CSA Moonwalker Challenge: Exploring the Distant Universe with JWST

Galaxy Hunters: Yusuf Ahmed, Dhvani Doshi, Ashley Ferreira, Daniel Reimer

Our Solution: Webb gAlaxy COunter (WACO)

A jupyter notebook that can demonstrate how to...

Step 1

Retrieve and enhance image

Step 2

Create a sky map to show object's coordinates

Step 3

Estimate the number of galaxies in given image

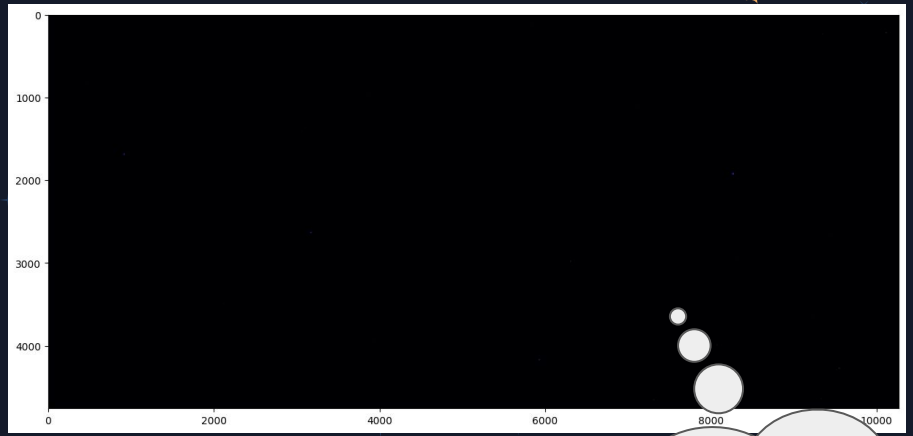
We noticed that much of the JWST data analysis tools were either quite advanced or based on simulation data and so our hope is to make real data more accessible to space enthusiasts like us!

Step 1: Retrieving and Enhancing Image

***

01

Chosen target was JWST's first deep field image: SMACS 0723



02

Initial raw image once it was retrieved using a MAST query

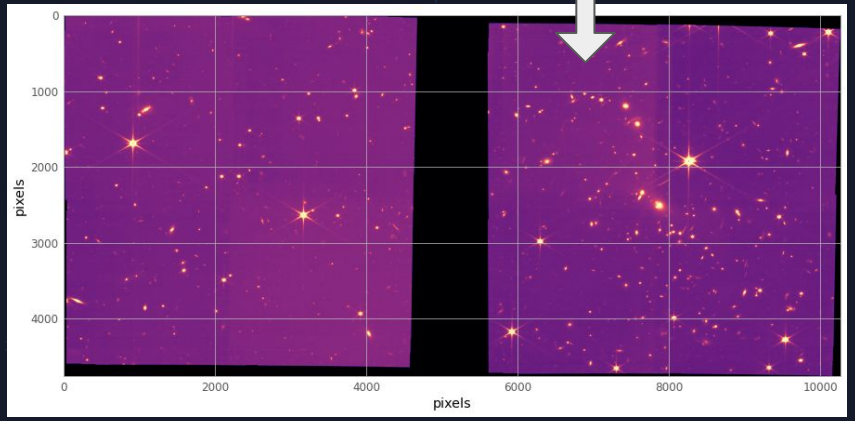
Completely dark since the image data has not been scaled correctly!

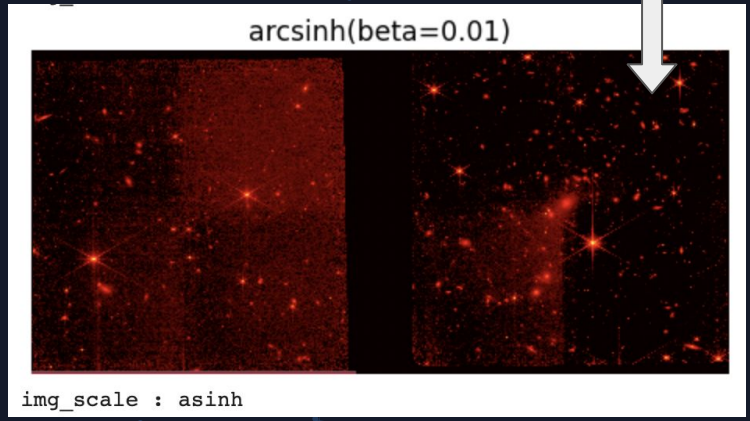
*** This is a post-processed image (by NASA) - not the raw image from JWST. Used for illustration purpose only.

Step 1: Retrieving and Enhancing Image

We can use different scaling methods to enhance the raw image in order to actually see the information

Image is “flipped”





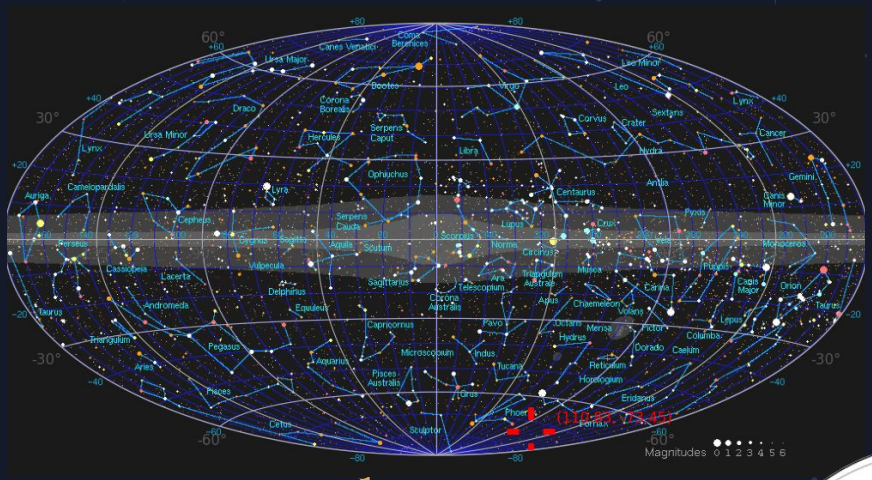
03

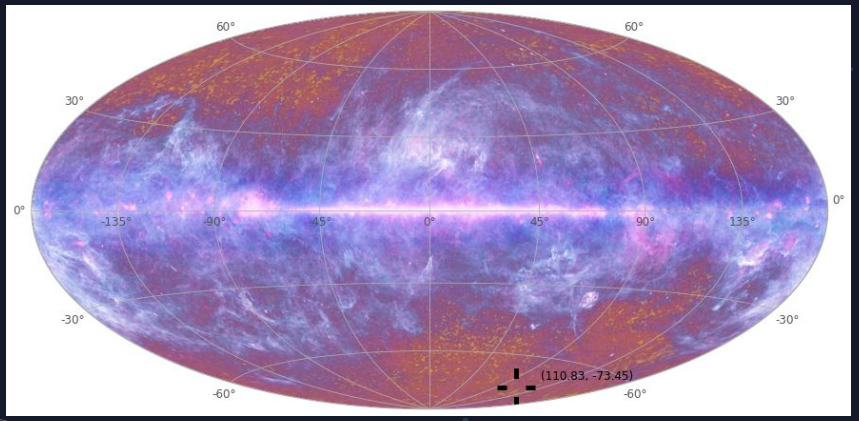
Enhanced image using astropy’s ZScaleInterval

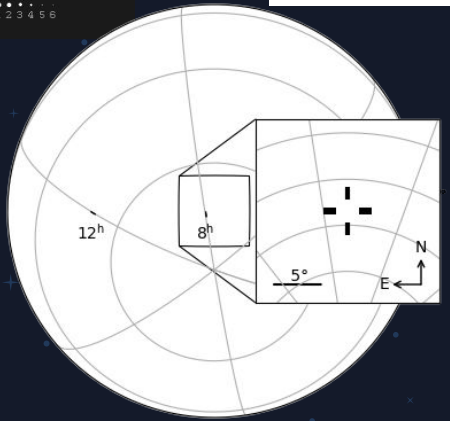
04

Further custom filters with variable parameters can be applied

Step 2: Place Target on a Sky Map







Users can see their target mapped onto several different projections and sky map backgrounds, they can even upload their own!

Step 3: Estimate Number of Galaxies

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estimation for number galaxies in image: 6305
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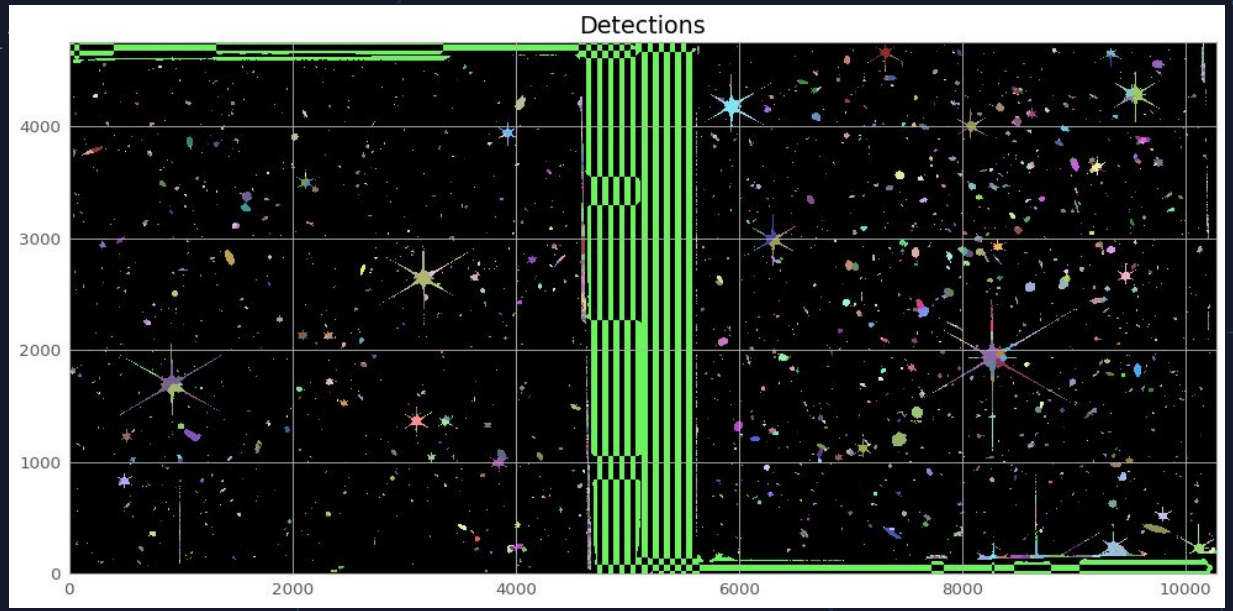
Ballpark close to expected value!
Elaboration in notebook



JWST Story

Written by GPT3 and Illustrated by DALLE2

When OpenAI launches an API for DALLE2 we can automatically and interactively generate story content like this in our notebook!

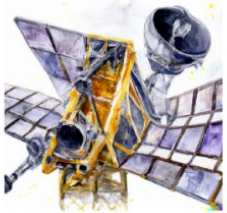
Big Telescope, Bigger Dreams

Written by: GPT3

Illustrated by: DALLE2

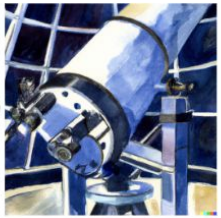
1

The James Webb Space Telescope was built to explore the universe.



2

It is the largest and most powerful (*space*) telescope ever made.



3

The telescope will allow scientists to see things that they have never seen before.

4

They will be able to see the first stars and galaxies that formed after the Big Bang.

5

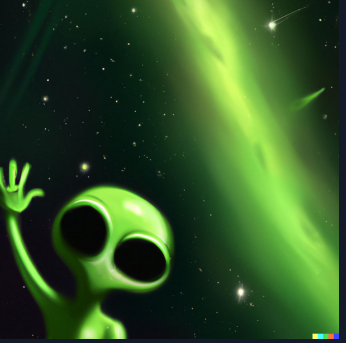
They will also be able to study the atmospheres of planets around other stars.

6

The telescope will help us to understand the universe and our place in it.

7

8



Thanks!

Thank you to all the space apps organizers, mentors, and judges - we learned so much!
A full list of references and acknowledgments is included in our notebook.

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon,** infographics & images by **Freepik**

*** The deep field image on Slide 3 was retrieved from https://www.nasa.gov/.