FIT3162 Project Management Report

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Project Title: Information-based associative analysis and deep learning for classifying time-series data

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1. Introduction

Nowadays, time series data is present everywhere including our daily lives and many fields of study such as healthcare, economics, transportation, meteorology and others. Therefore, it is important to be able to effectively analyze time series data to uncover any relationships and patterns in the data so that it can be used to obtain information of the future. In our project titled “Information-based associative analysis and deep learning for classifying time-series data”, we aim to develop an improved deep algorithm that is able to predict time series data accurately.

Our team consists of 3 individuals, each having different roles to ensure that every aspect of the project is thoroughly covered.

The first member of our team is Muhammad Abdullah Akif who is our project manager. His primary role is to ensure the planning and execution of the project. He distributes tasks that lead to the completion of the project, creates schedules and monitors the team’s progress to ensure they are on track with the timeline. He sets clear communication channels and organizes meetings to inform the team on the project’s development, updates and changes.

Liang Dizhen, our technical lead, specializes in software development and manages the technical aspects of the project. He does research to find opportunities where the software can be improved and optimized. He is responsible for deciding the software architecture and design as well as selecting the relevant technologies and methodologies to develop the software. He identifies the technical issues and performs troubleshooting to fix the problems.

Lastly, we have David Lee, responsible for quality assurance. He makes sure that the product meets all requirements and is of high quality to achieve customer satisfaction. He identifies weaknesses in the product and implements countermeasures to prevent defects. He checks and tests the product to ensure that it is error free. He finds areas in the product that can be improved and suggests enhancements.

We also have a team supervisor, Miss Ong Huey Fang. She acts as the project stakeholder, providing us with the project scopes and requirements, and gives us feedback on the project. She also guides us to come up with ideas and solutions for our work.

2. Project Management

a. Introduction

A project is “a temporary endeavor undertaken to create a unique product, service, or result.” (Project Management Institute, 2017) In the world of IT, projects are normally large and

complex, needing knowledge on various technologies, many resources and manpower. Teams that consist of people with different skill sets are formed temporarily to develop the project. With a project consisting of so many attributes, project management is important so that all these different aspects are managed and used effectively, leading to the success of the project.

Project Management is a critical discipline that involves planning, executing, and overseeing a project to achieve specific goals within the triple constraints: scope, time, and budget. It leads to having a systematic approach to manage time, cost, resources, risks, communication, quality and stakeholders, resulting in benefits such as more efficient project development, reduced costs and better product quality. Project management techniques and tools such as WBS and Gantt charts can be utilized to help teams manage their project.

b. Methodology

i. Selection and Explanation of Methodology

For our computer science project, we adopted the Agile methodology. (Agile Alliance, n.d.) Agile project management works by repeating the process of product development and incorporating changes requested by stakeholders in short sprints. The Agile approach is particularly beneficial in environments where project requirements are prone to change. This flexibility was crucial for our project, as our initial objectives shifted from an ARM architecture with Deep Neural Networks (DNN) to a focus on feature selection and possible improvement of existing machine learning. This pivot occurred after client feedback from an early sprint, which highlighted the need to adjust our deliverables to meet the minimum viable product requirements and enhance the likelihood of completing the entire project.

The decision to use an Agile approach was driven by several factors. One of them is that our team is small. Through the Agile approach, teams take responsibility for their work and make their own decisions on how to approach the project. Our team consists of only three members, allowing us to act quickly to make design decisions, solve issues that we face and make improvements without having constant permission from management.

Another reason that we use the Agile approach is due to the project being highly volatile. Our project is to explore ways to improve deep learning algorithms to predict more accurately. There is a high probability of changing requirements due to its exploratory and innovative aspects. Using the Agile approach, the project slowly builds towards completion in short iterations, making it suitable to make any changes even in the middle of the project.

With the constant involvement of the stakeholder, our project supervisor, the Agile approach is suitable as our project management method. With the constant meetings, the stakeholder is up to date with our progress and can give feedback or suggest changes to the project. We can then quickly apply these changes so that the project evolves in line with their expectations and feedback, ensuring the stakeholder’s satisfaction.

ii. Execution of Methodology

At the start of the Agile project, the project's scopes and requirements are clearly set so that the team and the stakeholder's expectations are in sync. Communication channels are set up as it is important for the team to have a way to convey ideas and issues and also to obtain feedback from the stakeholder.

Next, the Agile methodology was executed through a series of sprints. The activities of each sprint is planned beforehand to make sure that it complies to the project requirements, adheres to the stakeholder's feedback and contributes to the completion of the project. When executing a sprint, the team works together according to plan to advance on the project and also incorporate feedback and make necessary adjustments promptly.

After each sprint, a review session where a meeting with the stakeholder is conducted. We present our progress to the stakeholder, ensuring transparency and alignment with their vision. They review the results of the sprint and provide feedback on improvements. These feedback are noted down in a logbook so that they can be applied in the next sprint.

At the end of each sprint, we conduct retrospectives to reflect on our performance. We identify the parts that worked well and make sure to maintain that work at the next sprint. The challenges faced are also reflected upon so that changes can be made to improve the team's efficiency.

These activities demonstrate our adherence to the Agile methodology, as they embody its principles of collaboration, flexibility, and continuous improvement. By following this approach, we were able to navigate the project's uncertainties and adapt to new challenges effectively.

c. Project Resources

i. Time

The project timeline is meticulously planned, with specific milestones set for the completion of model training and evaluation, like completion of the basic benchmarking which data are recorded to compare with the performance of our model designed in future. This ensures that every phase of the project, from data preprocessing to model deployment, adheres to a strict schedule, allowing for timely adjustments and ensuring that the project remains on track.

A Gantt chart is created using an online gantt chart maker (TeamGantt, n.d.) to visualize our project schedule (see Figure 1 and Figure 2). Due to the usage of Agile approach, the

schedule is adjusted from time to time to adhere to any changes. It is also regularly updated to mark the completion of a task or sprint or milestone.

ii. Human Resources

Our team is our greatest asset, with each member bringing unique skills to the table. Some members are adept at data preprocessing, utilizing libraries like Pandas (McKinney, 2010) and NumPy (Harris et al., 2020) to clean and prepare the data. Others excel in model development, harnessing the power of PyTorch and Scikit-Learn (Pedregosa et al., 2011) to build and refine our predictive models. This division of labors allows for a more efficient workflow and leverages the strengths of each team member.

iii. Technical Resources

We have applied to use the lab's computing units for training sophisticated DNN models, which provides a robust environment for efficient training and evaluation. However, this application is still pending for approval, so we have decided to turn to Google Colab's free computing resources, which offer the necessary computational power without incurring additional costs. (Google, n.d.)

d. Risk Management

Below shows the risks that have been triggered and how they were handled.

Disability: One of our team members suffered from food poisoning, which significantly reduced their ability to participate actively in project development and client meetings. This unexpected event led to a communication gap within the team. To address this, we initiated a physical meeting with our supervisor, emphasizing the need for face-to-face communication to ensure that all team members were aligned and informed about the project status.

Harmony within Team: The situation of the team has been reported to the university coordinator to keep them informed of our team's circumstances. This was a proactive measure to ensure transparency and to seek any potential support or guidance from the university.

Technical Issues and Resource Shortage: The long approval procedure for acquiring additional computation units posed a risk to our project timeline. The risk was monitored by maintaining regular communication with the relevant staffs and exploring alternative computational resources, such as cloud services, to prevent further delays. To mitigate this effect, we reassessed our resource allocation and adjusted our project timeline to accommodate the delays.

Workforce Shortage: The unavailability of one team member due to illness resulted in a workforce shortage. We addressed this by redistributing the workload among the remaining team members and adjusting our project management approach to maintain productivity.

Late Deliverables: Other work commitments also contributed to late deliverables. We managed this risk by prioritizing tasks and focusing on meeting the minimum viable product requirements within the adjusted timeline.

e. Limitations

i. Technical Limitations

Computation Unit Shortage: A significant limitation was the shortage of computation units, which hindered our ability to train models efficiently. This was partly due to the lengthy approval processes for resource allocation within the university.

Dependency on External Resources: Our reliance on external resources like Google Colab introduced a degree of uncertainty, as these platforms can have their own downtimes or limitations of resources that are beyond our control.

ii. Non-Technical Limitations

Team Member's Health Issues: The unexpected food poisoning of a team member was a setback, leading to reduced manpower and a temporary communication breakdown within the team.

Coordination with the Client: The processes and procedures required to report issues and acquire additional resources were sometimes slow, which affected our project timeline. No preparations were scheduled to deal with this coordination issue.

Balancing Academic and Project Commitments: Team members had to juggle between academic responsibilities and project tasks, which at times led to prioritization challenges and delayed deliverables.

iii. Discussion

These limitations highlighted the importance of flexibility and adaptability in project management. The technical issues underscored the need for a more robust contingency plan for resources, while the non-technical challenges emphasized the value of clear communication and well-being within the team. To address these issues, we implemented

more frequent team check-ins and sought to diversify our resource pool to mitigate the impact of similar limitations in the future. Moreover, we learned the importance of proactive communication with university departments to expedite processes and ensure that project needs are met in a timely manner.

Overall, while these limitations posed challenges, they also provided valuable lessons that will enhance our project management skills and preparedness for future projects.

f. Reflection Assessment

In this reflective assessment, we analyze the strengths and weaknesses of our project management.

i. Strengths

Effective planning: We spent time discussing with the stakeholder to define the project scopes and requirements. We made an effort to conduct research on the project topic to understand more about associative analysis and deep learning on time series data and to have ideas on how to develop our project. We also made a good estimation of time and resources needed for each sprint, allowing us to finish the sprints on time. Developing a schedule is crucial as we are able to visualize the sequences of tasks to do and their deadlines, helping us to know our priorities and allocate ample time to finish our tasks.

Stakeholder interaction: Stakeholders are a very important part of the project as its success lies in the satisfaction of the stakeholders. By constantly having them involved in the project by informing them on the progress of the project and providing feedback, we are able to improve our product so that it is of high quality and meet their requirements.

Adaptability to changes: As stated above that the project has an exploration nature and is prone to changes, our team did well by using the Agile methodology. Due to breaking down the project development into smaller sprints, we can easily adapt to changes at each sprint. Our team is also very flexible, able to accept new ideas and adjust our plans and schedules according to the feedback obtained and challenges faced.

ii. Weaknesses

Incomplete risk management: We were way too positive and failed to identify some potential risks as well as come up with contingency plans to negate these risks. We did not anticipate that a team member would be unavailable and had to make up his work in a rush. We also did not expect to take so long to gain access to the technology needed for our

project. The lack of response to these risks caused delays in our schedule and reallocation of our resources.

Poor communication: The communication within team members needed improvement, as we had difficulty finding a common time to have physical meetings, most of them were conducted online. However, due to network issues and poor devices, the discussions are not very effective, leading to misunderstandings. Team members are also slow to update the team on progress they have made, causing delays.

iii. Improvement

In the future, we will improve team communication. We can have a feedback mechanism to gain insights from different team members on our work done. This also encourages the team to communicate more, thus increasing the bond between team members. We will have more regular physical meetings so that we can convey information more effectively, preventing miscommunication.

Having gained experience from the current project, we will also strengthen our risk management. We will cover all aspects of the project to identify any potential risks. We will prepare countermeasures for each of these risks so that they will not affect the success of our project.

3. Conclusion

Due to the exploration nature of our project, our team applied the Agile team management methodology so that we will be able to adapt to changes. We plan and execute our project in small sprints, each building up to the completion of the project. We regularly update the stakeholder on the team progress and obtain feedback to improve our product.

In conclusion, project management is a crucial part that determines the project's outcome. By having a systematic approach to the many aspects of a project such as resources, risks, communication and stakeholder, the project can be completed successfully within the desired scope, budget and time. With an effective team management approach, a project will surely be bound for success.

4. References

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5. Appendix

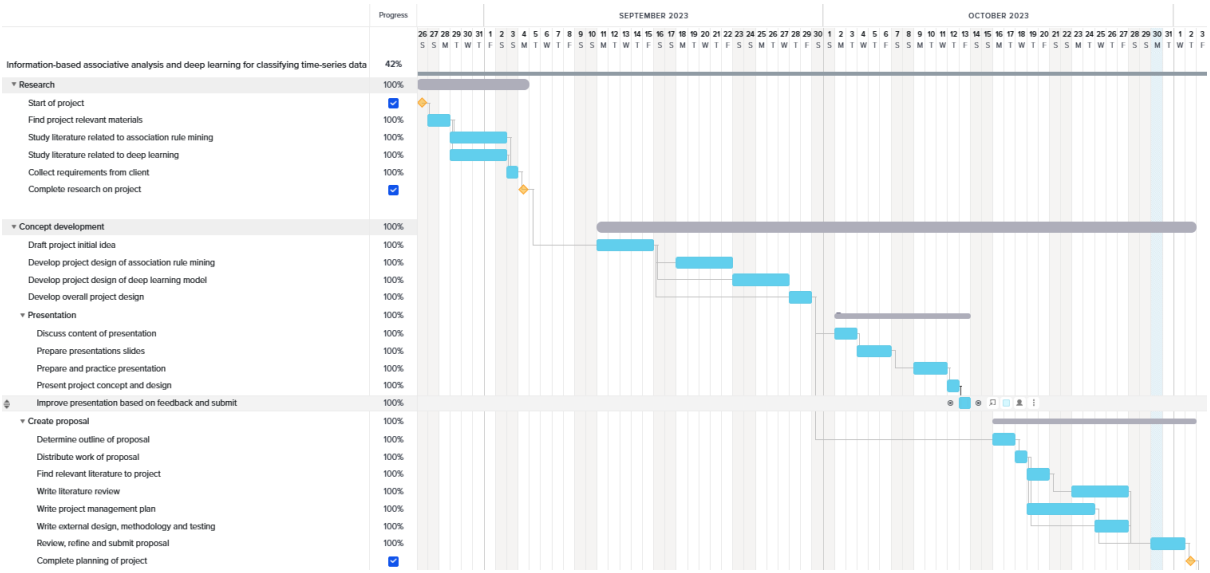

Figure 1: Gantt chart depicting first half of project schedule

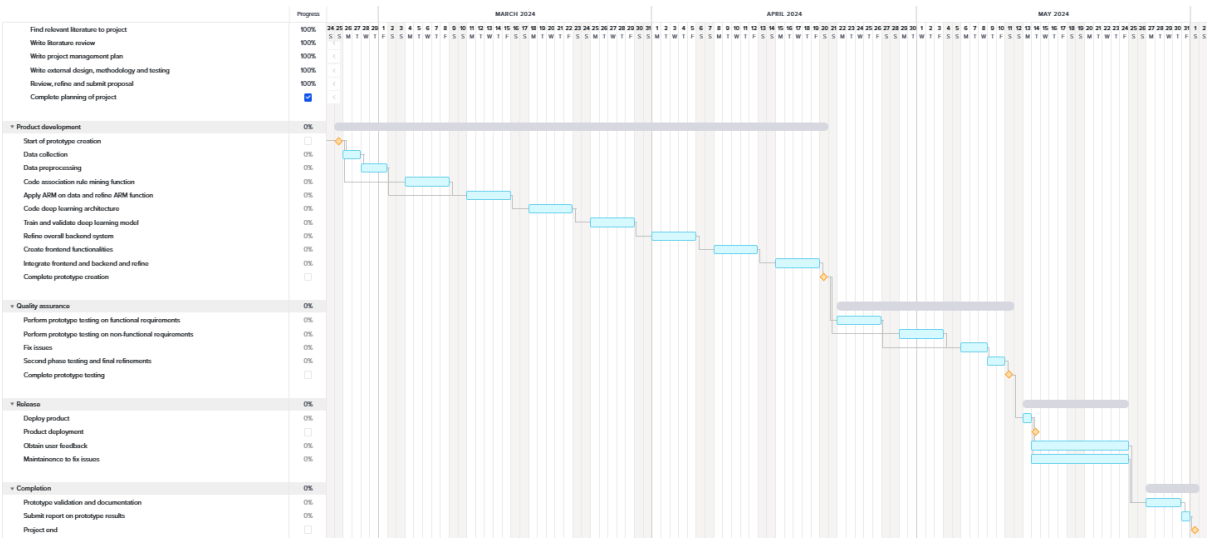

Figure 2: Gantt chart depicting second half of project schedule