Teesside University

School of Computing, Engineering and Digital Technologies

MSc Artificial Intelligence

Advanced Practice

Reflective Report

Advanced Practice

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1. INTRODUCTION

I had a great opportunity to use all my academic abilities by becoming a member of the team. I was able to learn theoretic information through the university's module study sessions, which helped me to understand the subject. I had the opportunity to obtain real-world experience by working as an intern while being supervised by my professor for the topics linked to artificial intelligence because this module was a part of my Master of Science(MSc) programme.

I established the following learning goals at the beginning of the internship:

- To better comprehend how things operate and what it's like to work on the real world problems.

- To determine whether I might be interested in pursuing this kind of work in the future.

- To experience the setting of work in a professional environment.

- To implement my theoretical knowledge on solving the real time challenges.

- To learn how to set up a research project (preparation, planning, obtaining approvals, etc.)

- To identify the skills and knowledge I still need to function in the workplace.

- To learn about field methodologies for data analysis and research methods.

- To gain deeper understanding of image processing algorithms and models.

- To gain experience in research and data collection in an unfamiliar setting

- To establish a network with people who are having the similar interests.

- To enhance my communication skills and ability to convey with others.

Since the task assigned to us for our internship is to detect the cones which were placed on the racecourse and path needs to be detected for smooth driving of the car, all together we have divided individual tasks for working on a Formula Car Automation. During my internship, I was a member of a five-person team to familiarise myself with teamwork. Working daily with my team, supporting one another with their duties, and overcoming obstacles while achieving our own.

This internship report describes my efforts to meet several my stated goals. I'll go over my performance, unexpected events, and learning goals I achieved during the internship in the following chapter. Finally, based on my learning goals, I draw a conclusion about my internship experience.

2. OBJECTIVES

- To improve my social abilities in a work- or research-focused circumstances.

- To gain more knowledge of the ethics and professional standards that apply in both the work and the research environment.

- To increase my skills, knowledge, and experience to enhance my own unique approach to lifelong learning.

3. WORK PLAN

The specifics of each week's responsibilities are set up in this section.

3.1 Week 1:

I learned about the internship's requirements and evaluation within the first few days. My relationship with my academic advisor, Prof. Ala Al Kafri, had just begun. The assignments during the first week were created to broaden the intern's knowledge and comprehension of the ICA standards. One of the most crucial lessons we learned was about the obligations that come with job.

3.2 Week 2:

This week's activity was a team meeting where we discussed the project's scope and the study we had done on automation in formula cars. In addition to introducing us to the class, our academic supervisor stressed the value of our presence and our commitment to showing up every day.

3.3 Week 3&4:

Since we talked about the importance of industry standards and how they relate to my professional development, it was beneficial for me to attend the meeting this week. I learned a lot and developed my presentation skills under the leadership of my academic supervisor, and I also had a great learning experience.

Giving the intern a foundational understanding of their responsibilities and what they would be doing later was the goal of the first two weeks' tasks. We began working on our first progress review during the third and fourth weeks, which gave me the chance to get input from my academic supervisor about what I might do better and where I could put more of my attention. From our meeting, it was concluded to implement R-CNN algorithm.

3.4 Week 5:

This week, we successfully collected an image dataset and implemented the R-CNN algorithm. Unfortunately, the efficiency of algorithm was not satisfactory. So, we decided to implement other image algorithm and did our research. After a lot of effort, we selected faster R-CNN algorithm and decided to implement.

3.5 Week 6:

The sixth week's task was to implement the faster R-CNN algorithm. We successfully implemented the algorithm on the image dataset and the efficiency of algorithm was also satisfactory. In addition, we spent time improving our research techniques under my supervisor's guidance.

3.6 Week 7:

The seventh week's task was to implement the faster R-CNN algorithm on video dataset. We successfully wrote the code to detect the cone in a video dataset which was taken from real world racetrack simulation. The algorithm also able to detect the cones based on their colour.

3.7 Week 8&9:

On these week's, we worked on path detection of racetrack depending on the cones which were detected on the track. It was most difficult part of the project as cones were overlapping with each other, and model was not so efficient in detecting the overlapped cones. We again did some modifications in the algorithm and tried increase the model efficiency. We also progressed on the Progress review part 2 and our supervisor suggested some inputs achieve the target.

3.8 Week 10:

This week, we were successfully able to predict the path depending on the cones as scheduled in the last week. We showed our progress to the supervisor, and he was satisfied with our work. He asked us to prepare a research paper based on our approach to the problem.

3.9 Week 11:

We had a team meeting with our manager this week where we discussed our work, provided feedback on the reflective report, and were given a deadline reminder. In addition, a code walkthrough video must be included with the research report.

3.10 Week 12:

The completion of the internship overview report and receiving comments on my initial evaluation task were both scheduled for the 12th week. The weekly tasks, working together with teammates to figure out how to accomplish things we didn't know how to do and then solving them, was a fantastic and enjoyable experience.

Throughout this process, I've learned about a variety of image algorithms which can be used in solving the real world problems. Due to the internship, I became strong in Python programming, research methods and image algorithms like CNN, R-CNN, Faster R-CNN and YOLO.

4. CONTRIBUTION TO THE HOST ORGANIZATION

My contributions during my internship period are as follows:

4.1 Company growth:

Students like my own who take part in internships can gain the knowledge and tools required to support the achievement of a company. By participating in the Formula Car Automation project, we came with on optimised solution. Unlike most submitted solutions, we used faster R-CNN which is a cutting edge algorithm and computationally challenging one. Due to this, a unique attempt is made from our side and helped to standout when compared with other solutions. I was able to contribute to coding part of the algorithm by discussing the thoughts with my supervisor.

4.2 Network:

This internship was a fantastic chance to interact, connect, and commute, but it was also a fantastic chance because of the network. In other words, chatting with others who shared my viewpoints was helpful for both of us.

4.3 Subject matter expert:

I profited from my team members' assistance and shared my knowledge of the subject area with them. Because of everyone's involvement, the project was finished more swiftly and effectively. I was able to successfully extend my support for at least 12 weeks. I've been putting in about 20 hours a week on this project, with extra time on the ICA and during the holidays.

5. REFLECTION

My internship as an Artificial Intelligence student during my academic career has been one of the most rewarding and stimulating experiences I've had. I formed connections with my classmates, cooperating professors, and other staff members, all of whom contributed directly and indirectly to my development as an Artificial Intelligence engineer. During my internship period I learnt about Python programming, Image Processing algorithms like Convolutional Neural Networks(CNN), Region-Based Convolutional Neural Network(R-CNN), Faster R-CNN and YOLO along with the libraries like PyTorch. Learning the programming language and knowing the intuition behind the algorithms has given me the courage to take on any analytical work. which will eventually be one of my strongest qualities.

Thanks to the advancement of artificial intelligence, which I learned through this internship, it is now possible to use data that has been collected for decades but never used to make smart business decisions. For example, extracting a text from a video file is quite challenging for so many years. The main reason for this problem is due to noise and the quality of dataset. As there are many recent advancements in the field of image processing, many advanced algorithms are evolved. On the other side, quality datasets are also available. So, using these algorithms, text can be extracted from the video file with good efficiency and accuracy.

I am positive that this experience has helped me attain my goals because of the direction I received from my supervisor, as well as my teammates. Because of it, I shall keep growing both personally and professionally. The most valuable learning opportunities I've had this semester have come from my advanced practice internship is the ability to function under tight deadlines and effective communication skills.

I learned about the machine learning and intelligent decision support systems module during my last semester, and it has been helpful in taking my idea to the next level during the advanced practice programme. I gained a variety of theoretical, practical, and professional experiences from this programme. I had numerous opportunities to test out all the image algorithms and parameter optimisation strategies while working on the dataset from a real-world racetrack.

I now feel confident enough to investigate these opportunities for employment in further detail. The chance to collaborate with others and learn about and participate in a real-world work environment was a priceless opportunity. Through this course of study, a better understanding of the needs, challenges, and value of data in the real world was acquired. I now have the knowledge and abilities necessary to deal with any issue in my line of work thanks to this internship. During this internship, I've had to overcome challenges like managing a large workload and working in a team.

6. PERSONAL BENEFITS

I gained a lot of skills throughout the internship, and I will continue to learn things that will be helpful to me for the rest of my life. I gained knowledge in several practical areas, including time management, teamwork, deep learning, computer vision, image processing, and scheduling. I

developed the skills necessary to manage the assignments my team handed me over the course of these 12 weeks by considering both the most recent and updated image processing algorithms in addition to industry best practices. I improved my programming and analytical thinking skills as well as learned about the latest image processing algorithms and computer vision ideas. But the most valuable thing I gained from this 12-week internship was the ability to stay up to date with technological developments. I've gained a lot of practical experience in addition to academic understanding, which will greatly strengthen my CV.

During my internship, I significantly improved. The following are the key benefits of internships:

6.1 Career path:

had the chance to study more about the Deep Learning and Image Processing fields during my internship, with a focus on AI usage and safety. I learned a lot from this experience about the Artificial Intelligence industry and whether this is the right career route for me.

6.2 Technical Proficiency:

I had a great opportunity to advance my technical knowledge thanks to the internship. My ability to distil key information from image datasets and transform technical content, like datasets, choosing the correct model for better efficiency improved because of the internship.

6.3 Working Skills:

During my internship, I acquired the ability to modify the tone and style of technical writing. I got the chance to develop consistently because the supervisor looked through each of my progress reviews. This method really improved my writing and several other talents.

6.4 Communication Skills:

I had the chance to practice my presentation abilities during my internship. My supervisor's comments and the information's organized presentation helped me feel more confident. My confidence in public speaking, expressing my ideas clearly, and engaging in in-depth conversation with others has increased because of the presentation.

6.5 Networking and establishing references:

I was able to develop my networking abilities because of my internship. I've developed a network of contacts and references in the professional world that I hope will be useful to me in my future job. I succeeded.

6.6 Leadership Skills:

The internship programme gave me the chance to develop and put into practise key leadership abilities. Effective communication, problem solving, forming connections, time management, achieving deadlines, cultivating empathy for team members, and other skills are all part of it.

6.7 Professional values and behaviour:

It was my supervisor's pure motivation that enabled me to complete the internship effectively. Initially, internships were a problem for everyone in our batch. It was the first time for some of us to participate in an internship, but I am grateful to my supervisor for encouraging me to look on the bright side of things and pushing me to do my best. He helped me think more clearly and

gave me ideas whenever I had a problem at work. He also provided me with various materials that helped me understand the subject better.

As a professional, I am responsible for all my activities and have met or exceeded the expectations of the organization. Key principles have been established and adhered to as a priority in my life. As a result of this internship, I have acquired the following professional qualities and values.

- Taking the ownership
- Dedication & Consistency
- Ethics & Values
- Professionalism

7. PROBLEMS ENCOUNTERED & HOW THEY WERE OVERCAME.

Nevertheless, despite the fantastic professional experience I had throughout my internship, I did run across some issues, which is typical for internship program. For instance, I did find it difficult to figure out where I fit in the team with which I was paired up, to manage my time due to having too much work, to deal with my teammates' remarks, and to grow my abilities because I was too hesitant to ask any questions. But as time passed, I did adapt and resolve the issues. For instance, by being open and free to classmates and asking them what was required of me, I was able to overcome the issue of finding my place in the team. Spreading out the workload and scheduling team meetings in the university's advanced practice rooms helped to solve the problem of time management. I was also able to realize that the work I was putting in was beneficial by concentrating on my long-term professional goals, and as a result, I started to adjust to the stress at work. Finally, I learned to quit making assumptions, which helped me overcome the difficulty of not being able to handle the colleagues' comments. I started talking to my boss after every action, which helped me identify the flaws and errors I was committing while working on my project.

8. CONCLUSION

In the end, I thought this internship was worthwhile. I've gained new knowledge, developed my skills, and made new friends during this period. I succeeded in several of my learning objectives. I gained a lot of knowledge about business practices and ethical standards, great understanding of Computer Vision, industry standards, how to work in a team environment, how to lead a group, how to solve problems fast, and many other things were among the things I learned. My internship helped me to gain a better understanding of my abilities as well as my weaknesses. Made it apparent what, in terms of my skills and knowledge, I need to work on as soon as feasible. I think it was a good use of my time to spend the time learning about Computer Vision while I was working on it. There is still much for me to learn and develop, and I am thankful for the chance this internship provided to take the first step in achieving those goals.

9. REFERENCES

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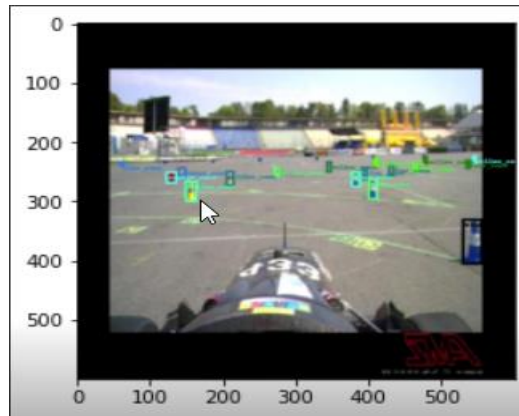https://neurohive.io/en/popular-networks/r-cnn/

10. APPENDICES

Figure 1. Cone detection

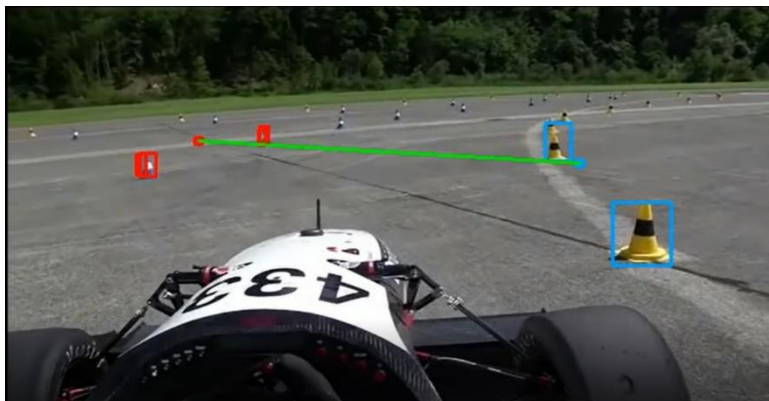*Figure 2. Cone detection on real world racetrack*

Figure 3. Cone detection depending on colour of the cone.

Figure 4. Predicting the path on racetrack