Project Specification Reflections

The project specification is very much describing on what the project covers, but instead of creating one neural network for abnormal trajectory detection, I chose to implement multiple and focus on the differences between the approaches. This gave me the chance to cover a larger breadth of deep learning techniques, which I thought to be more interesting and more valuable for myself, although it might have caused a lower depth of analysis of a particular approach. I have therefore ended up implementing three networks that solve the same problem in very different ways, but this is the only significant deviation to the project specification.

More precisely, in the specification, the task proposed is to train a deep neural network or a convolutional neural network to classify trajectories collected in an environment. I have chosen to adopt the deep neural network approach as it was a lot more prominent in recent literature, but the convolutional network model is mentioned and suggested as further work in this research. The project specification however doesn't mention Recurrent Neural Networks or Deep Autoencoders specifically, but I chose to pursue these newer architectures as opposed to other more conventional methods.

Another part of the project specification suggests extending the problem to handle variable trajectory lengths or classifying sub-trajectories. This is very much the case due to the datasets I've chosen, which already split the massive trajectories into multiple small trajectories. Due to this, the networks learn to handle small and dense trajectories that are only present on a small section in the scene. Therefore, any of the models I suggested would function in real-time with incomplete trajectories, given that the trajectory data is collected. However, there are no tests or results to highlight this, as I considered that creating a tracking algorithm that would extract trajectory data in real-time in a scene is beyond the scope of this project.

I believe all the goals in the project specification have been thoroughly met:

- A deep learning methodology was adopted, examining multiple implementations and justifying every decision.
- The research focuses on surveillance data collected via stationary cameras.
- Abnormal trajectory detection in security surveillance was the main theme of the project, and the results displayed prove that my architectures are capable of detecting anomalies in trajectory data.
- I used deep neural network architectures with fixed-length vectors as inputs to classify trajectories.
- The design handles sub-trajectories and incomplete trajectories.

Personal Reflections

Over the course of project I discovered that undertaking such a complex project can be a challenging and rewarding experience that requires a lot of time, effort and dedication. I encountered obstacles and opportunities for growth both in terms of academic abilities and my personal development. Here, I will give a brief overview of some of my feelings and emotions I experience.

The first obstacle I met was during project allocation. At the time I knew I wanted to do something in the field of game AI which I am very passionate about. I had a few personal ideas I was going to propose to teachers, but one of the projects in the project catalogue was covering exactly what I wanted to do. This is where I had a hard time deciding how to proceed, as I didn't know if it would be appropriate to propose my ideas to other teachers if they were like the one in the project catalogue, or if I should apply for the project proposed, and risk not getting chosen during allocation. I decided to apply for that project feeling quite confident that I would be allocated to my first choice. However, that didn't happen, and I ended up feeling disappointed and regretted not taking more action when I had the chance. This does not mean that I wasn't looking forward to studying and learning more about abnormal trajectory detection, and I was very happy with my choice of supervisor and was feeling confident in my ability to deliver good work. As I started reading more about this subject I realized this is a great opportunity for me to tackle a project in a way that is most valuable to me, focusing on learning as much as I can and getting a broader understanding of deep learning techniques.

After realizing what a great learning opportunity I have, I started developing the skills required for the undertaking of such a project:

- I greatly improved my academic writing skills, which is something I have been lacking ever since I started university.
- Frequent communication with my supervisor has been extremely helpful in understanding what are the best methods and approaches for academic writing, and I am very grateful to have had the chance to discuss this topic with someone with a lot of experience in the field.
- The semi-strict deadlines imposed by the supervisor helped me always stay on track, improved my time-management skills and fostered a greater sense of accountability and responsibility in me.
- Coming up with ideas and experimenting with various neural network architectures has helped my problem-solving skills immensely. I learned a lot about deep learning through sheer determination to find a unique implementation for solving abnormal trajectory detection.

In conclusion, I am now very happy with the outcome of this journey, as I had the chance to learn from a field of study I would never have delved into myself, and I have no doubt that in the future I will find the opportunities explore my passion in game AI, and this newly acquired knowledge will then prove very valuable.