surveillance%20System>

Project 6: Lung Cancer Detection Model

<p>1. Problem Statement:</p> 	<p>Current lung cancer diagnosis methods rely heavily on manual analysis of scans by radiologists, which can be time-consuming, prone to human error, and may miss early-stage tumors. This can lead to delayed diagnoses and hinder the effectiveness of treatment options.</p>
<p>2. Users/Stakeholders:</p> 	<ul style="list-style-type: none"> • Patients: Individuals concerned about their lung health. • Healthcare Professionals: Doctors and medical staff involved in lung cancer diagnosis and treatment. • Researchers: Professionals working in the field of medical imaging and AI. • Policy Makers: Government bodies and organizations responsible for healthcare policy and funding.
<p>3. Objectives:</p> 	<ul style="list-style-type: none"> • Develop an AI-powered lung cancer detection model capable of accurately analyzing medical X-ray images. • Improve early detection rates and reduce false positives/negatives. • Enhance the efficiency and accuracy of lung cancer diagnosis. • Contribute to the advancement of medical AI research and technology.
<p>4. Features:</p> 	<ul style="list-style-type: none"> • AI Algorithm: Implementation of machine learning for diagnosis. • Real-time Analysis: Capability to analyze medical X-ray images in real-time for timely diagnosis.
<p>5. AI Used:</p> 	<p>Machine Learning: Supervised Learning (Computer Vision using Python)</p>
<p>6. Data Used:</p> 	<p>Labelled Datasets: Annotated datasets with images indicating the presence or absence of lung cancer.</p>
<p>7. Solution:</p> 	<ul style="list-style-type: none"> • Development of a lung cancer detection model using AI algorithms trained on medical imaging data.

	<ul style="list-style-type: none"> • Integration with existing healthcare systems for seamless adoption and use in clinical settings.
8. SDG Involved:	 <p>Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages. By improving early detection rates and accuracy in breast cancer diagnosis, the project contributes to achieving this goal.</p>
9. Future Scope:	 <ul style="list-style-type: none"> • Integration with Electronic Health Records (EHR): Integrate the model with EHR systems to streamline patient data management and improve healthcare workflows. • Continuous Improvement: Continuously update and refine the model using new data and advancements in AI technology to enhance performance and accuracy over time.

Link of Project on Github: <https://github.com/1M1B/AI-Cookbook-Projects/tree/master/Project%206-%20Lung%20Cancer%20Detection%20Model>

Project 7: Leak Weak

1. Problem Statement: 	<p>Many individuals, especially young girls and women, have questions and concerns about menstruation but may feel embarrassed or uncomfortable discussing them openly. Access to accurate information about periods is essential for menstrual health and hygiene.</p>
2. Users/Stakeholders: 	<ul style="list-style-type: none"> • Adolescent girls • Women of reproductive age • Parents and caregivers • Teachers and educators • Healthcare professionals
3. Objectives: 	<ul style="list-style-type: none"> • Provide accurate and reliable information about menstruation and menstrual health. • Address common questions and concerns related to periods in a confidential and non-judgmental manner. • Promote menstrual hygiene practices and debunk myths and misconceptions surrounding menstruation. • Empower individuals to manage their menstrual health confidently and comfortably.
4. Features: 	<ul style="list-style-type: none"> • Chatbot interface for asking questions and receiving personalized responses. • Comprehensive FAQ section covering a wide range of topics related to periods. • Educational articles and resources on menstrual health and hygiene. • Period tracking feature
5. AI Used: 	Natural Language Processing (NLP) for understanding and processing user queries.
6. Data Used: 	Medical literature and resources on menstrual health and hygiene.
7. Solution: 	The mobile application will serve as a user-friendly platform for individuals to access accurate information and support regarding menstruation. The integrated chatbot provide responses in real-time. The app will also feature educational resources and period tracking tools
8. SDG Involved: 	Goal 3: Good Health and Well-being (promoting menstrual health and hygiene) Goal 4: Quality Education (providing accurate and accessible information about periods)

<p>9. Future Scope:</p> 	<ul style="list-style-type: none"> • Integration with telemedicine services for connecting users with healthcare professionals for personalized advice and consultations. • Expansion of language support and cultural adaptation to reach a wider audience. • Collaboration with schools, NGOs, and government agencies to promote menstrual health education and awareness. • Incorporation of advanced AI capabilities for predictive analytics and personalized health recommendations. • Partnerships with menstrual product manufacturers and retailers for product recommendations and promotions.
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Project Link (for Chatbot Ihita):

<https://console.dialogflow.com/api-client/demo/embedded/7776c630-6ede-4c1a-860a-f8bfc6e7bb46>

In this case, the name of the chatbot is Ihita which means “Fighter / Warrior”.

Video Link

<https://drive.google.com/file/d/1EB4qye2Wzhhogqja0wFw81bIYD1Io1XK/view?usp=sharing>

Steps to create the chatbot using dialog flow:

Use the following link to get started with Dialog flow:

<https://dialogflow.cloud.google.com/#/getStarted>

Before creating the Chatbot in Dialog flow make sure you are ready with the list of questions and answers which you will use it to train the chatbot. Some sample questions are listed here.

1. Can I exercise while I am on my period?
2. What should I do to relieve my cramps?
3. What if I skip a period? Etc.

The list of questions with the answers can be accessed from this link.

https://drive.google.com/file/d/1_8wsyhP5FsnKK141wx43XJSCbL0JI3ys/view?usp=sharing

Then in Dialog Flow, Create an Agent by giving an appropriate name for the chatbot. Once the Agent is created, then it prompts you to create the intents.

An intent categorizes an end-user's intention for one conversation turn. For each agent, you define many intents, where your combined intents can handle a complete

conversation. When an Agent is created, by default two intents are created which are Default welcome intent, default fallback intent. The rest are to be created depending on the idea behind the chatbot. In the default welcome intent, when the user gives a greeting message, your chatbot should respond to the kind of services it can do. So, give only one response and remove all the other default welcome greetings.

All actions should be saved for the Agent to update itself.

Next step is to create as many intents as required by the objective of the chatbot.

Along with each intent, the training phrases with the respective answers should be given and trained.

Also, entities can be created in Dialog Flow. Defines the type of information you want to extract from user input. For example, vegetable could be the name of an entity type. Clicking Create Entity from the Dialog flow Console creates an entity type.

You can see all the entities associated with an intent by clicking on it in Dialog flow. Whereas intents represent the user's overall intention in their utterance, entities represent key words in the utterance that we want to extract.

After this, choose Integrations option from the menu (left hand side) and choose Web demo. In the next screen, Click on Enable. Then click on the hyperlink to open the chatbot in a separate tab. Then when the chatbot opens in a separate tab, greet the chatbot with Hi or any welcome greeting and see the response.

Other than this method, the chatbot can be integrated in any other platform like Google Site / Weebly / Thunkable.

Ex: If you want the chatbot in a Google Site, then open a Google site, in that select embed option, then choose Embed code option, paste the link, click on Insert option, then Next option and then finally Insert option. You can see that the Google Dialog Flow chatbot is inserted in the Google site. You can test the chatbot by clicking on the preview button and then publish it.

Project 8: Image Classification App Development

<p>1. Problem Statement:</p> 	<p>There is a need to introduce students to the basics of machine learning in a practical and engaging manner. Additionally, providing hands-on experience in creating apps that implement machine learning concepts through image classification can enhance students' understanding and interest in this field.</p>
<p>2. Users/Stakeholders:</p> 	<ul style="list-style-type: none"> - Educators and teachers - Students (elementary, middle, or high school level) - Educational institutions - Parents and caregivers
<p>3. Objectives:</p> 	<ol style="list-style-type: none"> 1. Introduce students to the fundamentals of machine learning in a user-friendly way 2. Provide practical experience in app development using MIT App Inventor and the LookExtension. 3. Foster creativity and problem-solving skills among students through app creation. 4. Enhance understanding of image classification concepts and their real-world applications.
<p>4. Features:</p> 	<ol style="list-style-type: none"> 1. Image classification functionality using smartphone or tablet cameras. 2. Confidence level display for each classification result. 3. User-friendly interface for app development using MIT App Inventor. 4. Integration of LookExtension for machine learning capabilities. 5. Interactive learning modules to explain machine learning concepts.
<p>5. AI Used:</p> 	<ul style="list-style-type: none"> - Machine learning algorithms for image classification. - LookExtension from MIT App Inventor for implementing machine learning in the app.
<p>6. Data Used:</p> 	<ul style="list-style-type: none"> - Training datasets for machine learning models (e.g., ImageNet, CIFAR-10). - Custom image datasets collected by students for app development and testing.
<p>7. Solution:</p> 	<p>The solution involves guiding students through the process of creating their own image classification apps using MIT App Inventor and the LookExtension. By allowing students to take photos with their devices and classify objects with confidence levels, the app provides a hands-on learning experience in machine learning concepts.</p>

8. SDG Involved: 	<ul style="list-style-type: none"> - Goal 4: Quality Education (enhancing STEM education and digital literacy) - Goal 9: Industry, Innovation, and Infrastructure (promoting innovation in technology education)
9. Future Scope: 	<ol style="list-style-type: none"> 1. Expansion of app functionality to include other machine learning tasks (e.g., text recognition, sentiment analysis). 2. Collaboration with educational institutions to integrate the app development curriculum into existing STEM programs. 3. Creation of online resources and tutorials for self-paced learning and community engagement. 4. Integration of feedback mechanisms to gather user insights and improve app usability. 5. Exploration of partnerships with industry professionals to offer mentorship and career guidance opportunities.

Project Link: <https://appinventor.mit.edu/explore/resources/ai/image-classification-look-extension>

Project 9: Fake Voices: The Ethics of Deepfakes

1. Problem Statement: 	Introducing students to synthetic media and its potential impacts, including deepfake technology.
2. Users/Stakeholders: 	<ul style="list-style-type: none"> • Educators • Students
3. Objectives: 	<ul style="list-style-type: none"> • To teach students about coding and artificial intelligence. • To provide a basic understanding of machine learning. • To prompt students to predict future uses and abuses of synthetic media.
4. Features: 	<ul style="list-style-type: none"> • Creation of a smartphone app that can modify speech rate and pitch. • Group presentations on the future impacts of deepfake media.
5. AI Used: 	Machine learning algorithms for modifying speech characteristics.
6. Data Used: 	<p>Speech data for training the app. Examples of deepfake media for discussion</p>
7. Solution: 	<ul style="list-style-type: none"> • Hands-on coding activities to create the app. • Group discussions and presentations on the future implications of synthetic media.
8. SDG Involved: 	<ul style="list-style-type: none"> • Goal 4: Quality Education - Enhancing students' understanding of technology and its societal impacts. • Goal 9: Industry, Innovation, and Infrastructure - Introducing students to emerging technologies like synthetic media.
9. Future Scope: 	<ul style="list-style-type: none"> • Expanding the curriculum to include more advanced topics in artificial intelligence and media literacy. • Integrating real-world case studies and examples of synthetic media to deepen students' understanding.

Project Link: <https://appinventor.mit.edu/explore/resources/ai/fake.voices.unit>

Project 10: An app to track mood over a period and visualize the data

1. Problem Statement: 	Creating an app to track mood over a period and visualize the data.
2. Users/Stakeholders: 	<ul style="list-style-type: none"> • Students • Educators
3. Objectives: 	<ul style="list-style-type: none"> • Develop and/or use a model to generate data. • Support explanations, predict phenomena, analyze systems, and/or solve problems through data visualization. • Enhance understanding of data analysis and visualization techniques.
4. Features: 	<ul style="list-style-type: none"> • Mood tracking functionality for a week or month. • Visualization of mood data over time (happy, angry, sad). • Step-by-step guide for app creation.
5. AI Used: 	No specific AI used in this scenario. The focus is on data generation and visualization.
6. Data Used: 	Self-generated data on mood (happy, angry, sad) over the tracking period.
7. Solution: 	<ul style="list-style-type: none"> • Creation of an app that tracks mood and visualizes the data. • Step-by-step guide for students to follow along and create the app.
8. SDG Involved: 	<p>Goal 4: Quality Education - Enhancing students' data literacy and analytical skills.</p> <p>Goal 3: Good Health and Well-being - Promoting self-awareness and mental health monitoring.</p>

9. Future Scope:



- Expanding the app to include more sophisticated mood tracking features.
- Integrating machine learning algorithms to predict mood patterns based on various factors.
- Incorporating feedback mechanisms for users to reflect on and improve their mood over time.

Project Link: https://appinventor.mit.edu/explore/ai2/data_science_unit

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