

G5

PROJECT DOCUMENTATION



Project Plan

Aerial Imagery Initiative

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Introduction

The Project

The NSW Spatial Services division of the DCS collects aerial and LiDAR images of the NSW landscape and is responsible for providing reliable spatial information to NSW Emergency Service Organisations. In order to better facilitate rapid responses and recovery efforts to emergency events such as bushfires and floods, this project aims to develop a machine learning platform that will analyse aerial and LiDAR imagery to detect areas affected by natural disasters.

The objective of the students is to develop a service, alongside DCS/Spatial Services and Intellify, that is able to analyse LiDAR and aerial imagery and detect specific features using Machine Learning (ML). Initially the project will aim to focus on detecting features specific to those left after a flood or fire. The identification of these features will identify areas in need of assessment and resources. This information can be passed on to SES, RFS and other services that require on the ground information and mapping of affected areas.

The project is to be completed and incorporated by the end of 2021. Students will work alongside DCS/Spatial Services and Intellify to produce a final product with a budget of \$50,000. The project will be developed in Amazon Web Services (AWS), utilising the Unified Process Framework. As students will be developing, using potentially costly AWS cloud computing services, they are required to pass the AWS Certified Cloud Practitioner Exam.

The Project Plan

This Project Plan will outline, in some detail, the plan, current skill set, practices and organizational structure that our team intends to use, to fulfill the requirements of our project. Additionally, we will explore the techniques used to plan, develop and implement the various iterative components, assessing risk, with a strong focus on our key deliverables. The Project Plan will also serve as a tool to analyse budget and expenditures, as well as track progress and plan & manage the team's schedule, through each iteration.

We will use these tools to structure our approach to planning and executing the ongoing development of documentation and works in Amazon Web Services.

Project Organization

Team Introduction

Our individual roles and responsibilities throughout this project, are initially outlined during our [Team Charter](#) (as available on Group 5's [Team Wiki](#)). In summary, our team consists of the following:

- ❖ Adam Blewitt - Our primary Wiki Editor and secondary Git Advisor, working as a Systems Integration Specialist, with a wide range of expertise, ranging from data management, computer networking and programming.
- ❖ Cameron Nyberg - Our primary Git Advisor, employing various levels of git and programming knowledge, to guide our workflow.
- ❖ Darren Sheehan - Our secondary Wiki Editor and vetted programming & project managing member, with over 9 years of experience in the corporate IT environment.
- ❖ Andrew Smith - Our secondary Style Advisor, with tested experience in programming and databasing as well as a budding interest in machine learning, through his exploration and work with artificial neural networks.
- ❖ Patrick Funnell - Our primary Style Advisor with seasoned experience in technical consulting, management, programming and problem solving.

Our communication channel for both text and voice will be Discord, throughout the duration of this project. A link to our push communication method can be found on our [Team Wiki](#).

Team Prerequisites

In order for our team to embark, down the path to completing our Spatial Services project, we must all complete our [Foundational Pearson VUE AWS Certification](#).

Project Brief

An outline, including some background on the project can be found via our [Project Proposal](#).

The goal for the project is for students to develop a system, by which LiDAR and aerial imagery can be analysed via a Machine Learning model to produce an identified affected flood area, to assist emergency services in identifying ground areas most in need of help, in the case of floods. Ideally, the project will then include the ability to identify fire affected areas, however this is not the primary goal at this stage and may be out of scope for this project.

There are 3 primary stakeholders at play here: the DCS/NSW Spatial Services, Intellify and the CSU Students, or the 'Students'. The DCS aims to be provided with a system at the end that is usable and appropriate for real world application. Intellify aims to assist the Students in developing a system that can fulfil the requirements, set forth by the DCS, through the passing of technical knowledge of AWS and other areas such as OpenCV and machine learning. Lastly, the Students aim to fulfil all requirements and produce a final product that has real world applications and provides a number of learning outcomes, towards understanding the Unified Process Framework and cloud compute solutions, including Machine Learning algorithms.

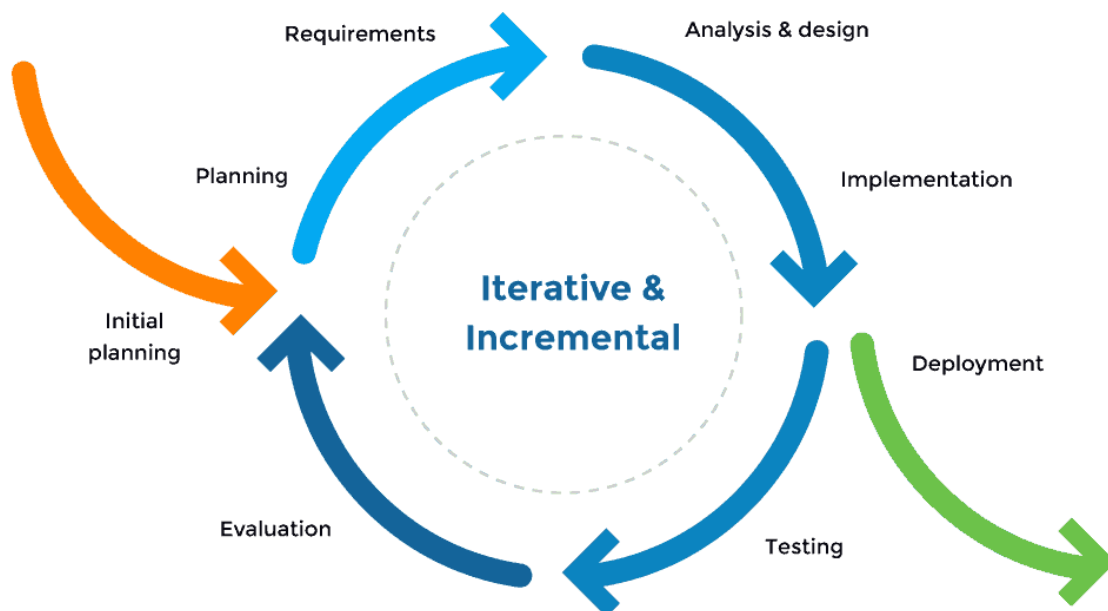
Project Status Reports (PSR's) are completed monthly by the Students, allowing for the demonstrable ability of the Students to critically analyse the project progress, as well as any identified risks and issues. Furthermore, Students will use the PSR reports to assess the status of the project, examining the schedule, scope of the project, resource usage, ongoing communication with other stakeholders and overall status of the project. The PSR (project status reports), allow the Students to encapsulate and report on incremental, monthly updates for the project, in all aspects.

The primary goal is for all of the technical aspects of the project to be implemented by the end of 2021. The Students are able to communicate with the DCS, as well as Intellify through the Slack and Teams platforms, with groups and associated links provided from each party. There are weekly meetings on Fridays held with the DCS, Intellify and the Students, in which technical components and goals can be analysed and constructed.

Project Practices & Measurements

Development Practices

Our project will use the iterative & incremental development process, wherein high level requirements can be realised, prioritised, planned, tested & implemented. This process will enable us to separate functional components and create necessary iterative changes, to ensure a satisfactory end product.



Our objective is to identify individual components of the project and devise an implementation approach that solves key problems, such as building a Machine Learning Model and efficiently processing large images, independently.

Our approach to planning can be discrete and realistic targets and goals for individual features of the project can be tracked, developed and reviewed. Our review process will require that another engineer (separate from those that are writing and submitting a code change), review and approve code for deployment.

Tracking Progress

During our iteration planning phase, features and functional objectives for our use cases can be identified, planned and delegated to a team member (or team members).

As part of our planning, we will set goals for when our functional objectives will be implemented, as well as smaller milestones, that will assist in tracking progress and identifying any potential help areas, to assist in keeping the iteration on track.

These milestones will enable our team to gauge whether we are falling behind, or require assistance and will also enable the team to report status to any stakeholders, if required.

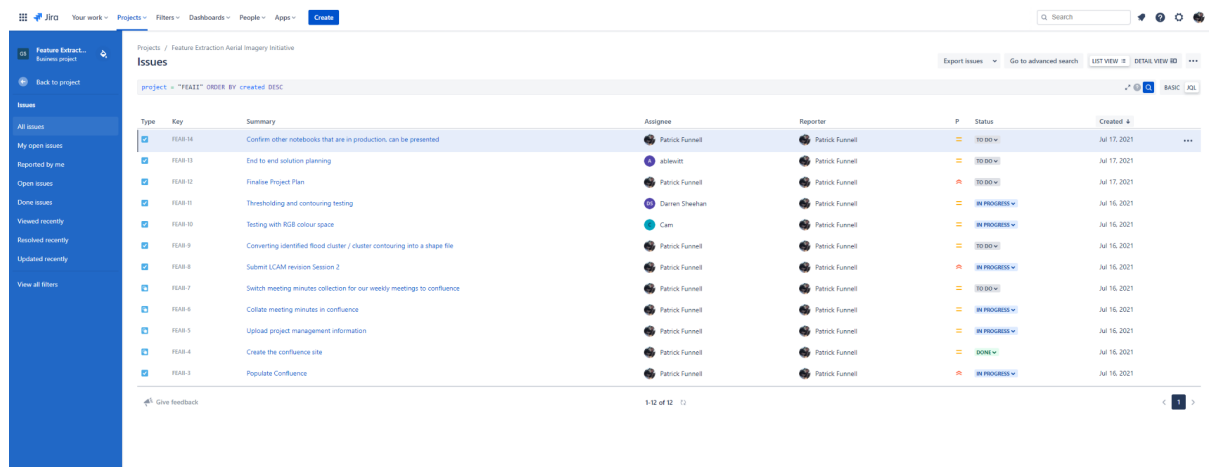
Progress is tracked through Jira. Jira is a software bug / project management tool used for tracking tasks and issues.

For access, discuss with the team.

[Feature Extraction Aerial Imagery Initiative - Jira \(atlassian.net\)](#)

Various elements from Jira are displayed in confluence (a documentation platform made by the same company as Jira)

Jira (lightly populated, more items have been added since).



Type	Key	Summary	Assignee	Reporter	P	Status	Created
Task	FEAB-14	Confirm other notebooks that are in production, can be presented	Patrick Funnell	Patrick Funnell	To Do	To Do	Jul 17, 2021
Task	FEAB-13	End to end solution planning	ablewett	Patrick Funnell	To Do	To Do	Jul 17, 2021
Task	FEAB-12	Finalise Project Plan	Patrick Funnell	Patrick Funnell	To Do	To Do	Jul 17, 2021
Task	FEAB-11	Thresholding and contouring testing	Darren Sheehan	Patrick Funnell	In Progress	In Progress	Jul 16, 2021
Task	FEAB-10	Testing with RGB colour space	Cam	Patrick Funnell	In Progress	In Progress	Jul 16, 2021
Task	FEAB-9	Converting identified flood cluster / cluster contouring into a shape file	Patrick Funnell	Patrick Funnell	To Do	To Do	Jul 16, 2021
Task	FEAB-8	Submit LCAM revision Session 2	Patrick Funnell	Patrick Funnell	In Progress	In Progress	Jul 16, 2021
Task	FEAB-7	Switch meeting minutes collection for our weekly meetings to confluence	Patrick Funnell	Patrick Funnell	To Do	To Do	Jul 16, 2021
Task	FEAB-6	Collate meeting minutes in confluence	Patrick Funnell	Patrick Funnell	In Progress	In Progress	Jul 16, 2021
Task	FEAB-5	Upload project management information	Patrick Funnell	Patrick Funnell	In Progress	In Progress	Jul 16, 2021
Task	FEAB-4	Create the confluence site	Patrick Funnell	Patrick Funnell	Done	Done	Jul 16, 2021
Task	FEAB-3	Populate Confluence	Patrick Funnell	Patrick Funnell	In Progress	In Progress	Jul 16, 2021

Confluence (home page).

Feature Extraction, Aerial Imagery Initiative

Project Resources

- Project Resources | Development-Team
- Costing
- Deliverable
- Meeting minutes
- Project Status Reports (PSR)

Links

Site	Status	Link
Google Calendar	ACTIVE	https://calendar.google.com/calendar/u/0?cid=ZmcwcmU3a211MHBkNGk4dG8hN2dnachyNGNkZ3V0dXUvZS2W5KXkYhZ29uZ2h0LmN0bWQ
Document Github	ACTIVE	itl/ITC303-ments

Tasks

Key	Summary	T	Created	Updated	Due	Assignee	Reporter	P	Status	Resolution
FEAII-14	Confirm other notebooks that are in production, can be presented	✓	Today 5:34 AM	Today 6:48 AM	21/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-13	End to end solution planning	✓	Today 4:40 AM	Today 6:48 AM	30/Jul/21	ablewit	Patrick Funnell	1000	Unresolved	
FEAII-12	Finalise Project Plan	✓	Today 1:14 AM	Today 1:14 AM	17/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-11	Thresholding and contouring testing	✓	Yesterday 11:16 AM	Today 2:33 AM	23/Jul/21	Damen Sheehan	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-10	Testing with RGB colour space	✓	Yesterday 11:08 AM	Today 2:33 AM	23/Jul/21	Cam	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-9	Converting identified flood cluster / cluster contouring into a shape file	✓	Yesterday 10:26 AM	Today 4:21 AM	23/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-8	Submit LCAM revision Session 2	✓	Yesterday 9:06 AM	Yesterday 11:10 AM	17/Jul/21	Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-7	Switch meeting minutes collection for our weekly meetings to confluence	✓	Yesterday 9:05 AM	Yesterday 11:09 AM		Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-6	Collate meeting minutes in confluence	✓	Yesterday 9:05 AM	Yesterday 11:09 AM		Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved

Patrick is tracking progress and managing the team's internal project management for the second session of this project to unify production and ensure the team moves forward to meet major deadlines with great clarity and high success. The team is highly capable and highly motivated meaning this will move forward very smoothly.

In confluence a simple task allocation page has been set up for an easy overview of tasks assigned and to do alongside the documentation in confluence.

Feature Extraction, Aerial Imagery Initiative / Project Management

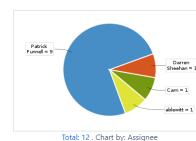
Task Allocation

Created by Patrick Funnell
Last updated yesterday at 10:55 am • 1 min read

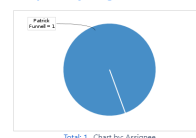
Key	Summary	T	Created	Updated	Due	Assignee	Reporter	P	Status	Resolution
FEAII-14	Confirm other notebooks that are in production, can be presented	✓	Today 5:34 AM	Today 6:48 AM	21/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
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FEAII-12	Finalise Project Plan	✓	Today 1:14 AM	Today 1:14 AM	17/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-11	Thresholding and contouring testing	✓	Yesterday 11:16 AM	Today 2:33 AM	23/Jul/21	Damen Sheehan	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-10	Testing with RGB colour space	✓	Yesterday 11:08 AM	Today 2:33 AM	23/Jul/21	Cam	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-9	Converting identified flood cluster / cluster contouring into a shape file	✓	Yesterday 10:26 AM	Today 4:21 AM	23/Jul/21	Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-8	Submit LCAM revision Session 2	✓	Yesterday 9:06 AM	Yesterday 11:10 AM	17/Jul/21	Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-7	Switch meeting minutes collection for our weekly meetings to confluence	✓	Yesterday 9:05 AM	Yesterday 11:09 AM		Patrick Funnell	Patrick Funnell	1000	Unresolved	
FEAII-6	Collate meeting minutes in confluence	✓	Yesterday 9:05 AM	Yesterday 11:09 AM		Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-5	Upload project management information	✓	Yesterday 9:04 AM	Yesterday 11:09 AM		Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved
FEAII-4	Create the confluence site	✓	Yesterday 9:04 AM	Yesterday 9:15 AM		Patrick Funnell	Patrick Funnell	1000	DONE	Done
FEAII-3	Populate Confluence	✓	Yesterday 9:03 AM	Yesterday 11:10 AM	17/Jul/21	Patrick Funnell	Patrick Funnell	1000	IN PROGRESS	Unresolved

12 issues Refresh

All Jobs



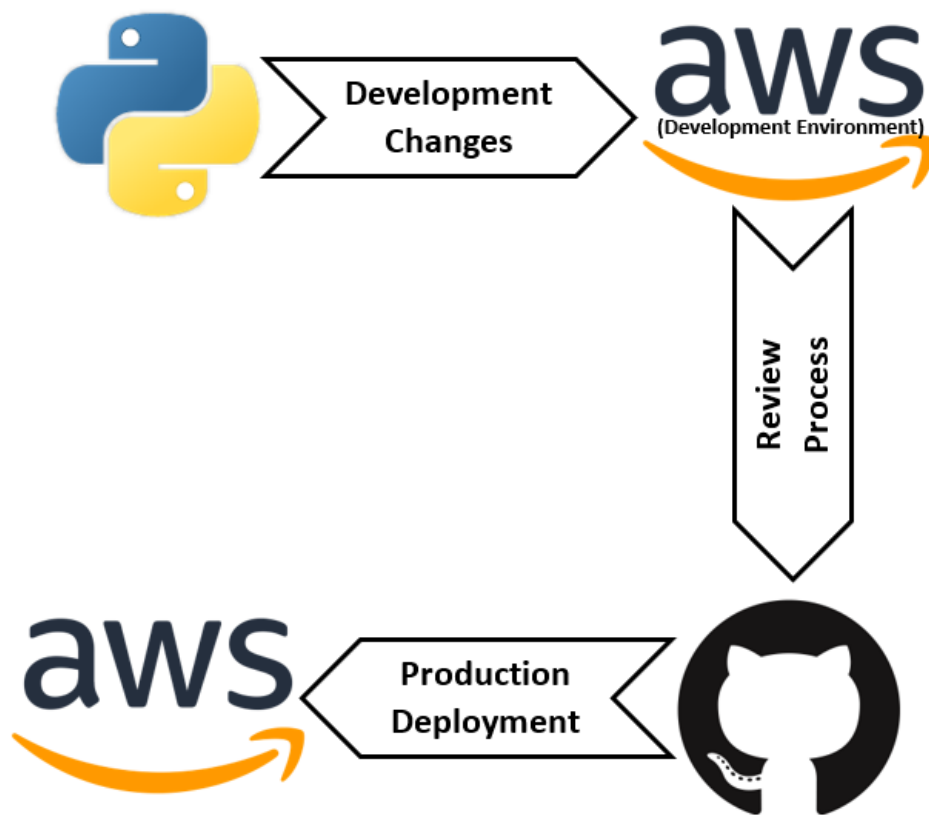
Completed by Assignee



Deployment

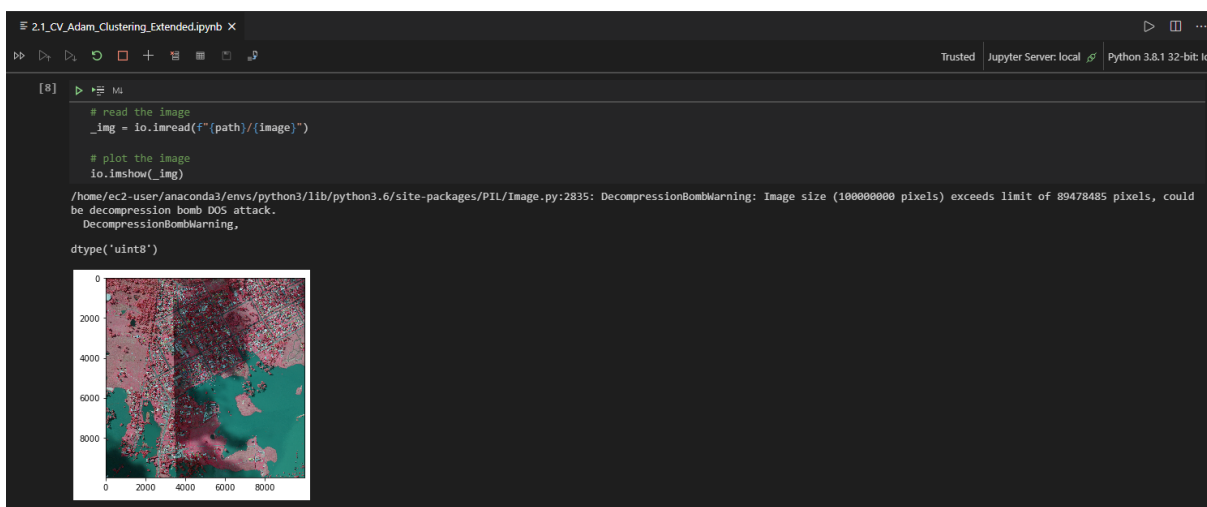
Our primary method for deploying updates, as well as establishing new features and implementing them outside of a final production solution, is through Git. Amazon provides some documentation on this integration, in their [source control docs](#).

By using Git, we enable the ability for major systematic changes, through separate branches, that don't change or affect the master branch, before going through the Git review process.



Reducing Computational Requirements & Costs

The cost of production is managed by DCS but the student team have an obligation to ensure low cost with testing and development. As the requirement for more computational power increases, while the project is still in its very early development stages, Students have elected to take their work off of the cloud (AWS) and work locally (through Visual Studio Code). This process has boosted usage and thus the effectiveness of version control for the project.



The current list of SageMaker instances can be observed below:

Notebook instances					
<input type="text" value="Search notebook instances"/>		<input type="button" value="Actions"/> <input type="button" value="Create notebook instance"/>		<input type="button" value="1"/>	
Name	Instance	Creation time	Status	Actions	
cameron-test	ml.t2.large	May 27, 2021 11:58 UTC	Stopped	Start	
andrew-test-large	ml.t2.large	May 20, 2021 01:39 UTC	Stopped	Start	
darren-test	ml.t2.large	May 19, 2021 10:14 UTC	Stopped	Start	
patrickfunnell-test	ml.t2.large	May 19, 2021 10:13 UTC	Stopped	Start	
Nik-CV	ml.c5.xlarge	May 14, 2021 01:26 UTC	Failed	Start	
andrew-test	ml.t2.medium	May 09, 2021 09:23 UTC	InService	Open Jupyter Open JupyterLab	
Adam1	ml.t3.xlarge	May 07, 2021 10:13 UTC	InService	Open Jupyter Open JupyterLab	
test	ml.t2.medium	May 07, 2021 06:52 UTC	Stopped	Start	
Nik	ml.m5.xlarge	Apr 30, 2021 02:16 UTC	Stopped	Start	
myNotebook	ml.t2.medium	Apr 22, 2021 23:30 UTC	Stopped	Start	

The costs associated with these instance types are as follows:

- ml.t2.medium - \$0.0464/hour
- ml.t2.large - \$0.111/hour
- ml.t3.xlarge - \$0.20/hour

- ml.c5.xlarge - \$0.204/hour
- ml.m5.xlarge - \$0.23/hour

In moving the development environment from AWS to the Students' local PC's, the running costs generated are nullified.

While a large portion of the development work is completed, Students can avoid any sort of budget constraints, for computational usage, reducing the risk for experimentation.

Services being used in this project.

Deliverable Content

Deliverables are to be discussed and outlined in the confluence site as, Maria (already requested access) and other stakeholders for this project will be able to request access and be able to see what is available / what we are aiming to have available / what tasks are required to achieve this document availability.

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Deliverable

Created by Patrick Funnell
Last updated: 17 minutes ago • 2 min read

Testing (Devel)

ACTIVE

Breakdown

The Aim!

To understand the best method for identifying a flood region from the collection we have researched and been exposed to by Nik from Intelify. Once a model has been chosen (looks like the Gaussian Mixture Model algorithm will be the one to move forward with as of 17-July-2021) the team will refine the model and ensure it has the encompassing elements to become an end to end solution, identifying a flood region

What we have so far...

Notebooks in the works

- Andrew_clustering_gmm03.ipynb
- Others to be confirmed shortly.

Research and architecture documentation (Currently LCAM)

Document	Access	Link to GitHub repository
Project Vision	PUBLIC	ITC303-Documents/LCAM Project Vision.pdf at main · ablewit/ITC303-Documents · GitHub
Master Test Plan v2	PUBLIC	ITC303-Documents/Master Test Plan.pdf at main · ablewit/ITC303-Documents · GitHub
Revised Requirements Model	PUBLIC	ITC303-Documents/Revised Requirements Model.docx.pdf at main · ablewit/ITC303-Documents · GitHub
Project Plan	PUBLIC	ITC303-Documents/LCAM Project Plan.pdf at main · ablewit/ITC303-Documents · GitHub
Architecture Notebook	PUBLIC	ITC303-Documents/LCAM Architecture Notebook.pdf at main · ablewit/ITC303-Documents · GitHub
Executable Architecture	PUBLIC	ITC303-Documents/Executable Architecture.docx.pdf at main · ablewit/ITC303-Documents · GitHub
G5 Executable Architecture.mp4	PUBLIC	G5 Executable Architecture.mp4

Quickstart

What is next?

Complete the tasks of this stage.

Prototype a full working product using all of the best results of the testing.

Further details being added to this daily, and Prototype (QA) is being planned.

Tasks

Tasks that need to be completed to progress this stage of the product deployment.

- ☒ FEAI-10: Testing with RGB colour space **IN PROGRESS**
- ☒ FEAI-11: Thresholding and contouring testing **IN PROGRESS**
- ☒ FEAI-9: Converting identified flood cluster / cluster contouring into a shape file **TO DO**
- ☒ FEAI-13: End to end solution planning **TO DO**
- ☒ FEAI-14: Confirm other notebooks that are in production, can be presented **TO DO**

More tasks TBA.

Progression

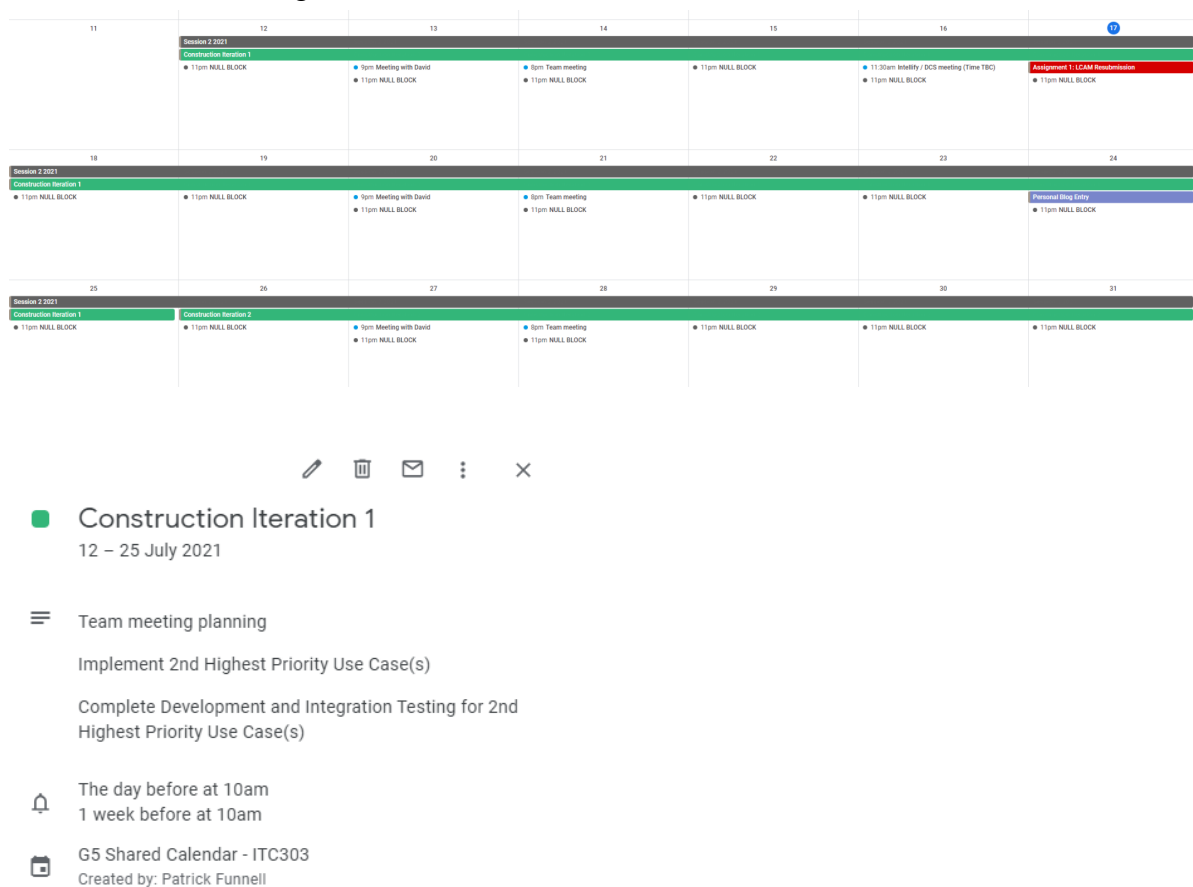
Timeline

Major project related tasks are managed in Jira. Access can be arranged.

Time Management

Google Calendar is being used to maintain deadlines and general time management. Added to the calendar is the following...

- All iteration time frames
- Major internal assessment dates
- Journal entry deadline
- Weekly meetings.
 - + Team
 - + Technical meeting with DCS and Intellify
 - + Meeting with David



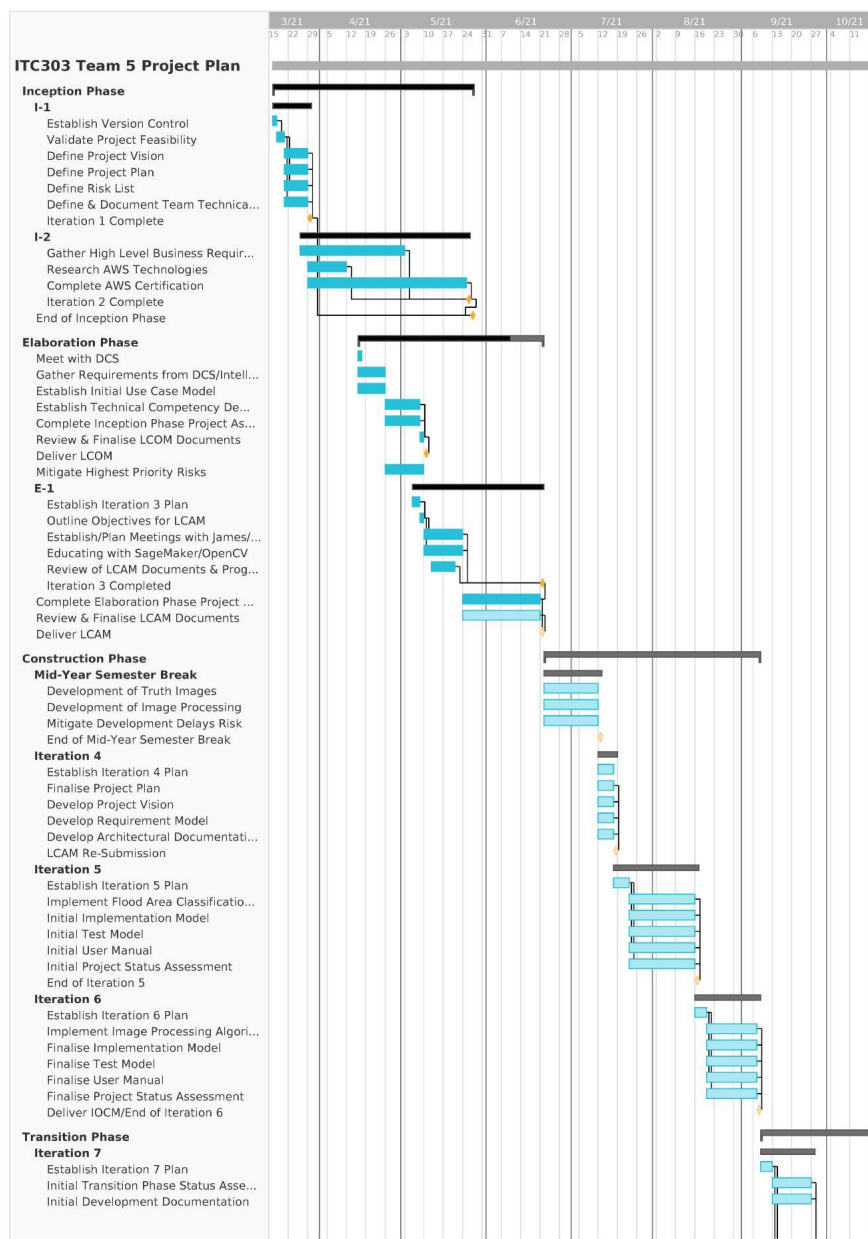
This calendar is publicly available at

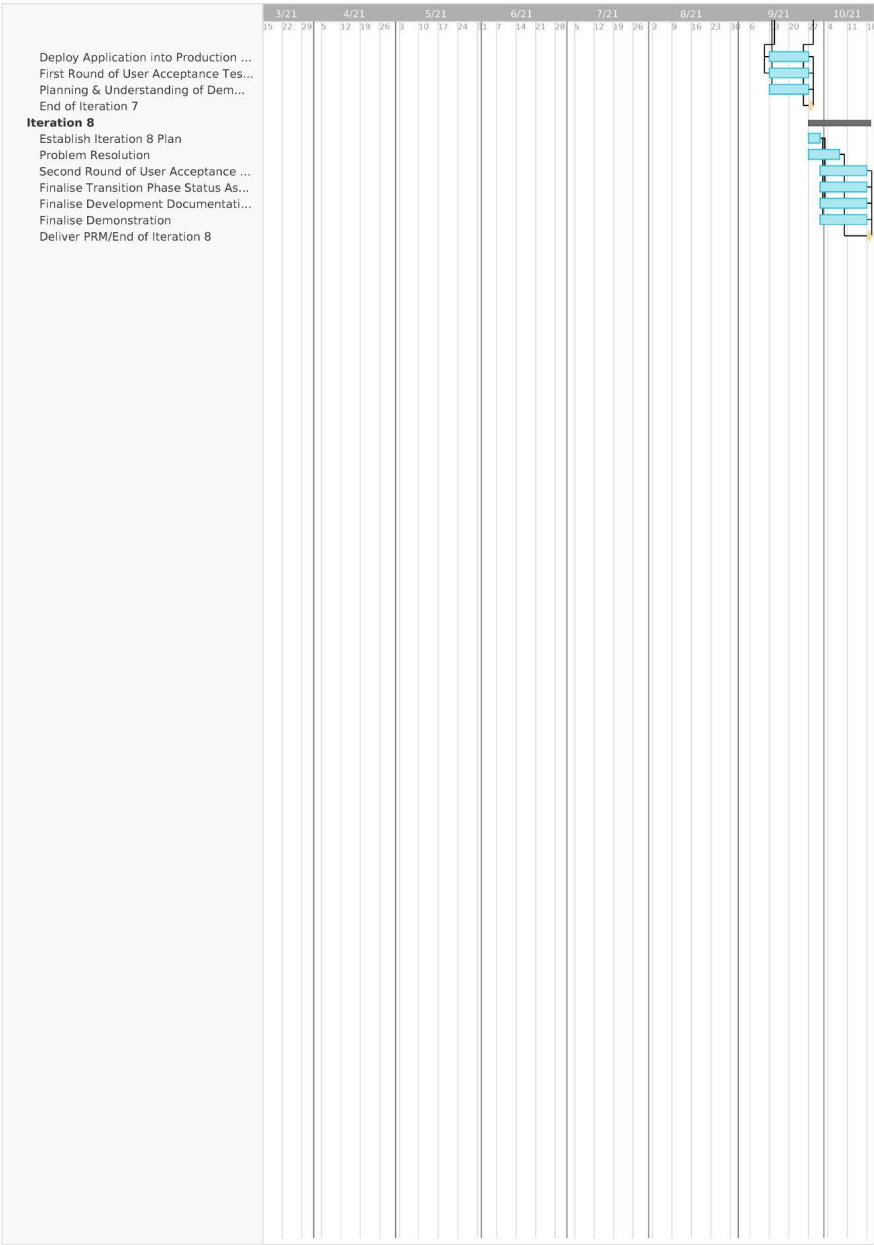
<https://calendar.google.com/calendar/u/0?cid=ZmcwdmU3a211MHBkNGhkdjBnNzdnazhyNGNAZ3JvdXAuY2FsZW5kYXluZ29vZ2xlLmNvbQ>

Time is also managed in Jira for various tasks relating to each iteration and meetings.

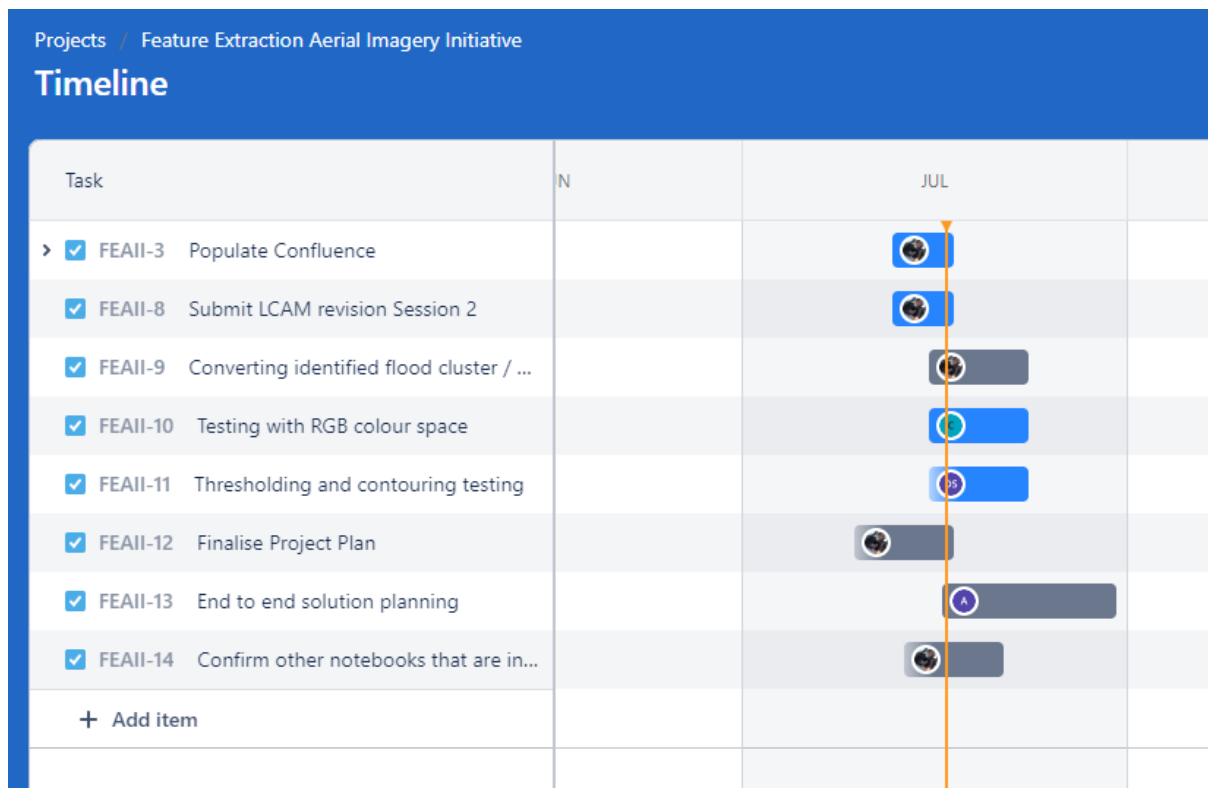
Project Milestones & Objectives

This timeline for the most part represents the internal project flow. A more accurate task and project flow gantt chart has been created in Jira (discussed under tracking progress). A snapshot of the new project management can be seen below these older ones.





Jira timeline, it is not complete yet, more planning and detailed analysis is being conducted and will be completed shortly after this document is submitted.



Change Log

Version	Date	Change	Author
1.0	-	Created document and majority of the original content	Cameron Nyberg
1.0.1	15-06-21	Addition of the Change Log	Cameron Nyberg
1.1	16-06-21	Touch-Up of Introduction	Cameron Nyberg
1.1.1	16-06-21	Implementation of Project Brief	Cameron Nyberg
1.2	17-06-21	Project Milestones & Objectives Overhaul (Gantt Chart Implementation)	Cameron Nyberg
1.2.1	17-06-21	Added discussion of reducing computational requirements & costs	Cameron Nyberg
1.3	18-06-21	Initial Construction Phase Iteration Assessment	Cameron Nyberg
2.0	18-06-21	LCAM document release	Cameron Nyberg
2.1	17-07-21	Updated tracking progress section	Patrick Funnell
2.2	17-07-21	Added time management section	Patrick Funnell
2.3	17-07-21	Added Deliverable section	Patrick Funnell
2.4	17-07-21	Updated computation requirements section	Patrick Funnell
3.0	17-07-21	LCAM revised	Patrick Funnell

References

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Title page cover photo.

Basin Pocket (Ipswich) flooded. (2011). Retrieved from

<https://www.abc.net.au/news/2011-06-03/brisbane-floods3a-before-and-after-article/2742794?nw=0>

