Development Plan
Software Engineering

Team 8, RLCatan
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Table 1: Revision History

Date	**Developer(s)**	**Change**
Sept 17	Sunny Yao	Draft of 3,4,8,9
Sept 17	Rebecca Di Filippo	Draft of 1,2,5,6,7,Team Charter
Sept 21	Rebecca Di Filippo	Revision of 1,2,5,6,7,Team Charter
Sept 21	Sunny Yao	Draft of Intro, 10, Coding Standards
Sept 22	Rebecca Di Filippo	Addition of individual Reflection
Sept 22	Rebecca Di Filippo	Updated Proj Scheduling
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This document outlines the development plan for RLCatan, an AI agent that learns to play the board game Catan competitively using reinforcement learning.

1 Confidential Information

There is no confidential information to protect in this project.

2 IP to Protect

There is no IP to protect in this project.

3 Copyright License

AlgoCatan is adopting the MIT License, which can be found at this link.

4 Team Meeting Plan

Our team regularly meets 4:30-6:30pm every Thursday. We will schedule additional meetings every time we have an addressable agenda. Virtual meetings will be held through a Discord call and physical meetings will be held at tutorial locations or ETB. Meetings may be hybrid depending on schedules. We will schedule meetings with our advisor when we require resources or expertise. Meetings will be structured with a set agenda devised by the notetaker before scheduling to address all of the topics we need to discuss.

We will be using Discord as our main communication platform. We will create a server with channels for general discussion, meeting scheduling, and project management. For more formal communication, we will use email to contact our advisor. We will also use GitHub Issues for tracking existing issues and their closures.

5 Team Member Roles

- Team Leader: this person is responsible for scheduling meetings, ensuring deadlines are met, and overall team coordination. This person will also be the main point of contact with the supervisor and the TA.
- Notetaker: this person is responsible for creating meeting agendas and also taking notes during meetings. This person will also be updating the Kanban board.

- IT: this person is responisble for managing the GitHub repository, including branches, pull requests, and issues. This person will also be resonsible for trouble shooting any technical issues that arise.
- Researcher: this person is responsible for researching any topics that the team is unfamiliar with. This person will also be responsible for finding relevant papers and articles to help the team understand the project better.

6 Workflow Plan

We will be using GitHub for version control and collaboration. To manage development, we will create branches for each task on the Kanban Board, along with sub-branches for individual team members work. Pull requests will be used to review and merge code changes, ensuring quality and consistency. GitHub Issues will be used to track tasks and bugs, with issues assigned to specific team members or whoever is available. To streamline this process, we will also use issue templates for consistency in reporting and classification of issues.

7 Project Decomposition and Scheduling

We will be using GitHub Projects to manage our project tasks and milestones. We will create a project board with columns for "To Do", "In Progress", "In Review ", and "Done". Each task will be represented as a card on the board. These tasks will be prioritized based on their importance and deadlines. Every deadline will directly correspond to deadlines from the course outline. The link to our GitHub project can be found here.
*ADD Scheduling******

8 Proof of Concept Demonstration Plan

The main risks for the success of our project are the AI not being able to effectively learn to play Catan at a high level, and the user interface not being intuitive or user-friendly. To mitigate these risks, we will conduct regular Elo testing against existing benchmark opponents to make sure the AI is improving or at least not regressing. We will also conduct user testing sessions to gather feedback and make iterative improvements to the interface. Lastly we will ensure that our AI models are thoroughly tested and validated before deployment. When we demonstrate our proof of concept, we will showcase that the AI is able to win a game of Catan, even if it is not performing at a high level at this stage.

9 Expected Technology

We expect to use Python as our primary programming language, as well as using the Catanatron open source libary for simulating Catan games and training our models. We will also utilize React and JavaScript as our web framework for building the user interface and digital twin. For computer vision models, we will be using openCV and yolov9 for image recognition and processing. We will not be using CI/CD, since our project doesnt require 100% uptime.

10 Coding Standard

Since our projects backend is primarily in Python, we will be following the PEP 8 Coding Standard. The link to this standard can be found here.

Our frontend is primarily in JavaScript and React, so we will be following the google style guide coding standard. The link to this standard can be found here.

Appendix — Reflection

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process. Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."
Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

Jake Read:

1. Most aspects of this deliverable went quite smoothly. We were able to fairly split the work, in such a way that we all contributed important sections, but were able to work in our own time, reducing time spent in meetings. I believe we were able to balance things in such a way that despite working on different sections, each of us still has a general understanding of the content in each part. What I'm happiest about is that we all seem to be working well together. There hasn't been any conflict between the four of us, and we were upfront about our schedules and availability and have stuck to the expectations we set. Whenever I ran into issues or had questions, it was easy to get a hold of someone in our Discord to help. The Discord server I set up has been perfect for organization, we have a general chat and various channels for sources, notes, resources, etc. Whenever we had any questions none of us could answer, we reached out to our TA or our supervising professor, who were happy to help.

2. We had a couple pain points during the project selection. We knew we wanted to work with AI/ML in the project, but not what project we wanted to do, so we began by running polls in our Discord server on the various potential projects. After voting and a subsequent meeting, we narrowed our options down to two. I was mostly interested in the *Catan* project, while the rest of the team was less certain which they preferred. We decided to schedule a meeting with the supervising profs of both projects, to get a more in-depth idea of what each one involved. This worked, and we ended up going with the *Catan* project. During this whole process, one teammate missed both meetings with little explanation, and was very slow to answer messages. After a discussion with the group, we agreed that we were concerned by the lack of

communication, and decided to gracefully part ways with our fifth member.

3. Decisions surrounding scope were quite complex, as none of us had extensive prior experience with reinforcement learning. This made it hard to judge how long certain aspects of the project would take, so we turned to our supervisor, Professor Istvan David. He was able to give us rough estimates regarding the scope/viability of various goals, which was a great help. The nature of our project made it quite simple to separate goals however, as the design process is rather modular (build simulation, train model, return data, etc.). The existing project description provided in the potential projects document also helped in this regard, as certain milestones were already marked as optional, making them clear contenders for stretch goals.

1. Why is it important to create a development plan prior to starting the project?

2. In your opinion, what are the advantages and disadvantages of using CI/CD?

3. What disagreements did your group have in this deliverable, if any, and how did you resolve them?

Appendix — Team Charter

External Goals

Our teams external goals for this project are to attain a strong understanding of reinforcement learning and computer vision, to be able to build a hireable portfolio. We also are aiming to get a A/A+ in the course, since we plan to put a lot of effort into the project.

Attendance

Expectations

Our team meets every week at 4:30-6:30 pm on Thursday. All other meetings are scheduled on a weekly basis, depending on deadlines and amount of work. It is expected that all team members attend every meeting and arrive on time. If a team member is unable to attend a meeting they must notify the team at least 12 hours in advance (withholding an emergency situation). If a team member is going to be late or must leave early they must notify the team prior to the meeting.

Acceptable Excuse

An acceptable excuse for missing a meeting or deadline includes sickness, family emergencies, or academic obligations. On the other hand, unacceptable excuses include forgetting, being lazy, or not prioritizing the team. Again, it is expected that the team knows 12 hours in advance if a member is going to miss a meeting or deadline. This time frame allows the team to adjust their plans accordingly.

In Case of Emergency

In case of an emergency, the team member must notify the team as soon as possible, before the meeting or deadline. If a deadline cannot be met, other members will distribute the work among themselves to ensure the deadline is met. Its important to note that 1-2 missed deadline with little notice is acceptable, but repeated offenses will not be tolerated.

Accountability and Teamwork

Quality

It is expected that all team members come to meetings prepared with the assigned task completed for each week. It is expected that all tasks we complete are of high quality and have been reviewed by at least one other team member before submission. Each deliverable will be reviewed by all team members before submission to ensure quality and consistency. Lastly, all coding should follow the agreed upon coding standards.

Attitude

The team leader is responsible for ensuring that all team members are treated fairly. All team members need to be open to new ideas and willing to compromise. If conflicts arise, the team will discuss the issue and come to a resolution that works for everyone. If a team member is not contributing to the team, the team leader will address the issue with the member privately. If the issue persists, the team will discuss the issue with the TA or instructor.

Stay on Track

Our team will stay on track by setting clear weekly goals, using github Kanban boards to monitor progress, and holding regular check-ins to ensure accountability. Tasks will be distributed fairly according to skills and proficiencies, and progress will be tracked through version control commits and documented updates. Members who perform well will be recognized for their contributions and can take greater lead on project direction in future tasks. If a member's performance falls below expectations, we will first address the issue through direct communication and support, ensuring that individual effort is accurately reflected in evaluations. We expect to have high attendance from all members with prior warning for any absences.

Team Building

Considering our team will be working together for 8 months, its important to build team cohesion. We will do this by scheduling fun activities outside of meetings. one of those fun activities will be a team dinner at the end of the project to celebrate. We also plan to play *Catan* together outside of meetings.

Decision Making

Our team will converse together before making any major decisions. We will try to reach a consensus, but if we are unable to do so we will vote through discord polls. In the event there is a disagreement , the team leader will have the final say.