Group Project Individual Report

This individual report will cover the personal progress I have made throughout the development of this project, this in terms of what I have learnt both technically and non-technically, what I found to be the most easy and difficult, what I would do differently and anything that I regret or take pride in outside of this. In the appendix will be a formal time-sheet for one week of my work on the project.

Technical progress beyond taught material.

Technically, I made a large amount of progress in the development of this project on my knowledge of the reinforcement learning paradigm, especially when considering the limitations currently expected of its employment, along with recent breakthroughs made in its advancement. Specifically, I learnt of the current uses of its employment in real-world scenarios, such as the ability to create plans for events such as environmental disasters through the gain of experience impossible in real-world settings. In doing so, I found that current limitations are usually related to environmental complexity which is often associated with the number of agents involved and how these can cooperate, the difference between full and partial environmental observation for these agents, along with the size of the action-space available to each agent. I also discovered that sometimes the methodologies established to achieve results in such simulations are not viable in translation to real-world scenarios due to unexpected behaviour such as the exploitation of the rules of an environment only possible due to the limitations of their implementation compared with in real-world scenarios where such exploitation isn't possible. For example 'box-surfing' as employed in the multi-agent-emergence-environments environment would not be possible in the real-world and is only possible in that scenario due to approximations of real-world physics used.

On the frontier of this paradigm is the field of curriculum learning, which I now know the core characteristics of to a high-level, since I have participated in the employment of such techniques in both an approximate and accurate fashion – which I feel has given me a deeper understanding than I would have developed otherwise. I recognize now the importance of such a development in regards to improvements in agent-learning speed and success-rate. Along with how the field of transfer learning, and my now greater knowledge of this field, works in tandem with traditional reinforcement learning techniques to materialise this paradigm in its fullest capacity. Specifically, how an agent can be fed progressively difficult tasks within the same domain; how to shape the reward given and the subsequent complexity factor derived; and how this impacts the progression of the supply of these tasks to the agent.

Finally in terms of personal, technical, growth – I have greatly developed my skills in report-writing, including how to tailor report content based on the expected audience, and how to use more advanced document preparation systems, namely LaTeX, in order to produce high-quality and professional output. Through collaboration and feedback, I have made headway in my personal ability to establish and maintain an appropriate flow of information throughout a report – and to identify where I am falling short in this regard in a timely fashion. While through personal exploration of LaTeX syntax, I now feel confident in its employment for any future work where its use would be pertinent.

Non-technical Personal Progress

In terms of non-technical personal progress that I have made, mostly I have developed my understanding of the ways in which larger scale work can be conducted in a more efficient manor, and how scheduling can be handled in this regard – especially when compared with smaller scale team work which I have primarily participated in previously.

When considering, retrospectively, my participation in group communication, I have been able to recognise that timely, clear, consistent, open and honest communication is the key to effective coordination. Such communication fosters a healthier and more productive work environment between team members, and allows for disputes over time delegation and content incorporation to be settled more quickly and resolved in a constructive manner. This as opposed to the sometimes destructive nature of prior settlement methods and scenarios – when each team member's work feels valued and their words feel considered, they are more likely to feel a sense of union and thus produce higher quality work.

Where no-one seems to be taking charge, and proper delegation has not been accomplished, it is better to take this role upon yourself, sooner rather than later. Furthermore in this regard, when – due to a difference in time-zones or other issues – it is not possible to achieve timely, effective communication, it is better to delegate tasks yourself based on what knowledge you have than to allow tasks to go un-formalised and thus un-delegated. It is likely that proper application of established project methodologies from the get-go would mitigate many of the aforementioned issues greatly also.

What was easy to do

Overall, I have surprised myself in my ability to co-ordinate and communicate effectively with team-members, to which I have previously had great issue due to overwhelming feelings of anxiety and disconnection. The ease in which I feel I have managed to achieve this has given me a great confidence boost towards my leadership abilities, and those in team-working in general. One example of such is the eleven hour pair-programming session to which Luke and I participated, this experience was eye-opening in this regard as I had no prior such substantial experience in application of this methodology. Furthermore, I managed to enquire about the establishment of communication channels with potential additional necessary collaborators, in a way that I would have felt prior unable.

Additionally, I found that my ability to formalise my ideas a concise and appropriate manner has substantially improved throughout the project, meaning that I find this easier than at any point previously. In the dissection of leader direction and supervisor feedback, I found ease in the further delegation of such non-formal notions, such that they could be addressed in a formal sense by other team members. This evident in my extensive work in apprehending such direction in order to establish the necessary steps to be taken in overhauling our work to an appropriate standard – both in terms of the content and structure of our final report, along with that of our presentations and code.

What I found most difficult and interesting

The most interesting parts of this project were the development of my knowledge in multiple paradigms to which I had already had a base from prior taught material, as well as the establishment of knowledge in fields at the frontier of their development where one or more of these paradigms are employed cooperatively. More specifically in my new-found knowledge of the curriculum learning paradigm, in both a theoretical sense and implementation-focused sense. It was interesting to see how such ideas were implemented initially by our team, in an approximate manner; by a team fully accustomed to the paradigm in a correct manner; and to see how these implementations relate to one another and could be compared to develop a greater understanding of the field.

It was most difficult to handle the exploration of code-bases not yet ready for public deployment, or those so specific that it was impossible to simply find the answers to any issues that arose through web searches. Rather these issues had to often be solved through direct communication with the creators of such code, or through the application of solutions to similar problems found in projects that could be considered parallel in their direction and in their use of dependencies. For example, I experienced many issues when trying simply to get the code to execute on my machine, that other members of my team did not – which took many hours to fix, taking away from my available time for the project.

I also found it difficult to take into account negative feedback from outside sources where I felt that this feedback was inappropriate, suffering from a loss of motivation from such feedback and a sense of guilt. In future I would hope to take such feedback more lightly, trying to understand the position from which it came, and therefore addressing it in a more appropriate and healthy manner.

In future projects, I intend to set out specific phases of implementation, to which I can aim my efforts and thus more accurately and suitably delegate my time and also the time of others in order to deliver more effectively the content to which is required. I hope to spend my time more effectively, taking charge sooner where I feel that others will not, effectively reducing the burden upon myself and my other team members. This by reducing the scope of our current direction to more manageable and therefore achievable blocks, in such a way that they delegated effectively – hopefully preventing members from feeling overwhelmed by the overall project scope.

Any other particular points of pride or regret

In terms of additional points of pride in the development of this project, I have felt a great sense of accomplishment in that I feel that without my management of team-coordination, and the subsequent pursuit of effective cooperation and delegation of tasks, that our team would have not managed to accomplish the implementation that we did in code, nor our report. I also regret in this sense not having taken charge sooner, as I believe that this would have allowed us to achieve a more complete project, facilitating an increase in apparent time-available for its development. Although not literally increasing the available time, instead this would have reduced the time wasted.

Conclusion

Despite any regrets I may have and any shortcomings it may hold objectively, I feel proud of our implementation of such an emerging technique and the report we have developed. I have developed confidence in my ability to work in a team harmoniously, and in my ability as a team-coordinator. Following is a copy of a formal time-sheet for one week of my progress on this project, this week being one of those in which I spent the most time, but not the one in which I spent the most.

Appendix

Formal time-sheet for week starting Monday the 12th of April and ending Sunday the 18th.

Key: WFPD = Worked From Previous Day

Date	Day	Start	Finish	2nd Start	2nd Finish	Break	Total Hours
12/04/2021	Monday	00:00AM (WFPD)	06:21AM	N/A	N/A	N/A	6H 21M
13/04/2021	Tuesday	N/A	N/A	N/A	N/A	N/A	N/A
14/04/2021	Wednesday	03:00AM	04:00AM	N/A	N/A	N/A	1H 00M
15/04/2021	Thursday	N/A	N/A	N/A	N/A	N/A	N/A
16/04/2021	Friday	23:00PM	00:00AM	N/A	N/A	N/A	1H 00M
17/04/2021	Saturday	00:00AM (WFPD)	05:00AM	21:00PM	00:00AM	N/A	8H 00M
18/04/2021	Sunday	00:00AM	08:00AM	N/A	N/A	1H	8H 00M
						Total Hours:	**22H 21M**