AI PROJECT LOGBOOK

Resource for Students

(Adapted from "IBM EdTech Youth Challenge – Project Logbook" developed by IBM in collaboration with Macquarie University, Australia and Australian Museum)

KEY PARTNERS

INDIA IMPLEMENTATION PARTNERS

GLOBAL PARTNERS

AI Project Logbook

PROJECT NAME: Tic Tac Toe Game

SCHOOL NAME: Gurukul Global Global

YEAR/CLASS: 2024-2025, class12th

TEACHER NAME: Ritu Debnath

TEACHER EMAIL: ritudebnath@gmail.com

TEAM MEMBER NAMES AND GRADES:

1. Akshan Goyal, class12th
2. Harshil Ahuja, class12th
3. Turvashu Verma, class12th
4. _____
5. _____
6. _____

Note: *Add more rows if there are more members in your team*

1. Introduction

This document is your **Project Logbook**, and it will be where you record your ideas, thoughts and answers as you work to solve a local problem using AI.

Make a copy of the document in your shared drive and work through it digitally with your team. You can also print a copy of the document and submit a scanned copy once you have completed the Project Logbook. Feel free to add pages and any other supporting material to this document.

Refer to the **AI Project Guide** for more details about what to do at each step of your project.

2. Team Roles

2.1 Who is in your team and what are their roles?

Role	Role description	Team Member Name
Lead Developer	Responsible for coding the game logic, implementing AI algorithms, and debugging.	Akshan Goyal
UI/UX Designer	Focused on designing the user interface and enhancing the user experience.	Harshil Ahuja
Tester & Documentation	Responsible for testing game functionality, identifying bugs, and maintenance project documentation.	Turvashu Verma

2.2 Project plan

The following table is a guide for your project plan. You may use this or create your own version using a spreadsheet which you can paste into this section. You can expand the 'Notes' section to add reminders, things that you need to follow up on, problems that need to be fixed urgently, etc.

Phase	Task	Planned start date	Planned end date	Planned duration (hours, minutes)	Actual start date	Actual end date	Actual duration (hours, minutes)	Who is responsible	Notes/Remarks
Preparing for the project	Coursework, readings	Nov 1, 2024	Nov 2, 2024	4 hours	Nov 1, 2024	Nov 2, 2024	4 hours	Team	Identify resources and reading materials
	Set up a team folder on a shared drive							Akshan	Ensure shared access for all
Defining the problem	Background reading							Turvashu	Focused on game related bug sources
	Research issues in our community							Harshil	Identify key areas of user friction
	Team meeting to discuss issues and select an issue for the project							Team	Document key decision and
	Complete section 3 of the Project Logbook							Team	
	Rate yourselves							Team	
Understanding the users	Identify users							Team	
	Meeting with users to observe them							Team	Shedule observation With active players
	Interview with user (1)							Akshan	Focus on player pain points.
	Interview with user (2), etc…							Harshil	
	Complete section 4 of the Project Logbook							Team	
	Rate yourselves							Team	
Brainstorming	Team meeting to generate ideas for a solution							Team	Capture all ideas And priorities
	Complete section 5 of the Project Logbook							Team	
	Rate yourselves							Team	
Designing your solution	Team meeting to design the solution							Team	Layout key Features and
	Complete section 6 of the logbook							Team	
	Rate yourselves							Team	

Collecting and preparing data	Team meeting to discuss data requirements							Team	Define data Sources for AI Model training
Collecting and preparing data Prototyping	Data collection							Turvashu	
	Data preparation and labelling							Akshan	
	Complete Section 6 of the Project Logbook							Harshil	
	Team meeting to plan prototyping phase							Team	
Prototyping Testing	Train your model with input dataset							Akshan	
	Test your model and keep training with more data until you think your model is accurate							Harshil	
	Write a program to initiate actions based on the result of your model							Turvashu	
	Complete section 8 of the Project Logbook							Team	
	Rate yourselves							Team	
	Team meeting to discuss testing plan							Team	
Testing Creating the video	Invite users to test your prototype								
	Conduct testing with users							Team	
	Complete section 9 of the Project Logbook							Team	
	Rate yourselves							Team	
	Team meeting to discuss video creation							Team	
	Write your script							Harshil	
	Film your video							Team	
	Edit your video							Akshan	
Completing the logbook	Reflect on the project with your team							Team	

	Complete sections 10 and 11 of the Project Logbook							Team	
	Review your Project logbook and video							Team	
Submission	Submit your entries on the IBM	Nov 10, 2024	Nov 10, 2024	1 hour	Nov 10 2024	Nov 10, 2024	1 hour	Akshan	

2.3 Communications plan

Will you meet face-to-face, online or a mixture of each to communicate?

-> We will meet primarily online,with occasional face-to-face meetings.

How often will you come together to share your progress?

-> We will meet once a week,with ad-hoc meetings as needed.

Who will set up online documents and ensure that everyone is contributing?

-> Akshan will setup online documents and ensure team contributions.

What tools will you use for communication?

-> We will use Google Drive and Zoom/Google Meet for communication and collaboration.

2.4 Team meeting minutes (create one for each meeting held)

Date of meeting: **November 5, 2024**
Who attended: **Akshan,turvashu,harshil**
Who wasn't able to attend: **None**

Purpose of meeting:

To discuss the current state of the Tic Tac Toe project, identify issues, and set goals for the upcoming development cycle.

Items discussed:

1.
2.
3. Game bugs and Functionality.
   AI improvements.
   Multiplayer Feature.

Things to do (what, by whom, by when)

1.
2.
3. Fix game Bugs.
   Test AI Difficulty.
   Start multiplayer Development.

3. Problem Definition

3.1 List important local issues faced by your school or community

3.2 Which issues matter to you and why?

Problem Statement: How can we develop a Tic Tac Toe game that uses AI to provide challenging, strategic moves so that players can have a competitive and fun

Local Problem: Create an engaging Tic Tac Toe game using AI that can challenge players and provide an enjoyable gaming experience.

3.3 Which issue will you focus on?

Our focus will be on **smoothing the functionality** of the game and ensuring there are **no bugs** for a seamless and enjoyable experience.

3.4 Write your team's problem statement in the format below.

How can we help Tic tac toe players [a specific user or group of users] find a way to ___________ enjoy a smooth and bug-free gaming experience [do what] so that they can ______ [do something not done before that can be measured].

Rate yourself

Problem Definition

1 point - A local problem is described
2 points - A local problem which has not been fully solved before is described.
play seamlessly without interruptions or issues, improving overall user satisfaction?
3 points - A local problem which has not been fully solved before is explained in detail with supporting research.

4. The Users

4.1 Who are the users and how are they affected by the problem?

Users: Players interested in strategy-based games, including both casual players and those seeking to challenge an AI opponent.

4.2 What have you actually observed about the users and how the problem affects them?

User Observations: Users enjoy games that offer a mix of challenge and engagement; predictable AI can

4.3 Record your interview questions here as well as responses from users.

Interview Questions:

1. How would you describe your experience with Tic Tac Toe so far?
2. What features would make the game more engaging for you?
3. How easy is it to understand the rules of the game?
4. Have you played Tic Tac Toe on other platforms (mobile, web, etc.)? How does this version compare?
5. What is your preferred mode of play? (e.g., single-player, multiplayer, against AI)
6. Are there any difficulties you encounter while playing the game?
7. What do you think of the game's user interface and design?
8. Is there anything that frustrates you when playing Tic Tac Toe?
9. Would you like to see additional customization options, such as themes or difficulty levels?
10. How likely would you be to recommend this version of Tic Tac Toe to others?
11. What could be improved to make the game more fun or challenging?
12. What's your opinion on the AI difficulty level? Is it too easy, too hard, or just right?

Example User Responses:

User 1: "It's fun, but I would love some different game modes, like time-limited moves or challenges."

4.4 Empathy Map

Map what the users say, think, do and feel about the problem in this table

What our users are saying	What our users thinking
"I want to beat the AI!"	**"How can i outsmart this AI?"**
What our users are doing	**How our users feel**
Analyse moves, strategise during	**Excited, challenged, sometimes frustrated when losing.**

4.5 What are the usual steps that users currently take related to the problem and where are the difficulties?

1.
2. Launching the Game: Users open the Tic Tac Toe game on their device, initiating the gameplay environment.
3. Navigating the Interface: Users may encounter difficulties if the interface is not intuitive, leading to a slow start confusion about controls.
4. Selecting Game Mode: Users choose between playing against AI or another player, with potential issues if difficulty levels are not well-adjusted to their preferences.
5. Placing the First Move: Users begin the game by placing their move as "X" or "O". New users may struggle to strategize effectively at this-stage.
6. AI Response: The AI makes a move based on its strategy. If the AI is predictable, users may lose interest or find the game too easy.
7. Planning and Strategy: Users think through their moves, aiming to create a winning combination. Complex AI behavior may challenge users beyond their skill level.
8. Blocking AI Moves: Users focus on preventing potential wins by the AI, a key strategic element that can become frustrating if the AI consistently outmaneuvers them.
9. Countering AI's Strategy: Users attempt to outsmart the AI, which may prove difficult if the AI has limited or overly aggressive strategies.
10. Game Conclusion: The game ends with a win, loss, or draw. A predictable outcome can reduce player engagement over time.
    Reflecting on Results and Replay: Users decide whether to replay or exit. Without varied strategies or adaptive difficulty, users may become disinterested in repeated playthroughs.

4.6 Write your team's problem statement in the format below.

Tic tac toe players [a specific user or group of users]

are experiencing issues with game bugs and inconsistent functionality [problem] today

because of unoptimised code and a lack of comprehensive testing [cause]

Rate yourself ☐

The Users

1 point - The user group is described but it is unclear how they are affected by the problem.
2 points - Understanding of the user group is evidenced by completion of most of the steps in this section.
3 points - Understanding of the user group is evidenced by completion of most of the steps in this section and thorough investigation

5. Brainstorming

5.1 Ideas

How might you use the power of AI/machine learning to solve the users' problem by increasing their knowledge or improving their skills?

AI Idea #1	Implement a basic rule-based AI.
AI Idea #2	Add adaptive AI behavior based on player performance.
AI Idea #3	Introduce difficulty levels (easy, medium, hard).
AI Idea #4	Best Solution: Use a combination of rule-based and adaptive AI to balance difficulty while maintaining player engagement.
AI Idea #5	

5.2 Priority Grid

Evaluate your five AI ideas based on value to users and ease of creation and implementation.

VALUE TO USERS		
High	**High value to users, easy to create** Basic rule-based AI that plays using simple strategies (e.g., blocking moves, winning moves).	High value to users, hard to create
Low	Low value to users, easy to create Random move generator without strategic logic, providing only basic	Low value to users, hard to create AI that predicts and counters future player moves up to several turns ahead using
	Easy	Hard

EASE OF DEVELOPMENT

5.3 Based on the priority grid, which AI solution is the best fit for your users and for your team to create and implement?

Briefly summarize the idea for your solution in a few sentences and be sure to identify the tool that you will use.

Selected AI Solution: The best fit for our Tic Tac Toe game is a combination of rule-based logic and an adaptive AI behavior using the Minimax algorithm. This approach ensures that the AI opponent remains challenging while allowing for varying levels of difficulty, catering to both beginners and more advanced players.

Summary of the Solution: The AI will employ a rule-based strategy for lower difficulty levels to provide a more accessible challenge to casual players. For higher difficulty levels, it will use the Minimax algorithm to evaluate and predict optimal moves, ensuring strategic gameplay. This blend allows flexibility and engagement for users, offering competitive gameplay at all skill levels.

Tool Used: The solution will be implemented using Python, leveraging libraries such as NumPy for efficient computation and custom functions to execute the Minimax algorithm and game logic. This approach balances complexity and accessibility, providing an enjoyable experience for users while maintaining high engagement.

Rate yourself ☐

Brainstorming

1 point – A brainstorming session was conducted. A solution was selected.
2 points - A brainstorming session was conducted using creative and critical thinking. A solution was selected with supporting arguments in this section
3 points - A brainstorming session was conducted using creative and critical thinking. A compelling solution was selected with supporting arguments in this section.

6. Design

6.1 What are the steps that users will now do using your AI solution to address the problem?

1. Launch the game.
2. Choose difficulty level.
3. Play against AI, making moves alternately.
4. Observe AI strategies and adapt.
5. Game ends upon win,draw, or loss.
6.
7.
8.
9.
10.

Rate yourself ☐

Design

1 point – The use of AI is a good fit for the solution.
2 points - The use of AI is a good fit for the solution and there is some documentation about how it meets the needs of users
3 points - The use of AI is a good fit for the solution. The new user experience is clearly documented showing how users will be better served than they are today.

7. Data

7.1 What data will you need to train your AI solution?

Data Needed: Game moves and outcomes for different scenarios.

7.2 Where or how will you source your data?

Data needed	Where will the data come from?	Who owns the data?	Do you have permission to use the data?	Ethical considerations
Have		The project team (Akshan, Harshil, Turvashu).	Yes, as it is created and controlled by the project team.	
Want/Need		The project team (with user consent).	Yes,provided users consent to data collection and use for improving the game.	
Nice to have	Generated internally during game development and testing scenarios. Real matches played by users during the testing phase. AI simulation runs and evaluation against various strategies	The project team.	Yes,as it is generated through simulation conducted by the	No ethical concerns, as this data is self-generated and involves no sensitive information. Ensure user consent and anonymisation of data to protect privacy. No specific concerns, as data is generated through controlled simulations.

Rate yourself

Data

1 point – Relevant data to train the AI model have been identified as well as how the data will be sourced or collected.
2 points - Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced.
3 points - Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced, and that safety and privacy have been considered.

8. Prototype

8.1 Which AI tool(s) will you use to build your prototype?

AI Tools Used: Python libraries for AI development (e.g., Minimax algorithm)

8.2 Which AI tool(s) will you use to build your solution?

AI Tools for Solution: AI logic built using Minimax algorithm and heuristic evaluations.

8.3 What decisions or outputs will your tool generate and what further action needs to be taken after a decision is made?

Decisions and Outputs:

- The AI makes strategic moves based on game state.
- Outputs include AI moves, game state changes, and win/loss/draw outcomes.
- Next actions include analyzing player feedback and further refining AI strategies

Rate yourself ☐

Prototype

1 point – A concept for a prototype shows how the AI model will work.
2 points - A prototype for the solution has been created and trained.
3 points - A prototype for the solution has been created and successfully trained to meet users' requirements.

9. Testing

9.1 Who are the users who tested the prototype?

Users for Testing: Game enthusiasts, strategy game players, friends, and peers.

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

Observations During Testing:

- Users enjoyed challenging AI but occasionally found it too predictable or too difficult.
- The interface was intuitive but could be enhanced for better user

9.3 Complete the user feedback grid

What works	What needs to change
AI strategy is challenging and fun; UI is clean and simple.	**Add different difficulty levels to make it more accessible to casual players.**
Questions?	Ideas
“Can the AI learn from my moves?”	**Implement an AI learning mechanism for more adaptive behaviour.**

9.4 Refining the prototype: Based on user testing, what needs to be acted on now so that the prototype can be used?

Immediate Action: Introduce easy, medium, and hard difficulty settings for AI.

9.5 What improvements can be made later?

Future Improvements: Develop a learning AI that adapts over time.

Rate yourself ☐

Testing

1 point – A concept for a prototype shows how it will be tested.
2 points - A prototype has been tested with users and improvements have been identified to meet user requirements.
3 points - A prototype has been tested with a fair representation of users and all tasks in this section have been completed.

10. Team collaboration

10.1 How did you actively work with others in your team and with stakeholders?

Collaboration Summary:

• Team meetings were held regularly (face-to-face and online) to discuss progress.

• Akshan led coding and logic implementation, Harshil designed and improved UI/UX, while Turvashu focused on testing and documentation.

• Effective communication and task division ensured steady project progress.

Rate yourself ☐

Team collaboration

1 point – There is some evidence of team interactions among peers and stakeholders.
2 points - Team collaboration among peers and stakeholders is clearly documented in this section.
3 points - Effective team collaboration and communication among peers and stakeholders is clearly documented in this section.

11. Individual learning reflection

11.1. Team Reflections

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 issues in your local community.

Team member name:

Akshan: "I learned a lot about AI algorithms, especially Minimax, and how strategic logic can impact player experience."

Team member name:

Harshil: "Working on the UI design helped me understand the importance of user experience in games."

Team member name:

Turvashu: "Testing was critical in understanding user expectations

Team member name:

Team member name:

Team member name:

Note: *Add more boxes if there are more members in your team*

Rate yourself

Individual Learning Reflection

1 point – Some team members present an account of their learning during the project.
2 points - Each team presents an account of their learning during the project.
3 points - Each team member presents a reflective and insightful account of their learning during the project.

12. Video link

Enter the URL of your team video:

Enter the password (if any):

Appendix

Recommended Assessment Rubric (for Teachers)

LOGBOOK AND VIDEO CONTENT

Steps	3 points	2 points	1 point	Points Given
Problem definition	A local problem which has not been fully solved before is explained in detail with supporting research.	A local problem which has not been fully solved before is described.	A local problem is described	
The Users	Understanding of the user group is evidenced by completion of all of the steps in *Section 4 The Users* and thorough investigation.	Understanding of the user group is evidenced by completion of most of the steps in *Section 4 The Users*.	The user group is described but it is unclear how they are affected by the problem.	
Brainstorming	A brainstorming session was conducted using creative and critical thinking. A compelling solution was selected with supporting arguments from *Section 5 Brainstorming.*	A brainstorming session was conducted using creative and critical thinking. A solution was selected with supporting arguments in *Section 5 Brainstorming.*	A brainstorming session was conducted. A solution was selected.	
Design	The use of AI is a good fit for the solution. The new user experience is clearly documented showing how users will be better served than they are today.	The use of AI is a good fit for the solution and there is some documentation about how it meets the needs of users.	The use of AI is a good fit for the solution.	
Data	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced, and that safety and privacy have been considered.	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced.	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected.	
Prototype	A prototype for the solution has been created and successfully trained to meet users' requirements.	A prototype for the solution has been created and trained.	A concept for a prototype shows how the AI model will work	
Testing	A prototype has been tested with a fair representation of users and all tasks in *Section 9 Testing* have been completed.	A prototype has been tested with users and improvements have been identified to meet user requirements.	A concept for a prototype shows how it will be tested.	
Team collaboration	Effective team collaboration and communication among peers and stakeholders is clearly documented in *Section 10 Team collaboration*.	Team collaboration among peers and stakeholders is clearly documented in *Section 10 Team collaboration*.	There is some evidence of team interactions among peers and stakeholders.	
Individual learning	Each team member presents a reflective and insightful account of their learning during the project.	Each team presents an account of their learning during the project.	Some team members present an account of their learning during the project.	
Total points				

VIDEO PRESENTATION

Criteria		Points Given 3 – excellent 2 – very good 1 – satisfactory
Communication	The video is well-paced and communicated, following a clear and logical sequence.	
Illustrative	Demonstrations and/or visuals are used to illustrate examples, where appropriate.	
Accurate language	The video presents accurate science and technology and uses appropriate language.	
Passion	The video demonstrates passion from team members about their chosen topic/idea.	
Sound and image quality	The video demonstrates good sound and image quality.	
Length	The content is presented in the video within a 3-minute timeframe.	
Total points		