AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering

Week 11 (Assessments Guideline)

Dr Guohao Zhang, assisted by

Dr Penghui XU, Mr Zekun ZHANG, Mr Di HAI, Mr Yidi CHEN, Mr Zhen LYU

Necessary Information

- Course Repository (project download) link:
https://github.com/IPNL-POLYU/PolyU_AAE1001_Github_Project

- TA Information & Contact:

Group 1-3: Dr Penghui XU - xphsean12@163.com

Group 4-6: Mr Zekun ZHANG - zekun.zhang@connect.polyu.hk

Group 7-8: Mr Di HAI - 23037537R@connect.polyu.hk

Group 9-10: Mr Yidi CHEN - yi-di.chen@connect.polyu.hk

Group 11-12: Mr Zhen LYU - zhenn.lyu@connect.polyu.hk

Assessment

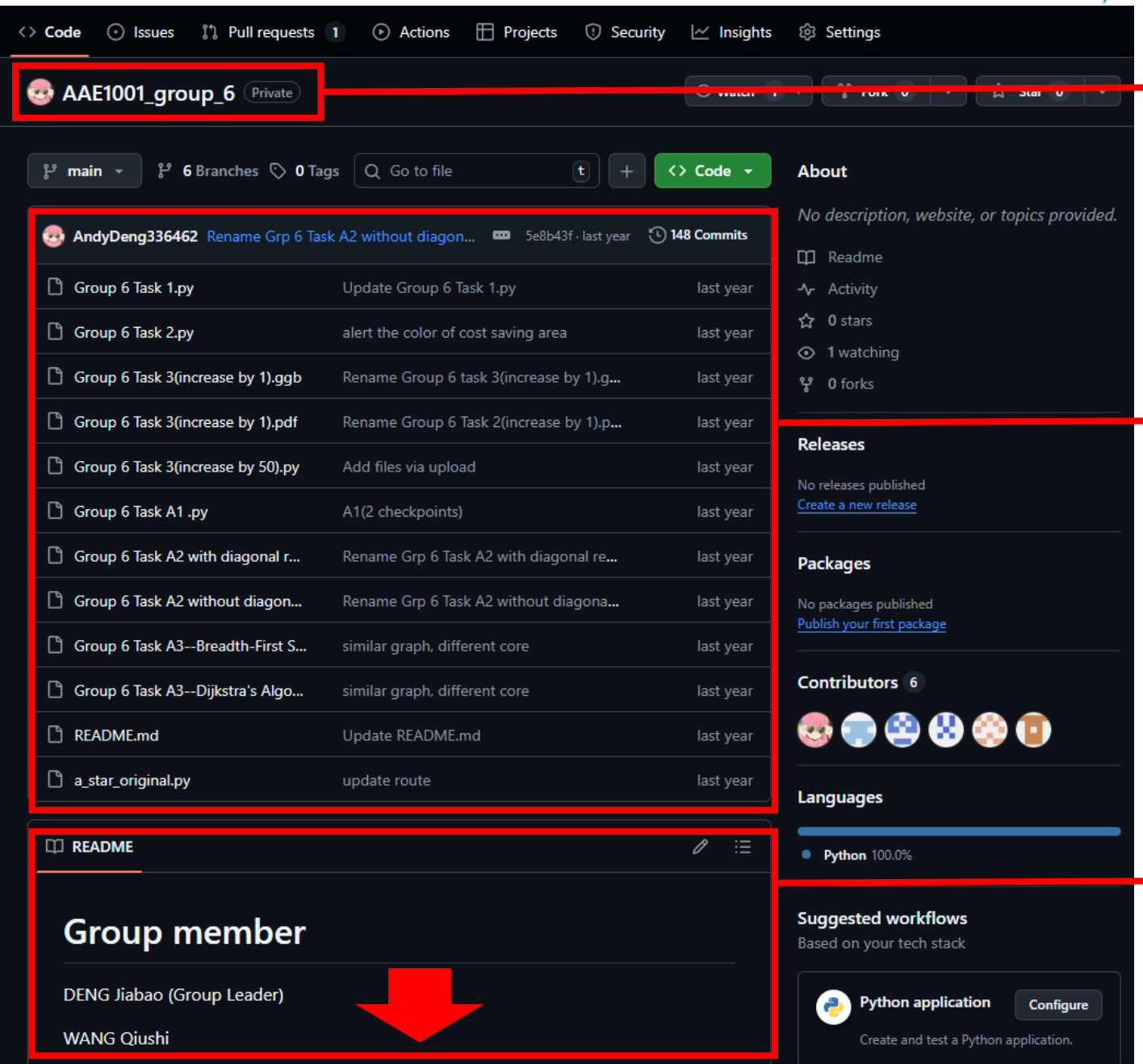
- **Laboratory (35%)**
  - **GitHub Repository (25%):**

    Group project contents (codes, results, etc.)
    Report (Readme file per group)
    Reflective essay (Individual)
  - **Peer Assessment Form (10%)**

- **Group Project Presentation (25%)**

  (both group and individual performances are considered)

Group project contents



Repository name format:
AAE1001_25_Group_[number]

Repository content:
Collection important documents related to the project. (create separate code file for each task)

Repository Readme file as the project report

Readme in GitHub Repository

What is a README.md?

A file for your repository front page

Contains:

- Information about your repository
- Directory
- Contribution
- And more...

Important? … Yes!

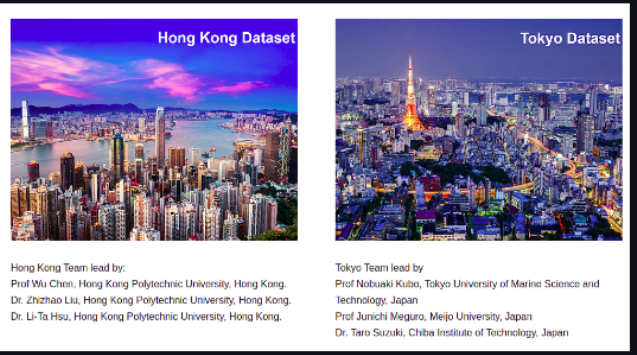
README.md

UrbanNav

An Open-Sourcing Localization Dataset Collected in Asian Urban Canyons, including Tokyo and Hong Kong

This repository is the usage page of the UrbanNav dataset. Positioning and localization in deep urban canyons using low-cost sensors is still a challenging problem. The accuracy of GNSS can be severely challenged in urban canyons due to the high-rising buildings, leading to numerous Non-line-of-sight (NLOS) receptions and multipath effects. Moreover, the excessive dynamic objects can also distort the performance of LiDAR, and camera. The UrbanNav dataset wishes to provide a challenging data source to the community to further accelerate the study of accurate and robust positioning in challenging urban canyons. The dataset includes sensor measurements from GNSS receiver, LiDAR, camera and IMU, together with accurate ground truth from SPAN-CPT system. Different from the existing dataset, such as Waymo, KITTI, UrbanNav provide raw GNSS RINEX data. In this case, users can improve the performance of GNSS positioning via raw data. **In short, the UrbanNav dataset pose a special focus on improving GNSS positioning in urban canyons, but also provide sensor measurements from LiDAR, camera and IMU.** If you got any problems when using the dataset and cannot find a satisfactory solution in the issue list, please open a new issue and we will reply ASAP.

Key words: **Positioning**, **Localization**, **GNSS Positioning**, **Urban Canyons**, **GNSS Raw Data**,**Dynamic Objects**, **GNSS/INS/LiDAR/Camera**, **Ground Truth**



Important Notes:

- **About access to GNSS RINEX file:** The GNSS measurements is provided as GNSS RINEX data. We will recently open-source a package, the GraphGNSSLib, which provide easy access to the GNSS RINEX file and publish the data as customized ROS message. Meanwhile, we GraphGNSSLib also provide the capabilities of GNSS positioning and real-time kinematic (RTK) using factor graph optimization (FGO). If you wish to use the GraphGNSSLib, keep an eye on the update of this repo.
- **Dataset contribution:** Researches who wish to contribute their dataset as part of the UrbanNav dataset, please feel free to contact us via email darren-f.huang@connect.polyu.hk, welson.wen@polyu.edu.hk, and lt.hsu@polyu.edu.hk. We wish the UrbanNav can be a platform for navigation solution development, validation and sharing.
- **Algorithm validation and contribution:** Researches are welcomed to share their navigation solution results, source code to the UrbanNav dataset after a code review process, e.g, code for GNSS/INS integration or LiDAR SLAM, etc.

Overview

- Objective
- Hong Kong Dataset
- Tokyo Dataset
- Getting Started
- Acknowledgements
- License
- Related Publications

Source Code vs Preview of README.md

Source Code

```
<!-- TABLE OF CONTENTS -->
<details open="open">
  <summary><h2 style="display: inline-block">Table of Contents</h2></summary>
    <li><a href="#Background-of-Path-Planning-to-Aviation-Engineering">Background of Path Planning to Aviation Engineering</a></li>
    <li><a href="#Theory-of-Path-Planning-Algorithm">Theory of Path Planning Algorithm</a></li>
    <li><a href="#Introduction-of-the-Engineering-Tools ">Introduction of the Engineering Tools </a></li>
  </ol>
</details>



<!-- ABOUT THE PROJECT -->
# Background of Path Planning to Aviation Engineering

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"At vero eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint o
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"On the other hand, we denounce with righteous indignation and dislike men who are so beguiled and demoralized by the charms of pleasure of the moment, so blinded by desire, that they cannot foresee the pain and trouble that are bound to ensue; and equal blame belongs to those who fail in their duty through weakness of will, which is the same as saying through shrinking from toil and pain. These cases are perfectly simple and easy to distinguish. In a free hour, when our power of choice is untrammelled and when nothing prevents our being able to do what we like best, every pleasure is to be welcomed and every pain avoided. But in certain circumstances and owing to the claims of duty or the obligations of business it will frequently occur that pleasures have to be repudiated and annoyances accepted. The wise man therefore always holds in these matters to this principle of selection: he rejects pleasures to secure other greater pleasures, or else he endures pains to avoid worse pains."
```

Preview

Table of Contents

- Background of Path Planning to Aviation Engineering
- Theory of Path Planning Algorithm
- Introduction of the Engineering Tools

Background of Path Planning to Aviation Engineering

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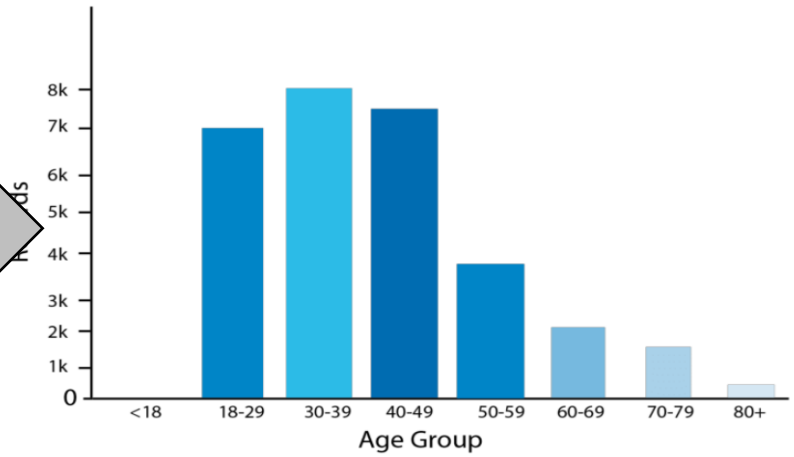

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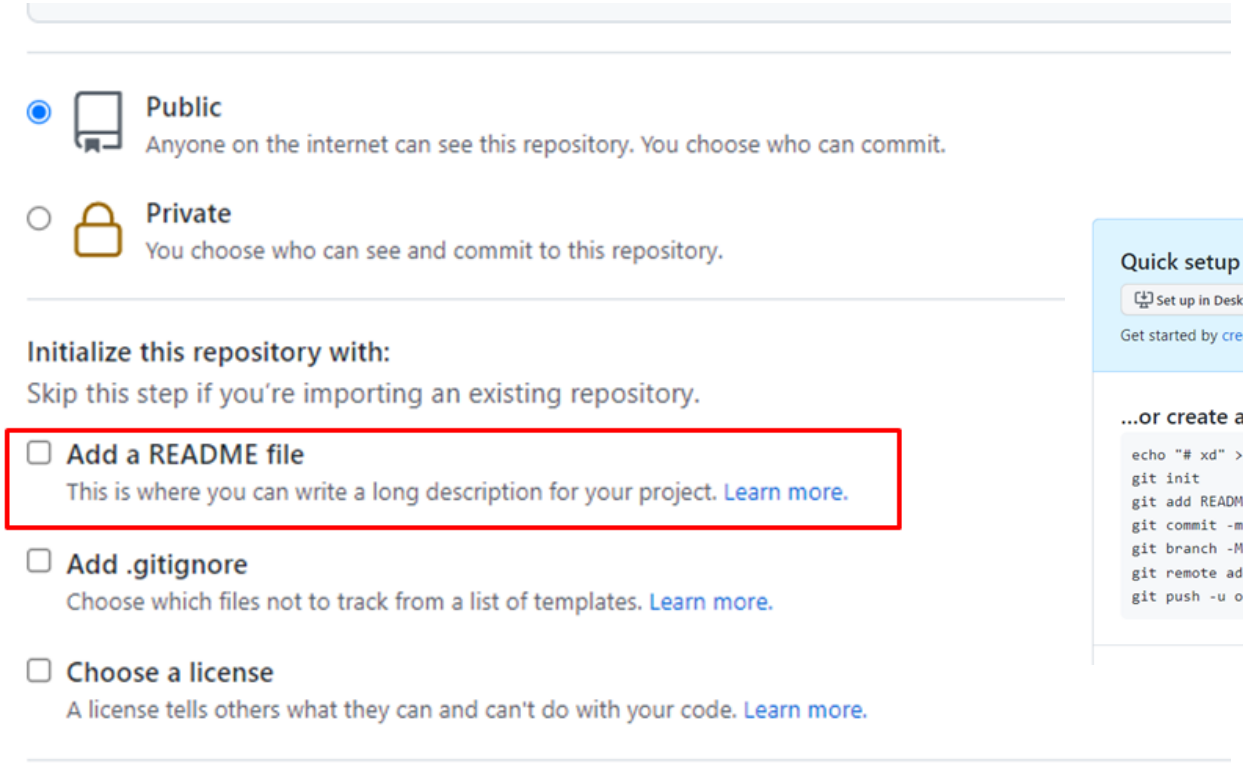
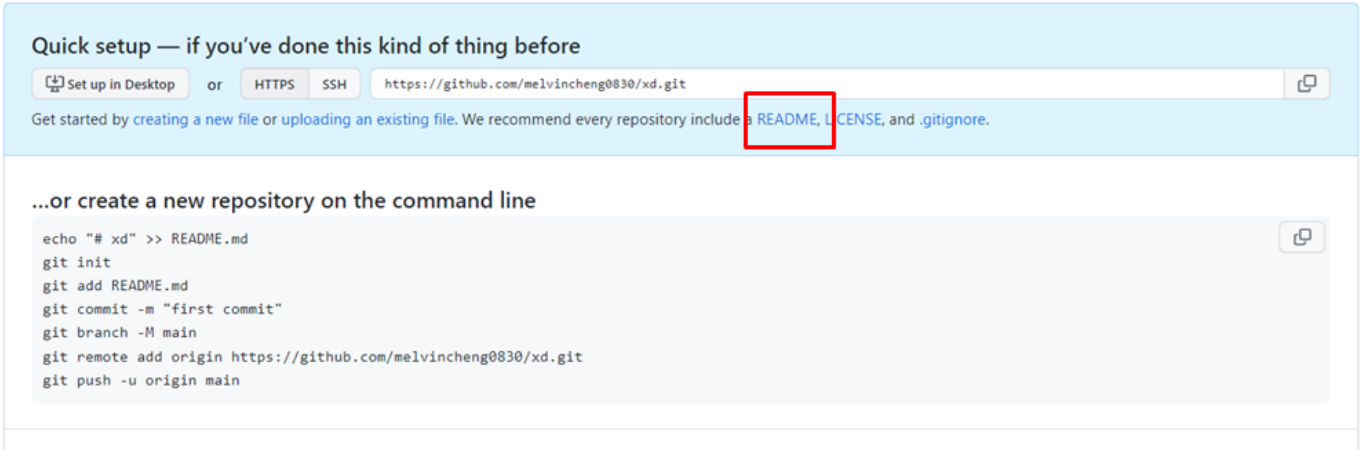
How to Create a README.md?





Basic Features of README.md?

1. Basic text, titles and subtitles
2. Table of contents
3. Inserting figures / photos

Basic Text, Titles and Subtitles

- To create normal texts, simply type them in to the source code
- To create a main title, add a '#' at the beginning
  - *# This is the Main Title*
  - *##### More # makes smaller titles*

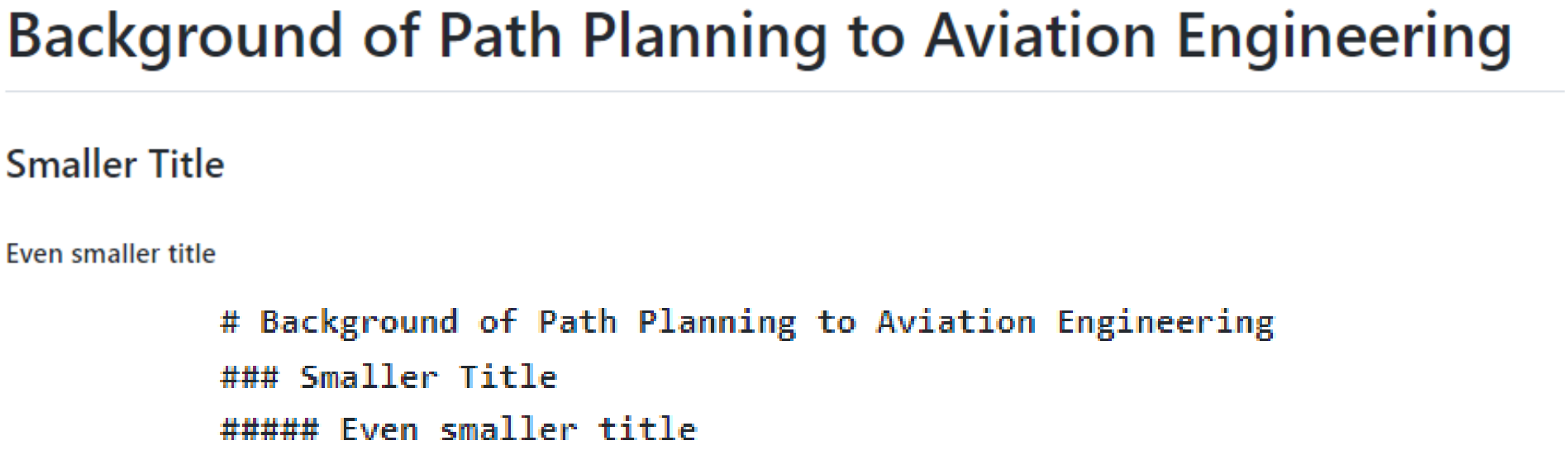


Table of Contents

- You need to have titles before creating a table of Contents
- Format of a table of contents
- Everything like fonts, text sizes and more can be altered!

```
<!-- TABLE OF CONTENTS -->
<details open="open">
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  </ol>
</details>
```

Text to be shown

Titles to be directed to

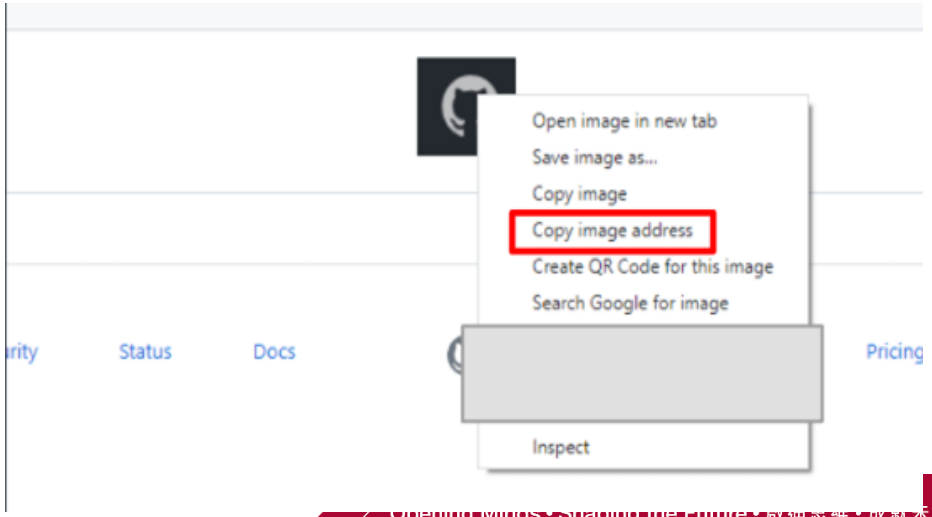
Inserting Figures / Photos

- You need to provide a link of the photo for this to work
- For screenshots you make, you can upload them to your repository and do the same thing by copying the image address!
- Example:

```
![This is an image](https://www.researchgate.net/profile/Jan-Bieser/publication/333867743/figure/fig2/AS:771428257374208@1560934237674/Bar-chart-showing-the-number-of-observations-value-attribute-for-each-age-group-key.png)
```

Message shown when picture cannot load

You can get the link for a photo by right clicking on it and select 'Copy link address'



Example

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Background of Path Planning to Aviation Engineering

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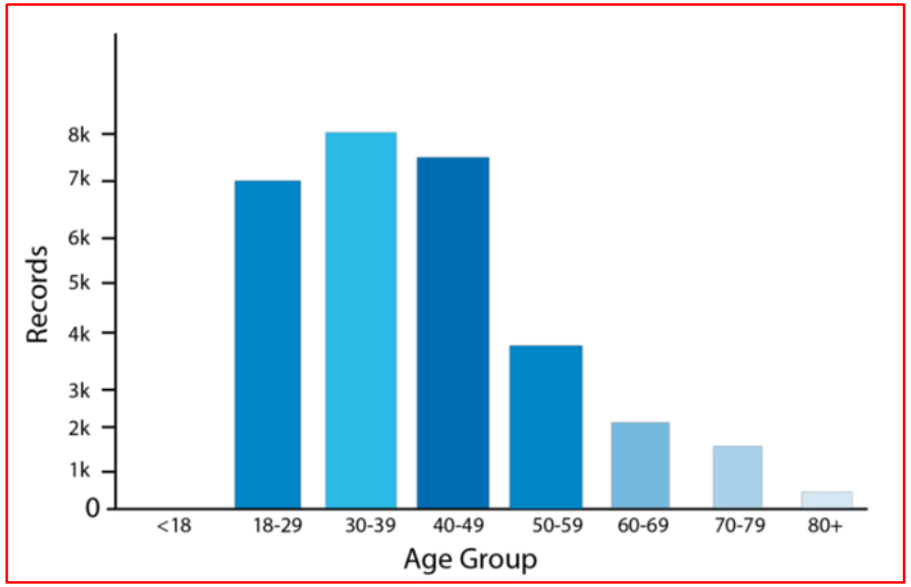

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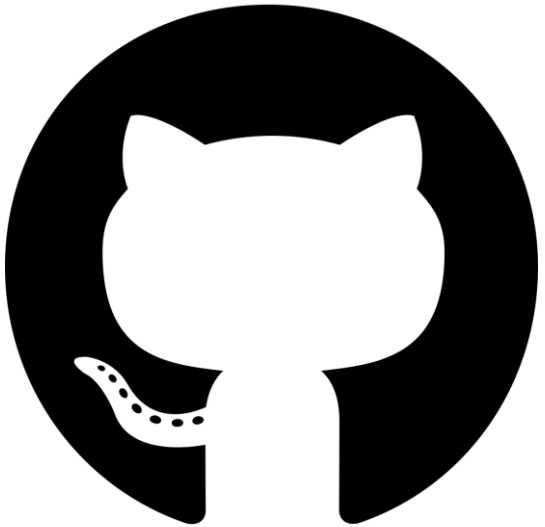
- Just like writing an HTML page
- Different formatting syntax creates corresponding visual formatting for the README page

Your README.md Report

- You are required to include the basic features mentioned in this PPT
  - Table of content, image, titling
  - **One report per group, with individual reflective essay at the end (200-250 words)**
- For bonus marks:
  - Search for more features on the web and include them appropriately to your README file!
  - What to add?
    - A gif showing your path planning plot
    - Other potential materials you find useful
- Useful links:
  - GitHub official tutorial



Peer Assessment

AAE1001 Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering
Confidential Peer Assessment Form

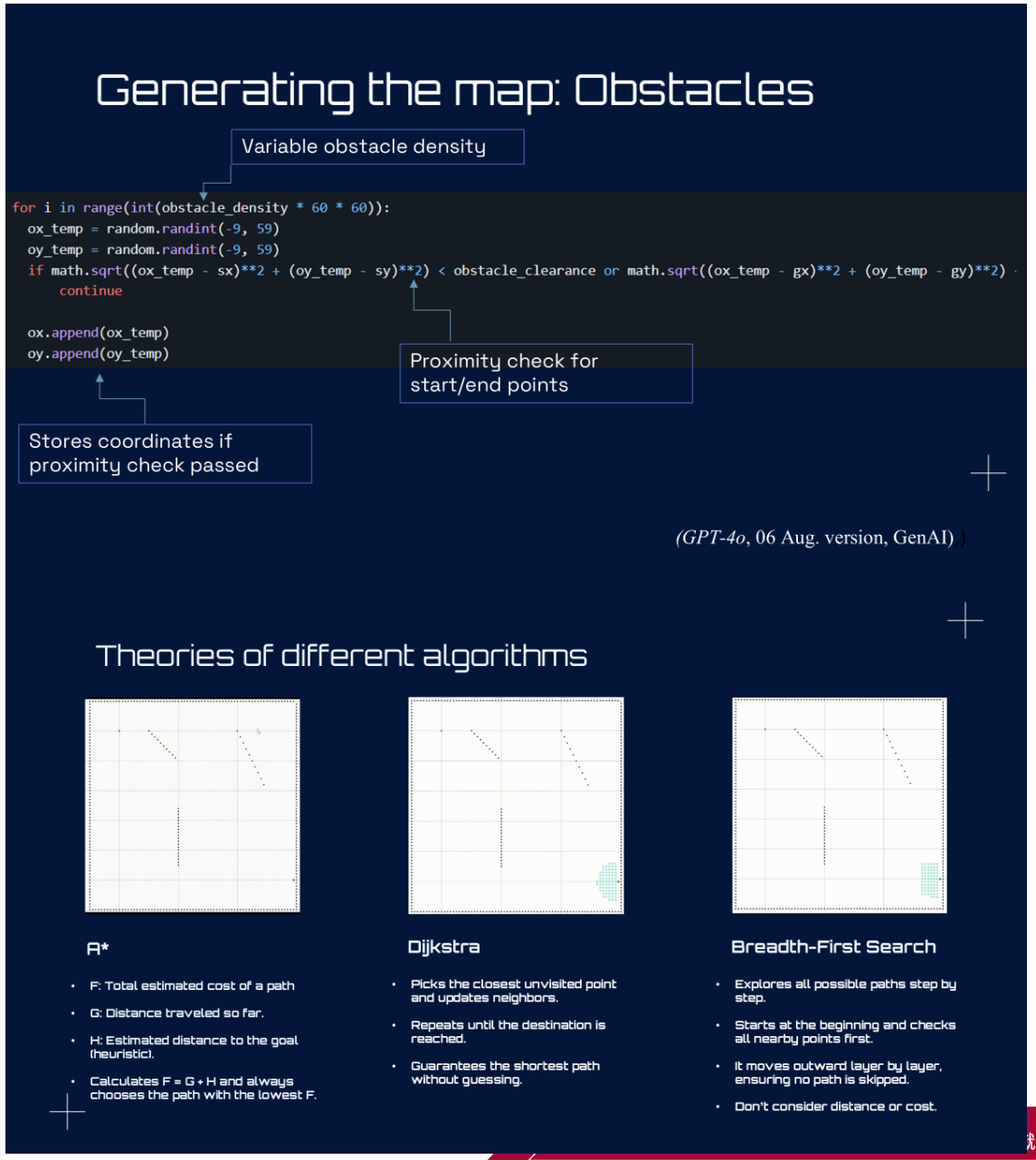
You are required to assess your peers' and your own contribution for key tasks of the project (given in the table). The contribution rating varies from 0% to 100%. 0% means no contribution at all, while 100% means all the work are carried out by the student concerned. The information provided will be treated with **strict confidentiality** and will not be revealed to any of your classmates.

Group No. _____

Project Tasks	Distribution of contribution (total 100% for each item)					
	Name of Assessor: (Your name)	Name of your group mate:	Name of your group mate:	Name of your group mate:	Name of your group mate:	Total
Example:	40%	20%	10%	10%	20%	100%
Task 1: **Discussion on the idea to solve path planning tasks**						100%
Task 2: **Path-planning python coding**						100%
Task 3: **GitHub participation**						100%
Task 4: **Project report writing**						100%
Task 5: **Project presentation**						

Comments:

Project Presentation

Project Presentation

- Face2F presentation by groups
  - Around 15 minutes in total
  - **Everyone** has roughly **2** minutes to present
  - **Must have a slide**
  - Inform the presenter sequence to the lecturer or TA after your presentation