Implementing a remote submission system for the Geometry Friends AI competition

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Learnings Report

Abstract—Integrated within a team effort to implement a more robust submission system for AI competitions using the Geometry Friends framework, this work had the goal of organizing the framework's code repositories, refactoring the code itself and correcting a specific agent concurrency problem. A study of the existing solutions was produced in order to achieve this aim. By the end of the activity, the project's components were summarized into three repositories containing merely the latest version of each module, where previously there were seven, in various stages of development. In addition, the framework code was refactored and is now consistent throughout all modules. Finally, a concurrency issue that made it difficult to compare agent performance was also successfully tackled.

Index Terms—(Geometry Friends, Artificial Intelligence, AI, Competition, Submission System, LaTeX).

The document is very poor in the description of Soft-skills! Its focus is mainly on Technical aspects of the work!

1 Introduction

Initially, I had selected another activity as my first choice for Independent Studies IV (ISIV). However, upon learning that that choice did not correspond to what I had previously envisaged, I informed my coaching team of this fact and immediately sought out the promoter of my second choice of activity, Professor Rui Prada, the one this report corresponds to.

Upon conversing with Prof. Prada, we both agreed that I could participate in the activity and that a meeting with the rest of the team should soon follow.

This activity consisted in improving upon work developed by my academic colleagues over the years, as well as in helping to build a more flexible system for various students in universities across the globe to participate in a popular AI competition, based upon the Geometry Friends (GF) framework [1] [2].

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This educational component appealed to me, since self-improvement is one of the most important things that I have striven for and valued throughout my life.

Indeed, all of my Independent Studies (IS) activities have followed this principle and have comprised of work relating to languages, public relations, educational or academic tasks.

2 Contacts with the promoter and the team

At the beginning of the activity, contacting with its promoter and the rest of the team in order to learn and familiarize myself with the tasks attributed to me was crucial.

These contacts consisted mostly of personal team meetings, usually in the promoter's office, and of electronic discussions between the team members and the promoter. Without this constant coordination along the project's evolution, the corresponding results would not have been mutually beneficial.

During these first meetings, I was attributed the responsibility of studying the existing project repositories, synthesizing them into a manageable number of new repositories, reviewing their code and correcting a crucial

(1.0) Excellent	LEARNINGS						DOCUMENT						
(0.8) Very Good	Context×2	Skills×1	Reflect×4	Summ×.5	Concl×.5	SCORE	Struct ×.25	Ortog×.25	Exec×4	Form ×.25	Titles ×.5	File ×.5	SCORE
(0.6) Good	0.6	0.6	0.6	0.8	0.8		0.6	0.8	0.8	1.0	1.0	1.0	
(0.4) Fair													
(0.2) Weak													

issue that would allow competing agents to be evaluated in a more fair manner.

Because the GF framework has been in development for over two years, will continue to be developed upon by other colleagues, and is the basis for an international academic competition in AI, these responsibilities appealed to my values.

3 Organizing the repositories

As already mentioned, the GF framework has been in development for many years now. Consequently, its evolution has resulted in the project code being spread across seven different repositories, each with overlapping project components in various stages of implementation.

At the promoter's request, my task was to synthesize existing repositories into three new ones, corresponding to: the game itself, the GF competition framework, and an advanced implementation of an agent for the game.

In order to summarize the code into the new repositories, I knew I had to do it in an organized manner: first, by determining which repositories contained the latest version of each module, and second, by identifying whether or not they could be decoupled from the rest of the code.

This study was fundamental for the success of the activity. Any future work on the project would be dependent on this task, since future developers would build upon the new repositories. To that end, I strove to maintain consistency across the project's components and modules.

In addition to this, the effort of the entire team would be facilitated, in the sense that colleagues less familiar with the repositories could better comprehend their function without delving too deep into the code itself.

This would result in them losing precious time in a task secondary to their main efforts, which consisted mainly of developing the infrastructure for competitors to submit their agents for the competitions, or sending competitor code to the server running the game itself and collecting and presenting each agent's score in the various game levels.

4 Code review and bug fixing

In addition to the above, and due to the many previous contributions to the framework along the years, there was a need to perform a review of its code.

Indeed, when a great number of people work in the same endeavour, it is natural that some nomenclature inconsistencies arise in the code base (some guidelines may be implemented to prevent this, but it is still inevitable). Therefore, this task required that I review all of the framework code in order to correct those inconsistencies.

If indeed this was a repetitive task, I knew also how crucial it was for future developers to comprehend the code and maintain a consistent conceptual model of the project.

The other task the promoter attributed to me consisted in implementing concurrency between agents run by the game.

The existing version of the framework ran all agents in a single thread, allowing for situations in which, when two agents are competing in a level, if one agent does nothing, the other agent cannot acquire the processor and execute actions. This is unfair, since the 2nd agent might be a good one, yet it will be scored identically to the first one.

I was conscious of the importance of this task, since it would bring added fairness to the competition, and as a result, hopefully attract more participants to the contest. Indeed, the competitor's perceived justice in the application of evaluation criteria is always a fundamental element for the success of any competition activity.

5 Conclusion

This activity was the most satisfying one that I had the privilege to work on during all four IS courses.

Although I had the opportunity to prepare and give two informal lectures, as well as preparing laboratory classes for the 3D Graphics Visualization and Animation course in the previous iteration of IS, the academic contribution of the current activity were determinant in my above consideration.

It also permitted me to improve upon some of my weaker soft skills (such as organizational and communication skills), while also being able to apply some of my hard skills in a practical context.

In addition, I believe my humble contributions to the project have improved the framework and the competition itself. I hope also that it will ease future participation in the contest and development on the GF project.

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