FIT3164 - Data Science Software Project

Project Management Report

Workshop: Thursday, 2pm - 4pm

Group: FIT3163_CL_04

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Word Count: 2170 words

1.2. Table of Contents

2. Introduction

Our group project aims to develop a successful predictive model that predicts the risk of patients contracting gastrointestinal cancer utilizing image processing techniques. These techniques involve using Convolutional Neural Network (CNN) as part of transfer learning to differentiate between Microsatellite Stable (MSS) versus Microsatellite Instable - Highly Mutated (MSIMUT) cells provided in each image. As our product's target audiences are health institutions, the finalized predictive model would be integrated into a website hosted on a designated online platform, where patients can obtain their probability of contracting gastrointestinal cancer.

This means that our project deliverables span over two major parts - finalized predictive model and the website. Our minimum viable product (MVP) for the predictive model includes a model developed using resnet18 with a minimum accuracy of 60%. As for the website, the MVP includes basic functionalities such as uploading images and the output of their cancer predictive risk. The specifications needed for the website MVP do not include any database implementation.

Our team consists of 3 members, Jack Ooi, Vionnie Tan, and Elaine. Each of us has our own task delegation assigned. A high-level description of task allocation can be found in Appendix A.

This report will therefore explain how the project management of our software development activities is handled. Also included in this report are the project management methodology used, resources used in the execution, management, and planning of the project, risk management, limitations, as well as a reflection of the success of our project management.

3. Project Management

3.1. Introduction

Effective project management remains a vital part of ensuring a project's success. As previously mentioned in our project proposal, our team has implemented Agile Methodology as part of our project management. Agile Methodology focuses on the flexibility of project scopes and adapting towards continuous changes throughout the project and is often described as an iterative approach as opposed to traditional project management methodologies that take into account the rigorous importance of initial planning and an unchanging scope (Serrador & Pinto, 2015). Agile's focus on individuals and interactions over processes, customer collaboration over contracts or formal negotiations, as well as responsiveness over rigid planning matches with the team environment provided to us which as a result, can greatly contribute to increased success within projects (Serrador & Pinto, 2015).

3.2. Project Management Methodology

3.2.1. Methodology Selection/Development

Our team chose Agile Methodology due to its collaborative nature and ease of adaptability in cases where changes are needed. Agile Methodology allows us to deliver maximum value against priorities in the time and budget allowed. Moreover, the lack of constraints regarding the budget for materials solidifies our choice for choosing Agile Methodology. Agile's collaborative nature allows us to adapt to necessary changes, in terms of both technical and non-technical difficulties experienced by us. The weekly team meetings both with our supervisor and without gives us feedback that points the direction of the team in the right direction.

Our team also ultimately decided to use Kanban instead of Scrum due to our small team size, which makes collaboration and communication extremely easy. Kanban's ease of visualization produces continuous improvement, flow, and delivery that allows for increased productivity for us as a team. In addition to this, Kanban does not require us to specify roles for each team member which is extremely beneficial in case any of us feels overwhelmed or is unable to meet with task delegations.

3.2.2. Execution

To manage a clear workflow of tasks, our team utilizes Kanban boards from Trello. The Kanban board is divided into columns like To Do, In Progress, as well as Done, where they are further subdivided into 3 different sections such as Website, Predictive Model, and Others. Each task is assigned to different members of the group and becomes their responsibility. The list of all tasks is initially placed in the To-Do section, then moved to the In Progress section once the task is started, and lastly placed in the Done section when the task is completed by the owner of each particular task. Using Kanban Boards as mediums of visualization leads to increased productivity and efficiency once it is filled up. There is also less confusion between tasks that were given compared to when the Kanban board was not implemented in the group.

The specific activities that we undertake are that we are responding to changes by following a structured plan and collaboration working with customers. By using Agile Methodology, we established a minimum viable product (MVP), in our case, a >60% accuracy of working predictive model and a working website with predictive model integrated. By establishing MVP, not only can it satisfy the needs of the early requirement but also provide something to provide feedback and improve. Furthermore, after an MVP is established, an iteration of the plan, do check, and adjust is created. After every iteration, customer feedback is obtained and then the product is then improvised to necessary changes based on the feedback. In our case, our weekly meeting with our supervisor.

3.3. Project Resources
3.3.1. Resource Allocation

To ensure increased efficiency within our team, it is, therefore, necessary to allocate resources to maintain high standards of code and quality of work in our project. As mentioned in our project proposal, preliminary learning of image processing techniques could take up to 200 hours. However, in practicality, we needed to delegate more time (~ 300 - 350 hours) due to our unfamiliarity with not only the theoretical but also the coding aspect needed to build the predictive model.

Time remains a valuable asset to our project's success. Our team has dedicated specific meeting hours to catch up on each of our progress. To increase the chances of our project's successful completion, it was necessary to adapt to differentiating situations faced within each week. On a general scale, each of us has delegated a minimum of 20 hours into coding and management of the project each week.

As our team size consists of only three members, it is extremely important to communicate and keep up-to-date with recurring changes and adaptations. Our team has delegated meeting hours every week (minimum of 30 mins per meeting) to discuss our progress and raise questions in cases where issues are found. Our allocated schedule allows us to meet with our supervisor every week, and it is of utmost importance that we all attend the class to discuss improvements to be made with our model.

In terms of technical resources, our team had made slight changes to what was previously mentioned in the proposal. For example, we hadn't specified which application we were using to implement our predictive model. At first, we decided on PyCharm, but upon execution, we found that VS Code was a better match for our team. These decisions have taken up to 80 hours of discussion as we had to conduct a minor execution at each resource to see whether it would suit our project environment or whether we have to further search for alternatives.

3.3.2. Software Tools

Tools remain a vital aspect in ensuring clear visualization of task delegation and we have implemented several of these tools in our project management. Firstly, we used a Trello Board to organize our workload and due dates. It allowed us to organize our projects into boards and inform our team who is working on what and what is being worked on. Our current Trello Board is included in this document (see Appendix C). In addition, we also used Github as our version control system. Due to the current Covid-19 pandemic, members of our team are not able to meet face to face so a reliable Version control system is required. GitHub allowed us to always keep track of current code progress and it virtually kept our data safe and accessible between us.

3.4. Risk management

As shown in the risk register (see Appendix B), a few risks have been triggered. For example, the risk of slow decision-making was triggered due to the team's indecisiveness resulting in team members' unsuccessful understanding of given tasks. This risk has now been resolved after conducting internal meetings with the team members to gain clarity of the project objectives and requirements, as well as by having a clearer task delegation in individual tasks for each team member using cards present in our Kanban Board.

Secondly, risk such as incomplete project design and deliverable definition was triggered as well due to our unfamiliarity with WordPress software. This risk has been resolved after switching our software from WordPress to raw CSS, HTML, and Python framework called Flask.

Furthermore, the risk of having low accuracy on the predictive model has also been triggered. The predictive model initially developed had an accuracy of around 25%. After training and testing with various batch sizes and epochs, our predictive model now has an accuracy of around 50-60%. This risk is now still active since we aim to have an accuracy greater than 60% for our MVP. To resolve this risk, our group might try to use other CNN frameworks such as AlexNet and DenseNet for our predictive model or try training and testing with different alterations of batch size, epoch numbers, scheduler, and pre-processing methods.

3.5. Limitations

There are several limitations encountered during project management. Firstly, there are time limitations in our team that we are not able to meet with our mentors all together frequently enough (once per week), sometimes we do not have enough time to get extensive feedback from our mentors regarding our project methodologies, and feedback about our current frameworks implemented in code. Despite having learned about project management methodologies, it was hard to implement in practicality - preferring to go about with our understanding of project management. In addition, since all of our team members have their priorities and commitments, setting up more meetings in another time slot is nearly impossible for us, which also means that we have to trust each other with the workload given to us before each week.

Moreover, our team did not allocate tasks to be done in Semester 2 during the transition from Semester 1 which led to poor task allocation of each team member causing some delays in our progress in the first few weeks of the semester. This was due to our team not having a clear understanding of what was expected of us from this project, and a lack of a personal initiative to start with the project. We also could not fill up our Kanban board at an early stage and had only a low-level description of each task.

3.6. Reflection

Overall, despite the bottlenecks experienced, our group's project management has been successful. Throughout the project, our team was able to quickly adapt to the changes in requirements when they are needed. The implementation of the Kanban board also contributed to the success of our project management as its visualization of tasks helped the team to be more productive and work more efficiently. Every team member can see the progress of each task and spot bottlenecks easily if any is forming.

However, task allocation is something that could have been done differently especially since it caused a setback for our team earlier in the semester. This was a problem for us as the tasks were not properly delegated to each team member at the beginning of the semester causing none of the team members to have any confidence in what needs to be done to make valuable progress. In the early stages of the project, it was difficult to note the differences between implementing Agile Methodology as opposed to conventional project management skills. This led to us only having a clearer understanding of Agile's expectations of us across the later stages of the project. If given the opportunity to redo, it would've been viable to conduct more extensive research, and implement Agile to its fullest extent.

4. Conclusion

To sum up, our team has chosen an Agile Project Management approach for our project and it helps us in a way that operates in a rapid cycle and actively uses feedback from customers to adapt to changing requirements. We have also decided to use Kanban instead of Scrum due to our small team size and its ease of visualization.

To execute the chosen project management methodology, we used software tools such as Trello to implement a Kanban board and GitHub as a version control system for project management and established a minimum viable product to adapt to changing requirements. This report has also mentioned the time, human and technical resources each member has delegated with regards to the project.

Risk is inevitable in every project and as a result, some risks have been triggered while executing our project. It includes slow decision making, incomplete project design, and deliverable definition, and having low accuracy on the predictive model. Risk management played an important role in our project to properly handle the triggered risks mentioned.

This report also briefly mentions the limitations faced by our team during project management. This includes time limitations and poor task allocation that hinders our team to progress as quickly as expected. In addition, we have also provided our reflections on our overall progress and successes such as how progress could be improved if better task allocation had been done.

5. References

Serrador, P., & Pinto J. K. (2015). Does Agile Work? - A quantitative analysis of agile project success. *International Journal of Project Management, 33*(5)*,* 1040-1051. https://www.sciencedirect.com/science/article/pii/S0263786315000071

6. Appendix

Appendix A
Task Allocation

Member	Tasks
Elaine	Predictive Model: ● Split dataset ● Training & testing ● Integration to Website
Jack	Website: ● Backend of Website (Flask) ● Frontend of Website (HTML/CSS) ● Database System of Website (SQLAlchemy) ● User authentication system
Vionnie	Predictive Model: ● Data augmentation & normalization ● Data Visualization ● Training & testing ● Inference Notebook - Confusion Matrix, Plot Graphs, Final Accuracy

Risk Register

Risk Register

| No.	Rank	Risk	Description	Category	Triggers	Root Cause	Potential Responses	Risk Owner	Probability	Impact	Status
1	6	Losing team members	Team members leaving the team	People risk	A team member decides to leave the team	Team member's personal issue	Consult project manager, redefine task responsibilities for each remaining team member	Team	5%	High	Potential
2	9	Team members unable to contribute	Team member not able to complete their task responsibilities	People risk	A team member encounters some issues that affects their work	Team member's personal issue	Consult project manager	Team	10%	Medium	Potential
3	8	Slow decision making / Project Conflicts	Indecisive and not prioritising the success of the project rather for personal gains.	Management risk	Clash within personal interests of team members and unsuccessful understanding of given tasks.	Lack of open-mindedness and clarity within team members	Conduct internal meetings with team members and settle on a middle ground.	Team	15%	Medium	Resolved

			Unclear of project objectives and requirements.							
4	4	Delay in completion of earlier phases of project increasing failure of project completion	Not enough time to meet the schedule target to complete the project	Resource risk/ Schedule Risk	Team member does not deliver task responsibilities on time	Time estimated for a certain task is not enough	Revise schedule estimates	Team	20%	Medium	Potential
5	1	Predictive model has a low accuracy	The predictive model developed produces wrong outputs most of the time	Technical risk / Performance Risk	When users inputs a medical image to the predictive model	Predictive model not properly developed	Reidentify important predictors for the model, do more research on algorithms used in developing predictive model	Team	30%	High	Active
6	5	Losing source code	Source code is deleted and unable to be recovered	Technical risk	Source code accidentally deleted	Improper storage of project source code	Use GitHub for backup to minimise the risk	Team	5%	High	Potential
7	7	Website downtime	The platform that we decide to host our	Operational Risk	Could be caused by massive traffic or overall	Not choosing a good platform to host the website	Researching on pros and cons of several website hosting	Team	10%	Medium	Potential

			website in is unreliable and can't handle major traffics		unreliability		platforms and choose the platform with the least risk				
8	10	Slow Stakeholder Actions that delays overall project completion	Poor communication with stakeholders and lack of verbal support from stakeholders		Attempting to have Communicative Measures with stakeholders but stakeholders remain unresponsive	Stakeholders are difficult to get hold of	Conduct regulatory meetings and emails to stakeholders. Have a stakeholder communication plan and update it accordingly. Make sure stakeholders are updated through every changes in the project	Team	5%	Low	Unlikely
9	11	Scope Creep	Addition of unnecessary extra functionality not originally stated in the project scope	Scope Risk	Wanting to add new functionalities to enhance user experience but not addressing triple constraints of project	Excessive ideas given by team members	Clearly and succinctly state the requirements and scope in the project proposal. Update business case in case of changes	Project Manager / Team Members	5%	Low	Unlikely
10	12	Incomplete project design and deliverable definition	Not following preliminary designs created and risking to create a whole	Technical Risk	Unclear preliminary designs that may not align with project scopes and	Failure in understanding the given project and what is deemed an appropriate design	Create a preliminary design of the website, and build on it accordingly at each phase of the project.	Team	5%	Low	Resolved

			new environment that may have different deliverables		definitions	and deliverable.					
11	2	Software does not fulfill customer requirements	Customers are collectively unable to obtain, view, save their results due to difficulty in accessing the user interface of the website	Software Risk	Customers may not be inclined to use the website for their purposes due to it being obsolete and not user-friendly	When customers are not satisfied with the product	Ensure that a substantial amount of testing is done on the website		15%	High	Potential
12	3	Lack of coding capabilities leading to failure of the whole project	Lack of self-awareness in coding capabilities may result in our team abandoning the whole project	Technical risk	Lack of desire to understand the resources required to build the predictive model and website.	Lack of self-awareness on coding skills that may be exaggerated in order to	Being honest with current coding capabilities, and attending extra workshops/consultations both from Monash and online resources to ensure basic foundational knowledge.	Personal	15%	High	Potential

Appendix C

Kanban Board
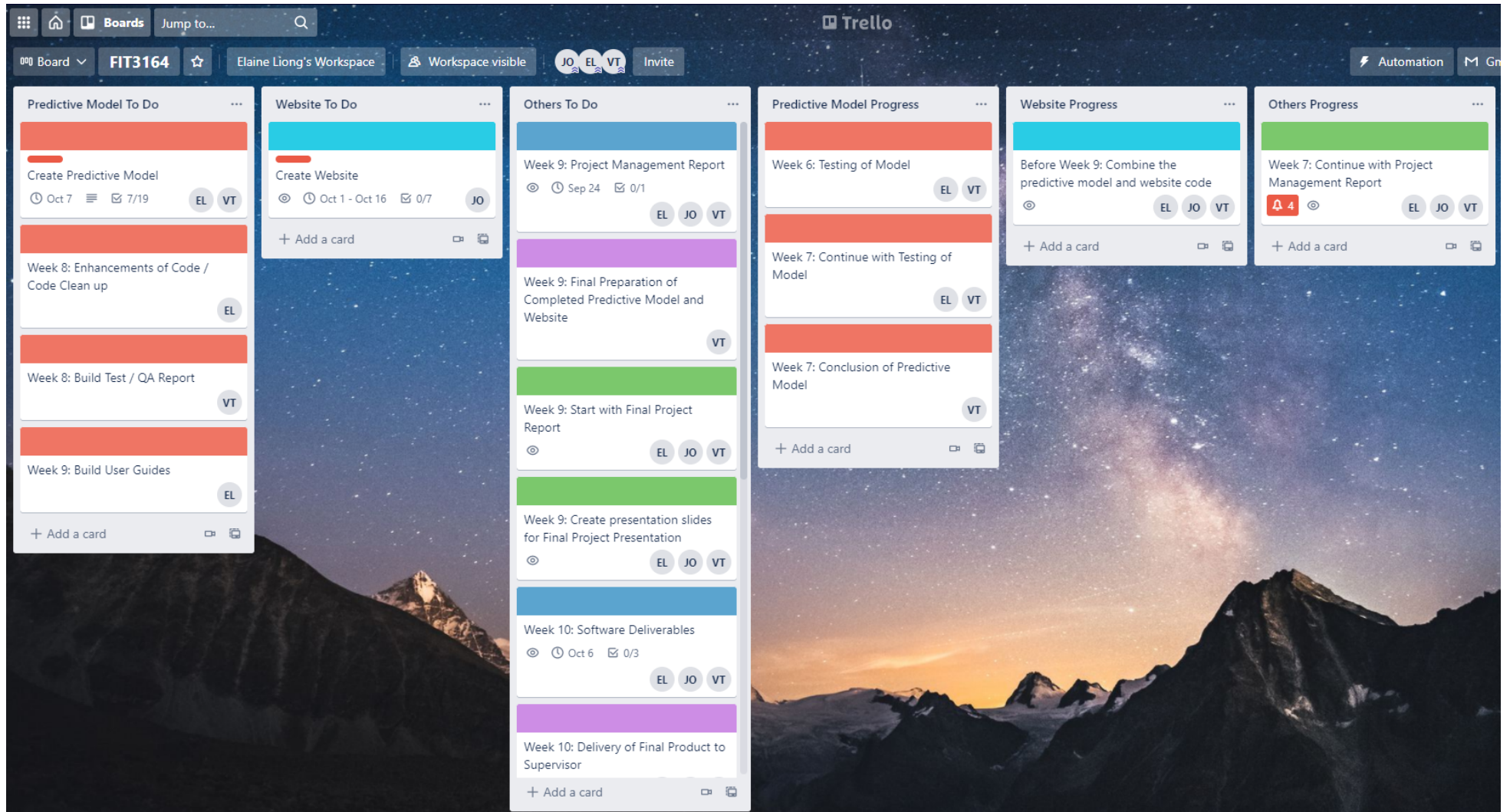
Create

JO EL VT Invite

Automation

Gmail by Cardbox

Show menu

Done

Week 6: Begin with Project Management Report

🔔 6 👁 EL JO VT

Week 7: Do more extra website functionality

🔔 1 👁 JO

Create more additional pages for the websites

👁 JO

Week 6: Interim Presentation

🔔 5 👁 🕐 Sep 1 ▤ ☑ 0/2

EL JO VT

Week 5: Record presentation video

🔔 7 👁 🕐 Aug 28

EL JO VT

Week 4: Finish creating presentation slides

🔔 7 👁 🕐 Aug 27 ☑ 0/7

+ Add a card

Project Resources

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Product-Related Deliverables

Software Code

Research Report

Website

Website Design Document

Website Software Code

Demo
🕐 Oct 7

User Guides
🕐 Oct 7

Test/QA Report
🕐 Oct 7

Final Project Report

Final Project Presentation

+ Add a card

Project Management-Related Project Deliverables

Business Case
🕐 Apr 16

Weighted Scoring Model
🕐 Apr 16

Scope Statement
🕐 Apr 16

Requirements Traceability Matrix
🕐 Apr 16

Risk Register
🕐 Apr 16

Final Project Presentation
🕐 May 28

Final Project Report
🕐 May 28

+ Add a card

+ Add another list

7. Annex

Team Member's Contributions	
Team Members	Contributions (Sections)
Elaine Liong	1. Project Management Methodology - Execution 2. Risk Management 3. Limitations 4. Reflection 5. Conclusion
Jack Ooi	1. Project Management Methodology - Execution 2. Software tools 3. Risk Management 4. Limitations 5. Conclusion
Vionnie Tan	1. Introduction 2. Project Management Introduction 3. Project Management Methodology - Selection / Development 4. Resource Allocation