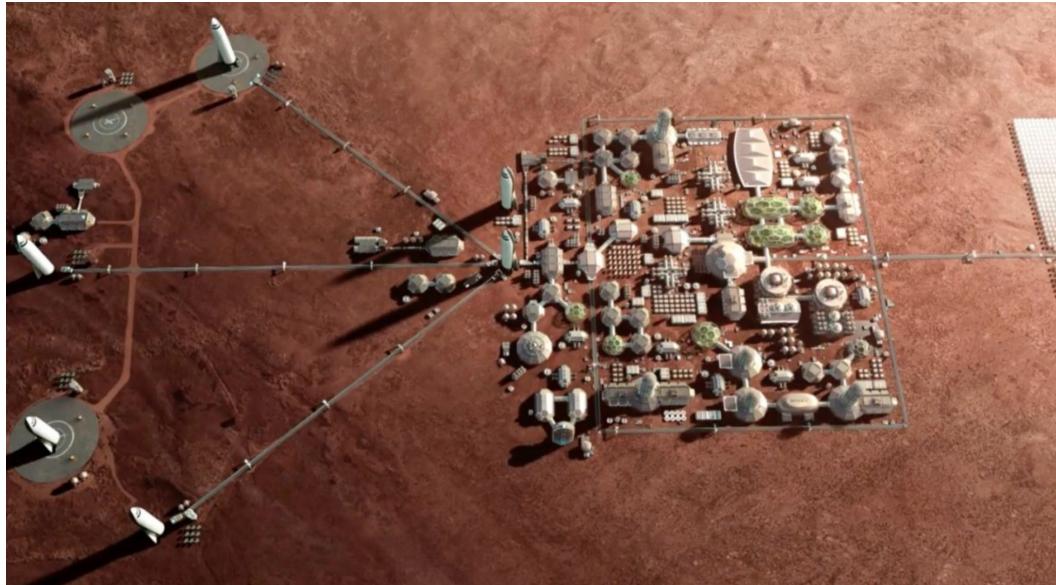


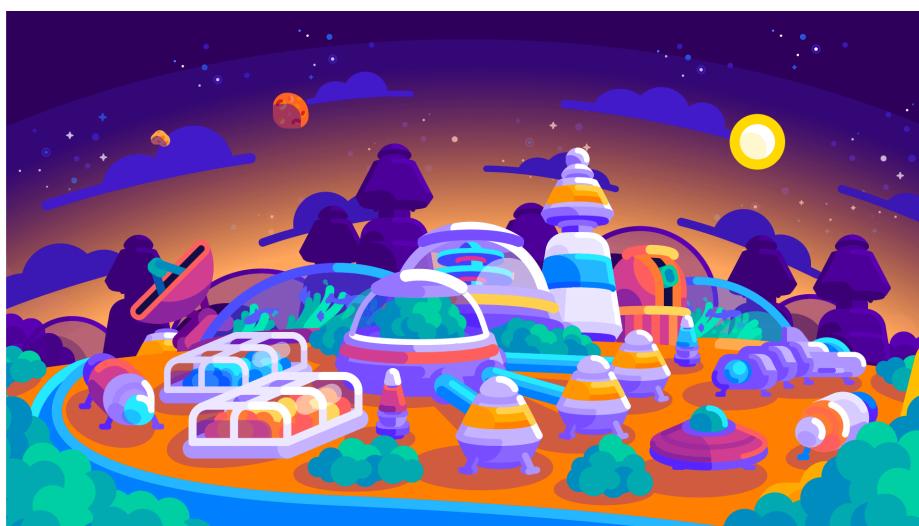
Space colonization: (Planetary chauvinist edition)



Idea

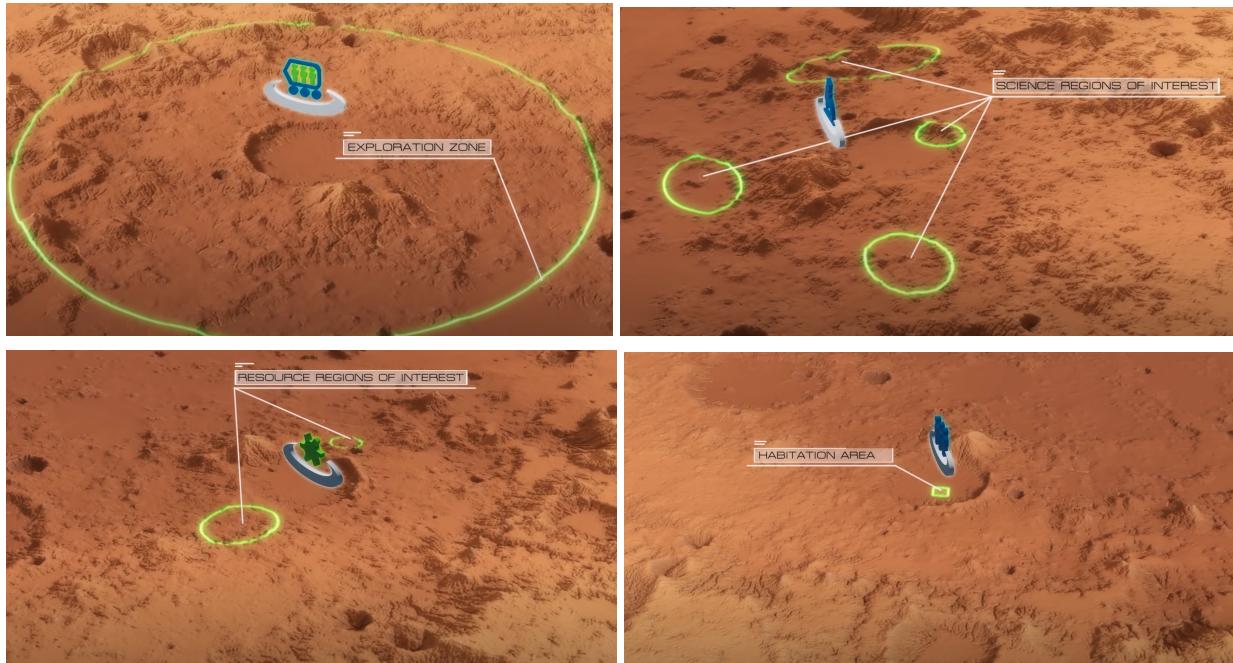
We as humans continue to explore the vast reaches of space and expand our presence beyond the earth. But to do that, we need to be able to plan and use the resources at our destinations in the most creative and optimal way possible to survive.

This project is a **plan of human colonies** on **one or more** planets/moons like mars, the moon, Europa, the asteroid belt, etc. How would you **optimize the locations of facilities**(like water, minerals, and so on) to make the best use of the given resources.





What are the computational problems we might face:



- We will have these different areas where we need to place facilities like greenhouses, solar farms and so on (based on which area has more water and which area is more sunbathed, etc.) Optimizing the location of these facilities
- Different areas to explore, so how to optimize the location of the habitat so that we can most efficiently explore all areas (modified version of the traveling salesman problem).

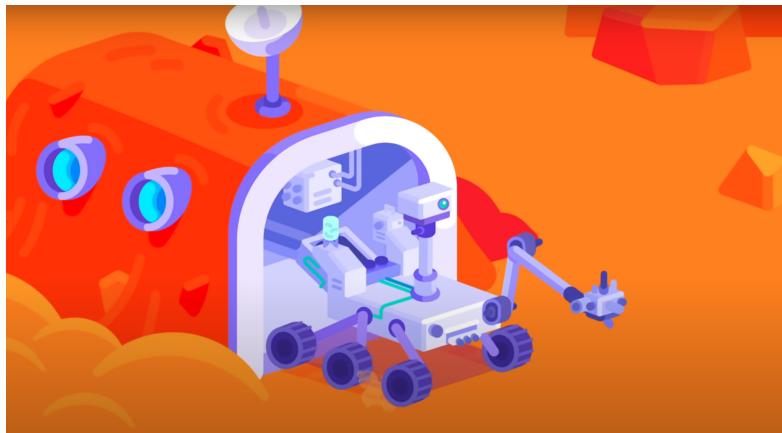
Algorithms used:

Graph algorithms, Dijkstra's algorithm of the shortest path, shortest reliable path, flows (not all algorithms might be used, and these might be subject to some change).

One interesting application can be that of machine learning algorithms in graphs.

Exploration of different approaches to solving the problems and seeing which suits better like greedy, backtracking, etc.

Traveling salesman problems (random algorithms).



Dp , backtracking and greedy

Submission type :

The project will be a report explaining what algorithms were used in which areas and what problems were solved using that.

We Will also have an analysis of why a type of algorithm isn't optimal for specific problems

Algorithms:

<https://www.oreilly.com/library/view/graph-algorithms/9781492047674/ch04.html>

<https://casmodeling.springeropen.com/articles/10.1186/s40294-017-0048-9>

<https://towardsdatascience.com/how-to-solve-the-traveling-salesman-problem-a-comparative-analysis-39056a916c9f>

- How to reach mars
- All pairs shortest paths
- Scc
- Traveling salesmen

Tentative timeline :

Week 1,2: identifying the various problems involved in planning the mars base and defining problem statements

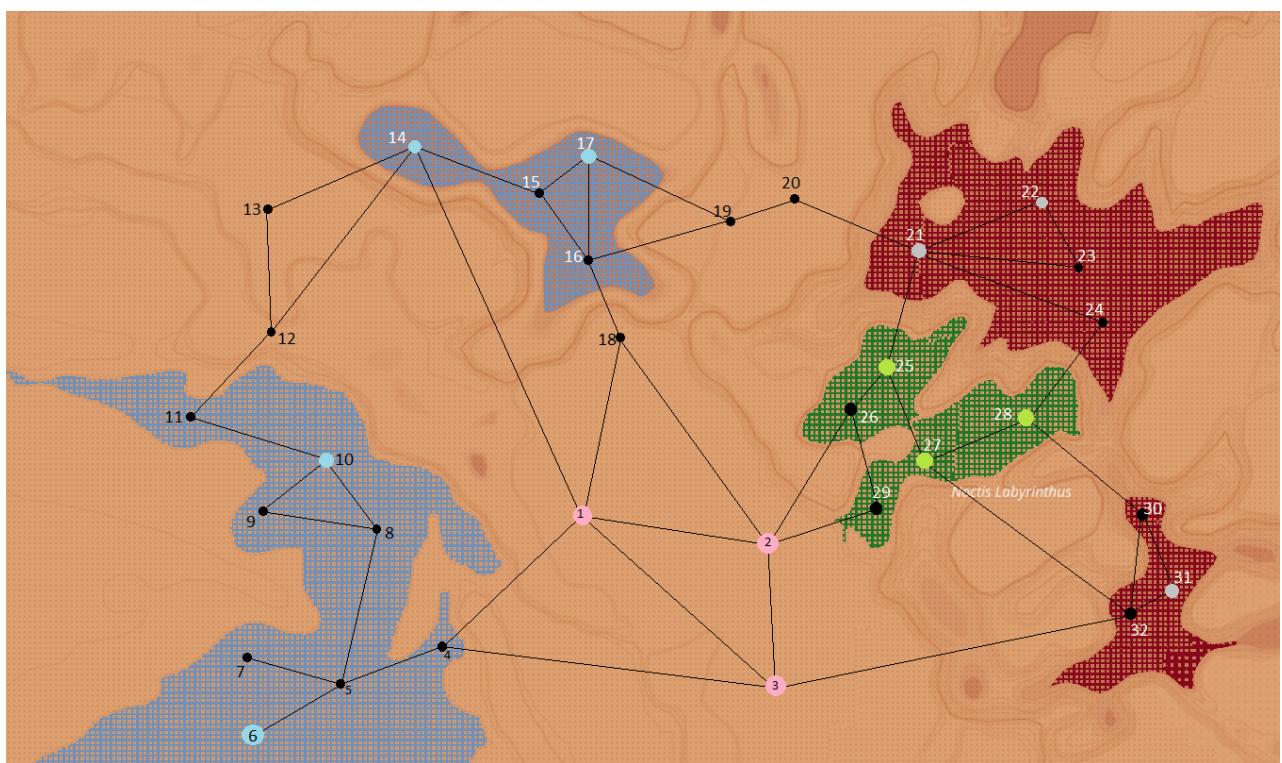
Week 3,4: proposing solutions to the problems and trying out different algorithmic approaches

Week 5,6 : brief layout of the map

Week 7,8: finalizing document and the map

Story:

Humanity has finally reached mars, and a small city is in construction to make the mars base self sustainable. But we face some problems and we need the use of graph algorithms to solve them for us!



Chapter 1: The Origins

After a decade of research and development of the spaceships and all the technologies, humanity is finally on mars. We have established

