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**COLLEGE OF ENGINEERING & COMPUTER SCIENCE**

**Graduation project title**

Space Exploration by using AI

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**APPROVAL FOR BINDING OF GRADUATION PROJECT REPORT**  
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## **Abstract :**

Space exploration generates vast amounts of data in the form of high-resolution images of celestial bodies. Manual analysis and classification of these images are time-consuming and challenging tasks. This project proposes the use of artificial intelligence (AI) models to automate image classification and provide valuable information about celestial bodies.

The project aims to develop an AI model capable of accurately classifying celestial body images and enabling efficient analysis of astronomical data. By leveraging AI techniques such as deep learning and image recognition algorithms, the model will streamline the analysis of astronomical images and provide insights into the nature and characteristics of celestial bodies more efficiently.

The potential applications of this project are vast. Researchers, enthusiasts, and educators will benefit from the automated image classification, as it will significantly reduce the time and effort required for manual analysis. The AI model will enable the analysis of larger volumes of data in a shorter time, facilitating more comprehensive observations and discoveries.

Moreover, the AI model can enhance the accuracy and consistency of image classification. It will be trained on a diverse dataset, allowing it to learn to recognize subtle patterns and features that may be difficult for human observers to identify. This will result in more precise categorization of celestial bodies and provide valuable insights into their composition, structure, and behavior.

The automation of image classification through AI models will also foster broader engagement in the field of space exploration. Accessible and interactive information about celestial bodies can be provided to the general public, enabling a deeper understanding and appreciation of the wonders of the universe.

In conclusion, the proposed AI model for space exploration has the potential to revolutionize the field by automating image classification and analysis. It will contribute to a deeper understanding of celestial bodies, facilitate scientific research, and inspire a wider audience to engage with the wonders of the universe.

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# **1. INTRODUCTION**

## **1.1 Introduction**

Space exploration has always been a captivating endeavor, and advancements in technology have allowed us to capture high-resolution images of celestial bodies. However, analyzing and classifying these images manually can be a time-consuming and challenging task due to the vast amount of data and the complex nature of celestial bodies. In this research project, we propose the use of artificial intelligence (AI) models to automate the image classification process and provide valuable information about celestial bodies.

The purpose of this project is to develop an AI model that can accurately classify images of celestial bodies and provide relevant data and descriptions for each image. By leveraging AI techniques, we aim to streamline the analysis of astronomical images and enable researchers and enthusiasts to gain insights into the nature and characteristics of celestial bodies more efficiently.

Space exploration gives rise to humongous amounts of data that cannot be analyzed through human intelligence. Through analyzing and deriving the meaning of the data, AI can change the trajectory of space exploration

Classifying celestial bodies involves identifying and categorizing various objects such as stars, galaxies, nebulae, and planets. Traditionally, these classifications have been performed manually by experts in the field, which is a labor-intensive and subjective process. By utilizing AI models, we can automate this process and potentially improve the accuracy and consistency of classifications.

The research question that guides this project is: "Can an AI model accurately classify images of celestial bodies and provide informative descriptions?" This question serves as the foundation for exploring AI techniques such as deep learning and image recognition algorithms to develop a model capable of analyzing and classifying celestial body images.

To achieve this goal, the project will employ a large dataset of labeled celestial body images to train the AI model. The model will learn to recognize patterns, features, and characteristics specific to different celestial bodies. Once trained, the model can be used

to classify new images and provide relevant information about the identified celestial bodies, such as their names, types, distances, and other pertinent data.

The potential applications of this project are vast. The developed AI model can be integrated into websites or astronomy-related platforms, allowing users to upload celestial body images and obtain instant classifications and information. It can assist astronomers in their research by automating the initial analysis of collected images, potentially leading to new discoveries or insights. Additionally, it can serve as an educational tool, providing accessible and interactive information about celestial bodies to students, educators, and the general public.

## 1.2 Problem Background

1. Vast Amount of Data: With advancements in telescopes and space probes, we have access to an ever-increasing volume of high-resolution images of celestial bodies. Analyzing this massive amount of data manually is time-consuming and impractical.
2. Subjectivity and Human Error: Human experts' subjective interpretation and potential errors in classifying celestial body images can lead to inconsistencies and inaccuracies in the analysis.
3. Efficiency and Scalability: The manual classification process is not scalable, especially when dealing with large datasets. Automating this process can significantly enhance efficiency and enable researchers to process and analyze data at a much faster rate.
4. Complex and Diverse Celestial Bodies: Celestial bodies exhibit a wide range of characteristics and features, making their accurate classification and analysis a challenging task. AI-based image classification can help identify subtle patterns and features that might be difficult for human observers to detect.
5. Challenges in AI Technology: Despite advancements in artificial intelligence and machine learning, there are several challenges in automated image classification. AI algorithms may struggle to accurately identify complex patterns or distinguish subtle differences in astronomical images. Overcoming these challenges and improving the

accuracy and reliability of AI-based classification systems remains an ongoing problem.

6. Potential Limitations in Scientific Exploration: While AI-based image classification offers promising opportunities for scientific exploration, there are potential limitations to consider. Solely relying on automated analysis may overlook unique or unexpected phenomena that human experts could identify. Additionally, interpreting AI-generated results requires careful validation and verification to ensure their scientific validity. Balancing the benefits and limitations of AI technology in scientific exploration is an ongoing problem that researchers need to address.

### **1.3 Problem Definition / Problem Statement**

Proposed Software Solution:

1. AI-Based Image Classification: The software solution aims to develop an AI model capable of classifying celestial body images accurately. This involves training the AI model using a diverse dataset of labeled images to recognize patterns and features specific to different celestial bodies.
2. Automated Data Extraction: The software will extract relevant data about each classified celestial body, such as its name, type, distance from Earth, and other pertinent information. This automated data extraction eliminates the need for manual data collection and provides valuable information for further analysis.
3. Integration with Websites and Platforms: The software solution can be integrated into websites or astronomy-related platforms, allowing users to upload celestial body images and obtain instant classifications and information. This integration enhances accessibility and enables enthusiasts, researchers, and educators to benefit from the automated analysis.
4. Real-Time Classification: The software solution provides real-time image classification, allowing users to receive instant results and classifications as soon as they upload the celestial body images. This ensures quick and efficient analysis without delays.

5. User-Friendly Interface: The software solution features a user-friendly interface that is easy to navigate and interact with. Users can effortlessly upload images, view classifications, and access extracted data in a clear and intuitive manner, making it accessible to users with varying levels of technical expertise.

6. Performance Optimization: The software solution includes performance optimization techniques to ensure efficient and fast image classification and data extraction. By leveraging algorithms and parallel processing, the solution can handle large datasets and perform computations quickly, providing users with timely results and reducing processing time. This optimization enhances the overall user experience and enables the software to handle high volumes of image uploads with ease.

## 1.4 Project Goals and Objectives

The primary goal of the "Space Exploration using AI Model" project is to develop an AI-based software solution that can accurately classify images of celestial bodies and provide relevant information about each image. The overarching objectives of the project are as follows:

### Goals:

Develop an AI model for image classification: The project aims to train an AI model using a diverse dataset of labeled celestial body images. The model will be trained to recognize and classify different types of celestial bodies, including stars, galaxies, nebulae, and planets.

### Objectives:

Enable automated data extraction: The project will implement algorithms and techniques to extract relevant data about each classified celestial body. This includes extracting information such as the celestial body's name, type, distance from Earth, and other pertinent information.

Enhance accuracy and efficiency: The project aims to improve the accuracy and efficiency of the image classification process by leveraging AI techniques. By

automating the classification process, the project aims to reduce reliance on manual analysis, which can be time-consuming and prone to human errors.

Foster scientific research and discovery: By developing an AI-based software solution for space exploration, the project aims to contribute to scientific research and discovery in the field of astronomy. The accurate classification of celestial body images and extraction of relevant data will provide researchers with valuable insights into the universe, enabling them to study and understand celestial objects more effectively. This can lead to new discoveries, theories, and advancements in our understanding of the cosmos.

In summary, the "Space Exploration using AI Model" project aims to develop an AI-based software solution that can accurately classify celestial body images and extract relevant information about them. This will enhance the efficiency and accuracy of space exploration and reduce the need for manual analysis. Additionally, the project aims to foster scientific research and contribute to new discoveries in the field of astronomy.

## **1.5 Project Scope**

the project scope can be defined as follows:

1. Astronomical Research: The classification results contribute to understanding the structure, formation, and evolution of celestial bodies, aiding ongoing astronomical research.
2. Astronomical Image Analysis: The project automates the identification and characterization of celestial bodies in astronomical images, saving time and effort in manual analysis.
3. Education and Outreach: The project serves as an educational tool, introducing students and the public to celestial bodies classification, fostering interest in astronomy.

The utilization of the project depends on available datasets, collaboration opportunities, and the specific needs of astronomical research projects or organizations.

## 1.6 Work Breakdown Structure & Gantt Chart

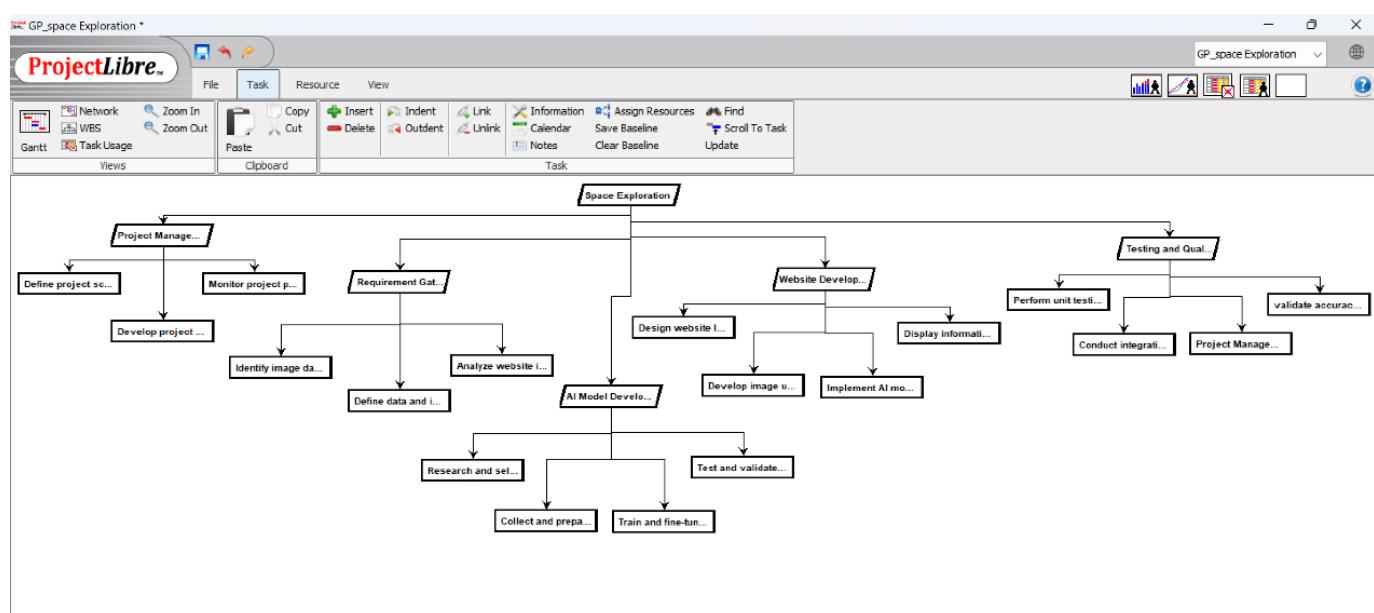
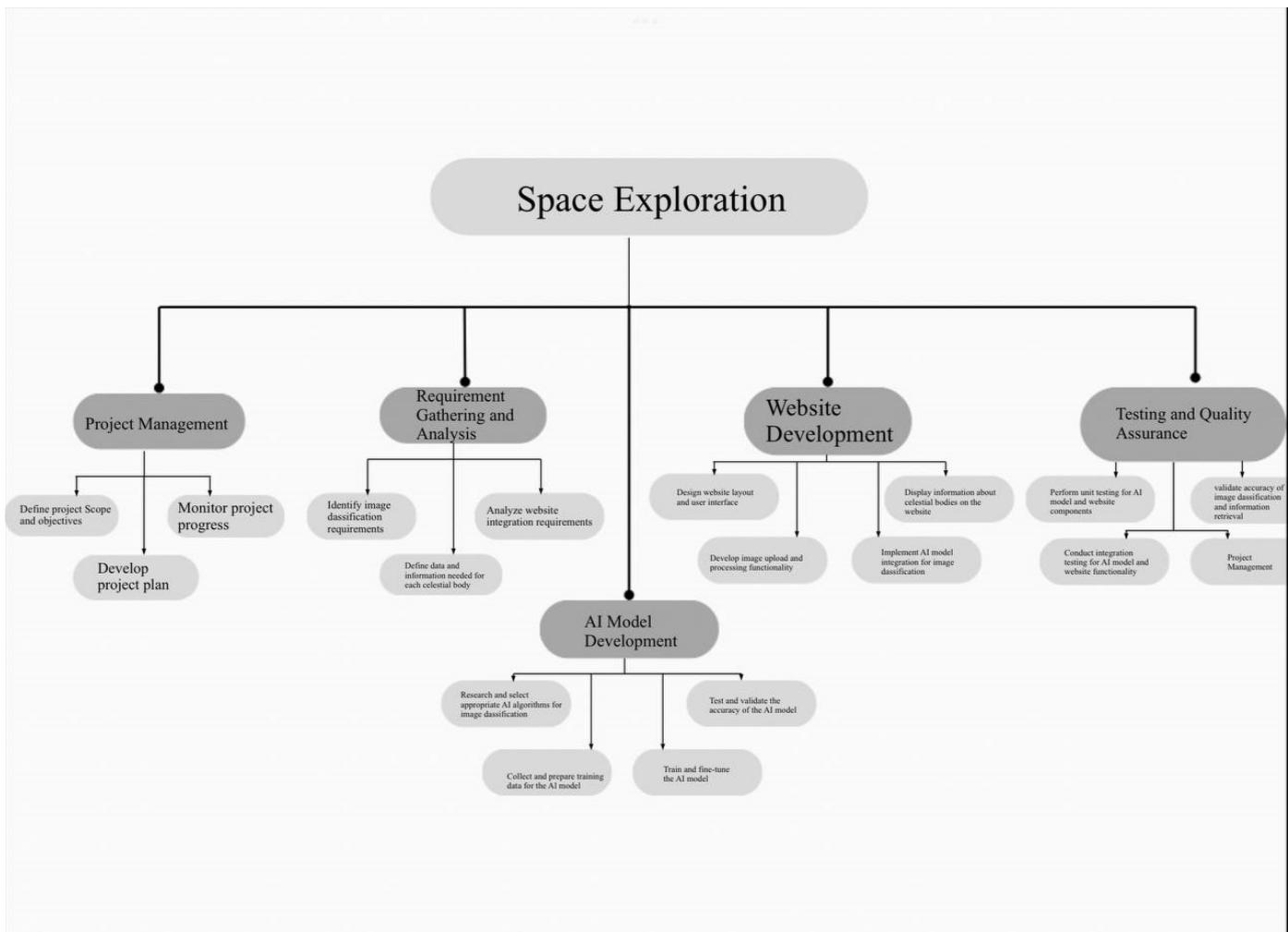


Figure 1 WBS

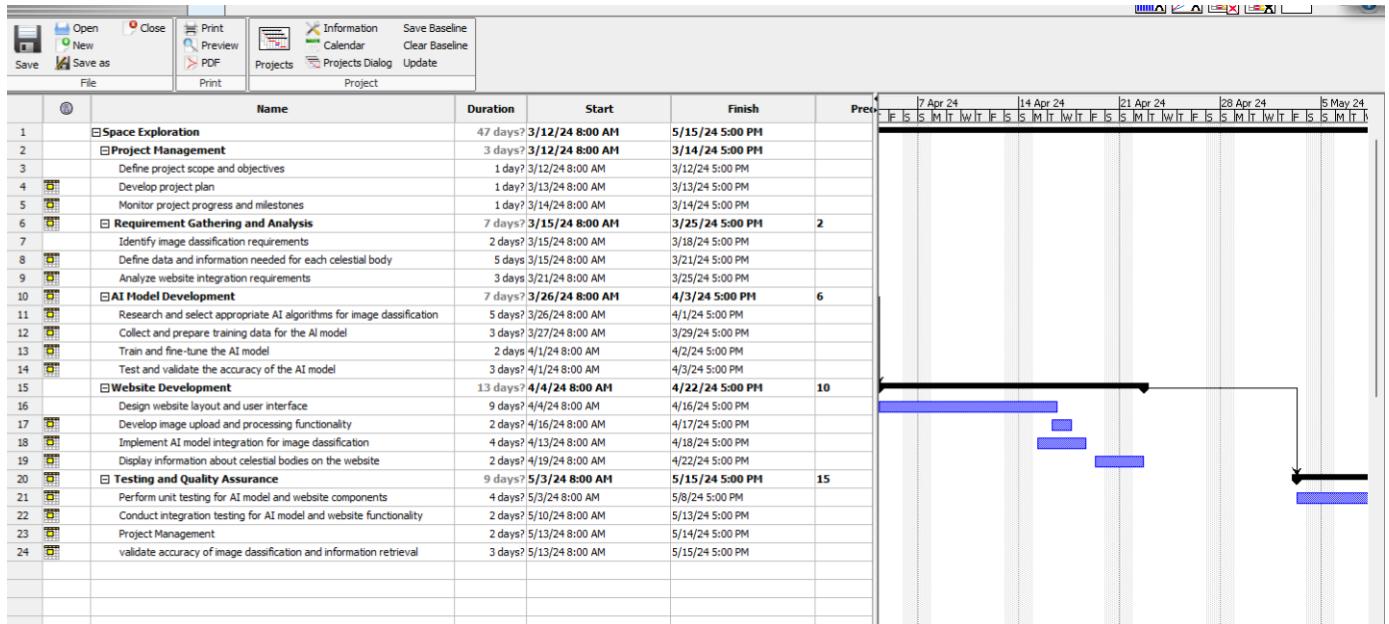


Figure2 Gantt Chart

## 2. SYSTEM ANALYSIS

### 2.1 Development Methodology

The software development life cycle (SDLC) is a commonly used methodology for the development of projects.

1. Requirements Gathering: In this phase, the project requirements are gathered and defined. This involves understanding the goals and objectives of the project, as well as the specific functionalities and features required for the AI model and website.
2. Analysis and Design: In this phase, the system architecture and design are developed. This includes designing the classification algorithms for the AI model and determining the structure and layout of the website. The data flow, database design, and user interface design may also be considered during this phase.
3. Development: Once the design is finalized, the development phase begins. This involves coding the AI model algorithms for image classification and developing the website functionality. The development process may involve programming languages like Python for the AI model and web technologies like HTML, CSS, and JavaScript for the website.

4. Testing: Testing is a critical phase to ensure the functionality and quality of the developed system. Different types of testing, such as unit testing, integration testing, and system testing, are performed to identify and fix any issues or bugs.
5. Deployment: After successful testing, the project is deployed to a production environment. This involves setting up the AI model on a server or cloud platform and deploying the website to a web server. Configuration and optimization are performed to ensure the system runs smoothly in the live environment.

## **2.2 User and System Requirements**

### **2.2.1 Functional Requirements**

Functional requirements define specific behaviors or functions of a system.

#### **1. Image Upload:**

Users can upload images directly from their device.

Users can submit images via a URL link.

#### **2. Image Processing:**

The system should validate that the file uploaded is in an acceptable image format (e.g., JPG, PNG).

The system should be able to retrieve images from specified URLs.

#### **3. Classification:**

The uploaded or linked images are processed using the trained AI model.

The model classifies images as either a planet, a galaxy, or other celestial bodies.

#### **4. Results Display:**

Display classification results clearly on the website.

Provide details about the classified objects, such as type, estimated size, distance, and other relevant astronomical data.

### **2.2.2 Non-Functional Requirements**

Non-functional requirements describe the system's quality attributes or characteristics.

### **1. Performance:**

The website should load within 5 seconds.

Image processing and classification should be completed within 10 seconds for optimal user experience.

### **2. Usability:**

The website should be user-friendly with intuitive navigation and accessible features.

The website should be responsive, providing an optimal experience across various devices and screen sizes.

### **3. Reliability:**

The system should be available 99.9% of the time.

The classification results should be accurate and consistent.

### **4. Scalability:**

The system should handle a large number of users and simultaneous requests without degradation in performance.

## 2.3 System Analysis Models

### 2.3.1 Use Case Diagram

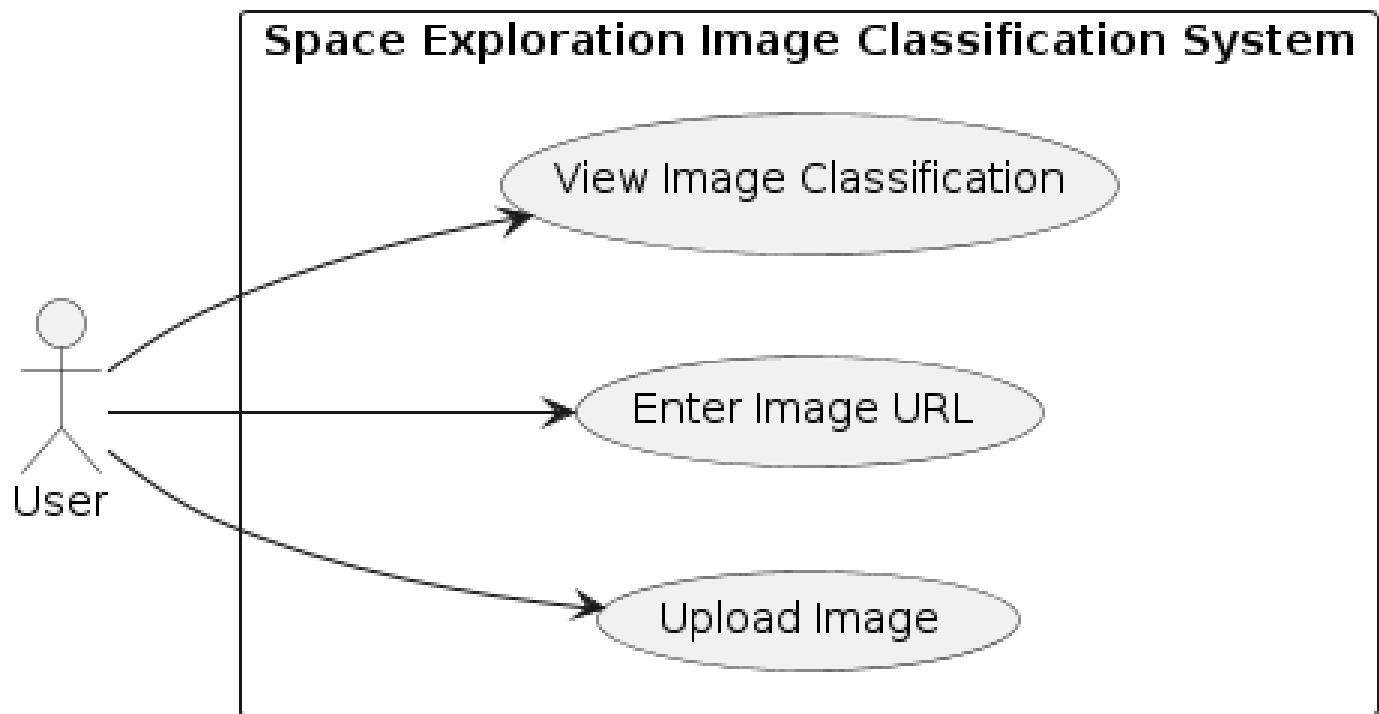


Figure3 Use Case Diagram

### 2.3.2 Sequential Diagram

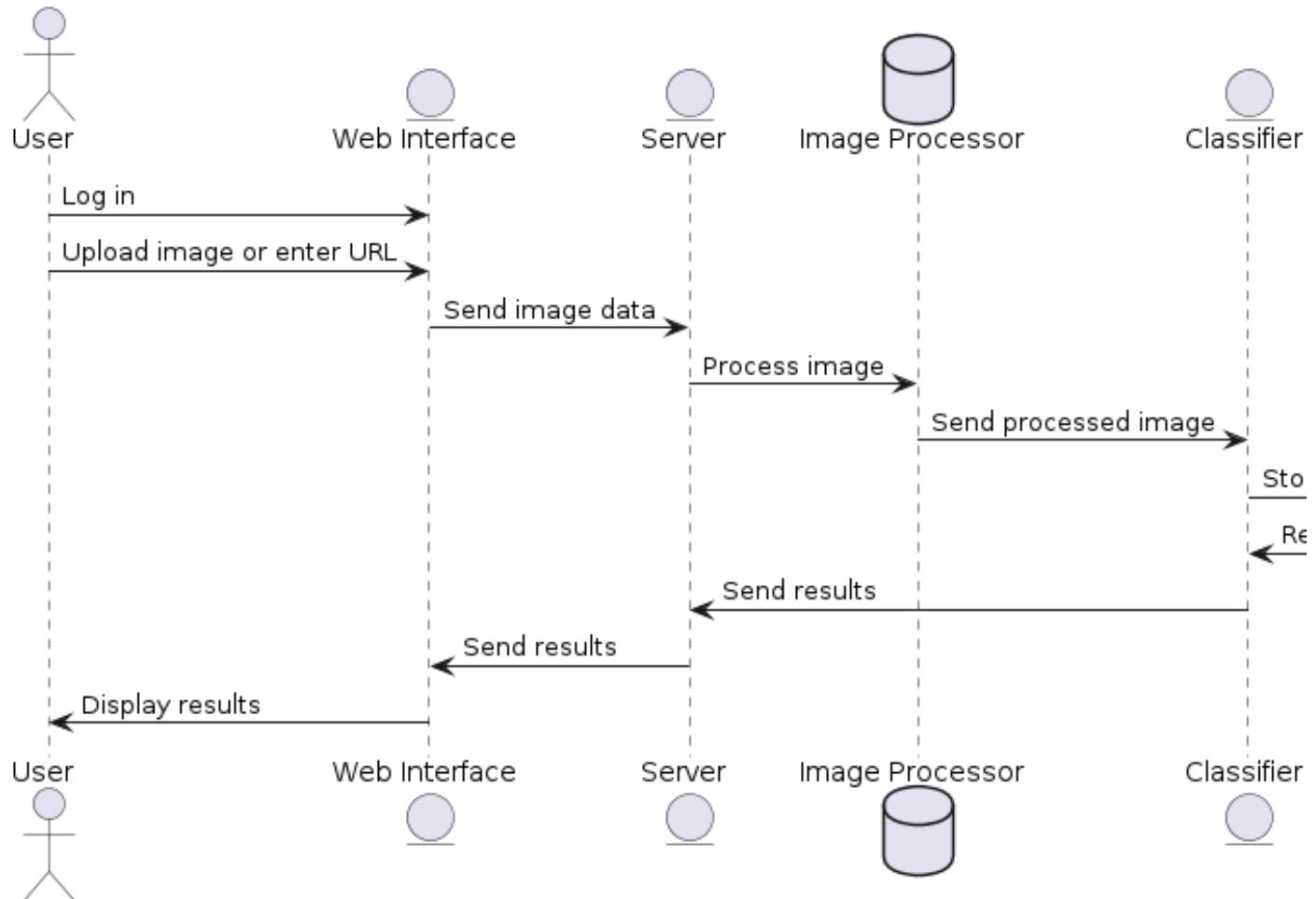


Figure4 Sequential Diagram

### 2.3.3 Activity Diagram

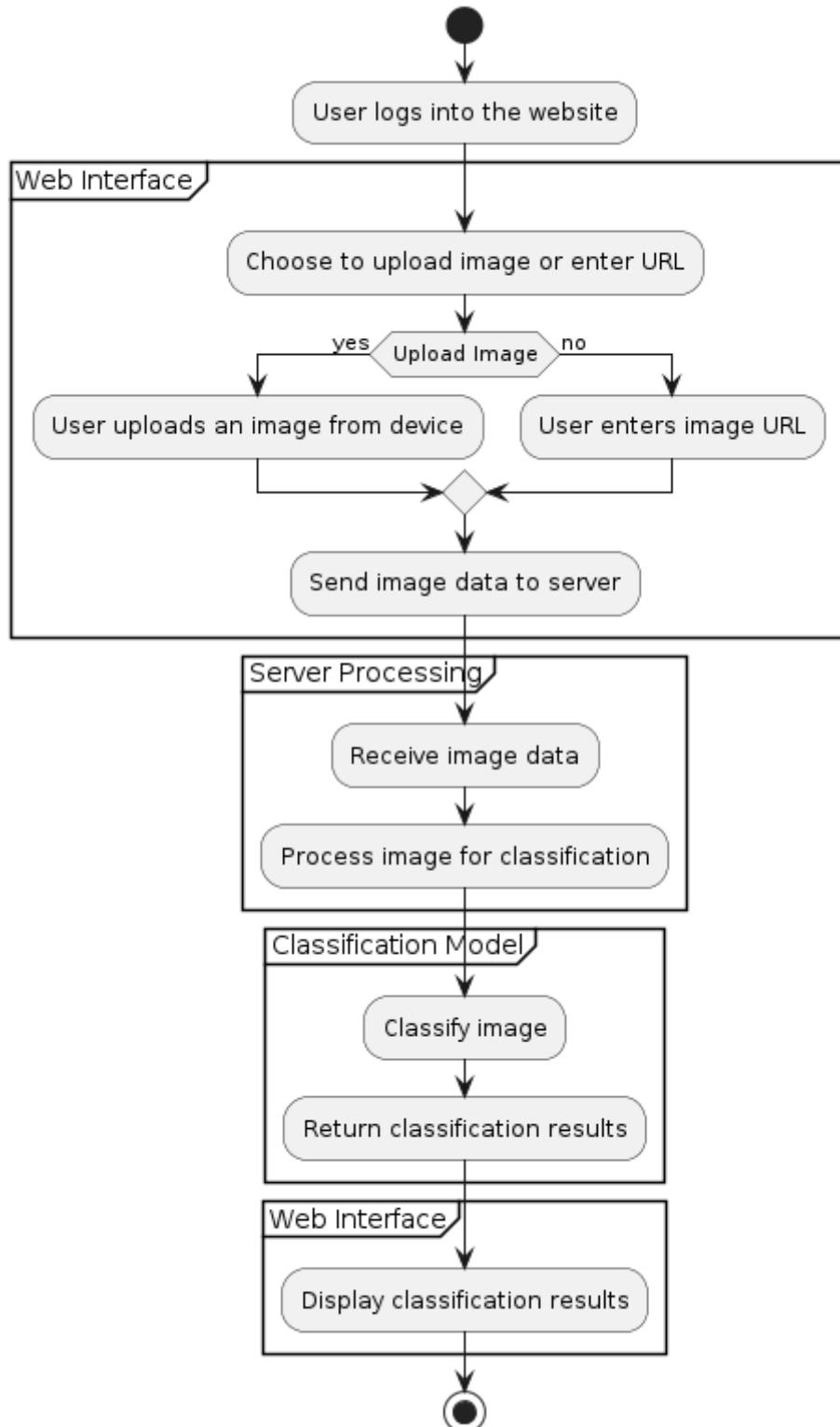


Figure 5 Activity Diagram

## 3.SYSTEM DESIGN

### 3.1 System Architecture

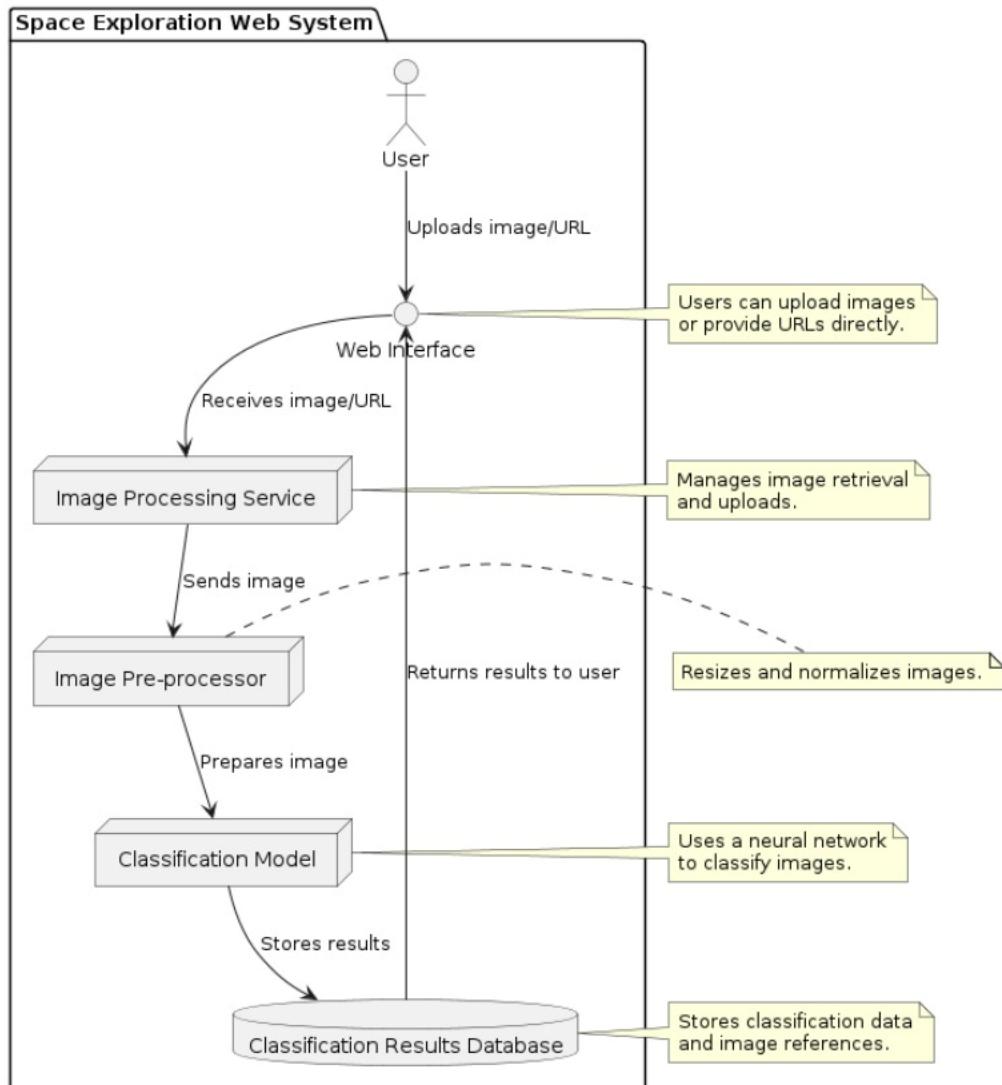


Figure6 System Architecture

- **DFD Level 0**

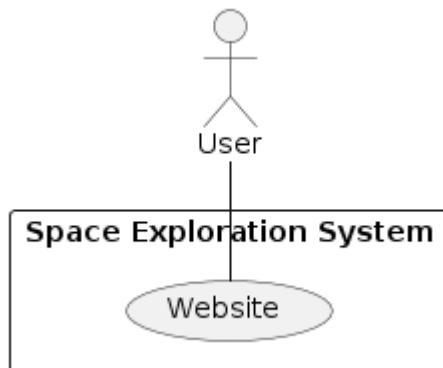


Figure7 Data Flow Diagram Level 0

- o DFD Level 1

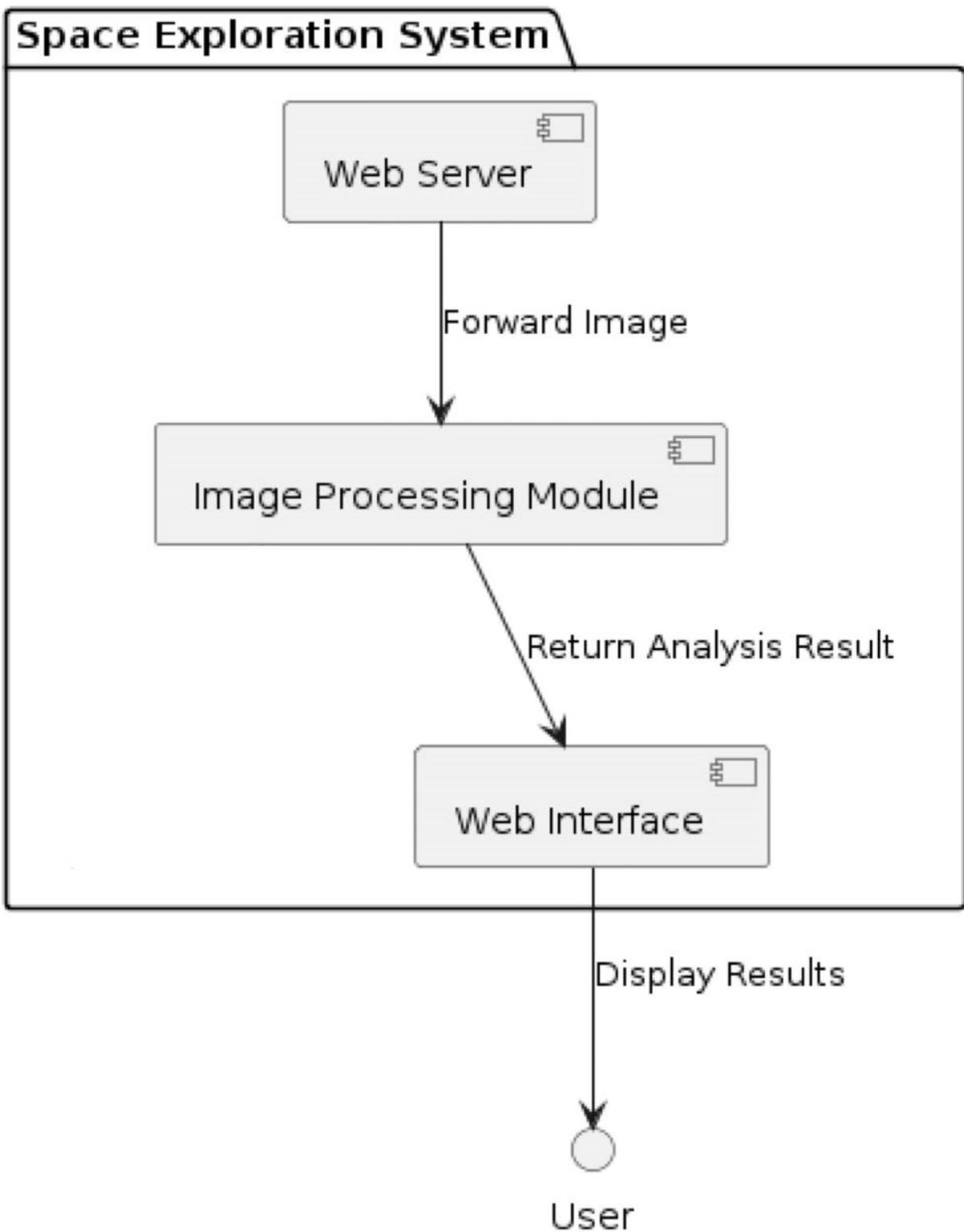


Figure 8 Data Flow Diagram Level 1

- DFD Level 2

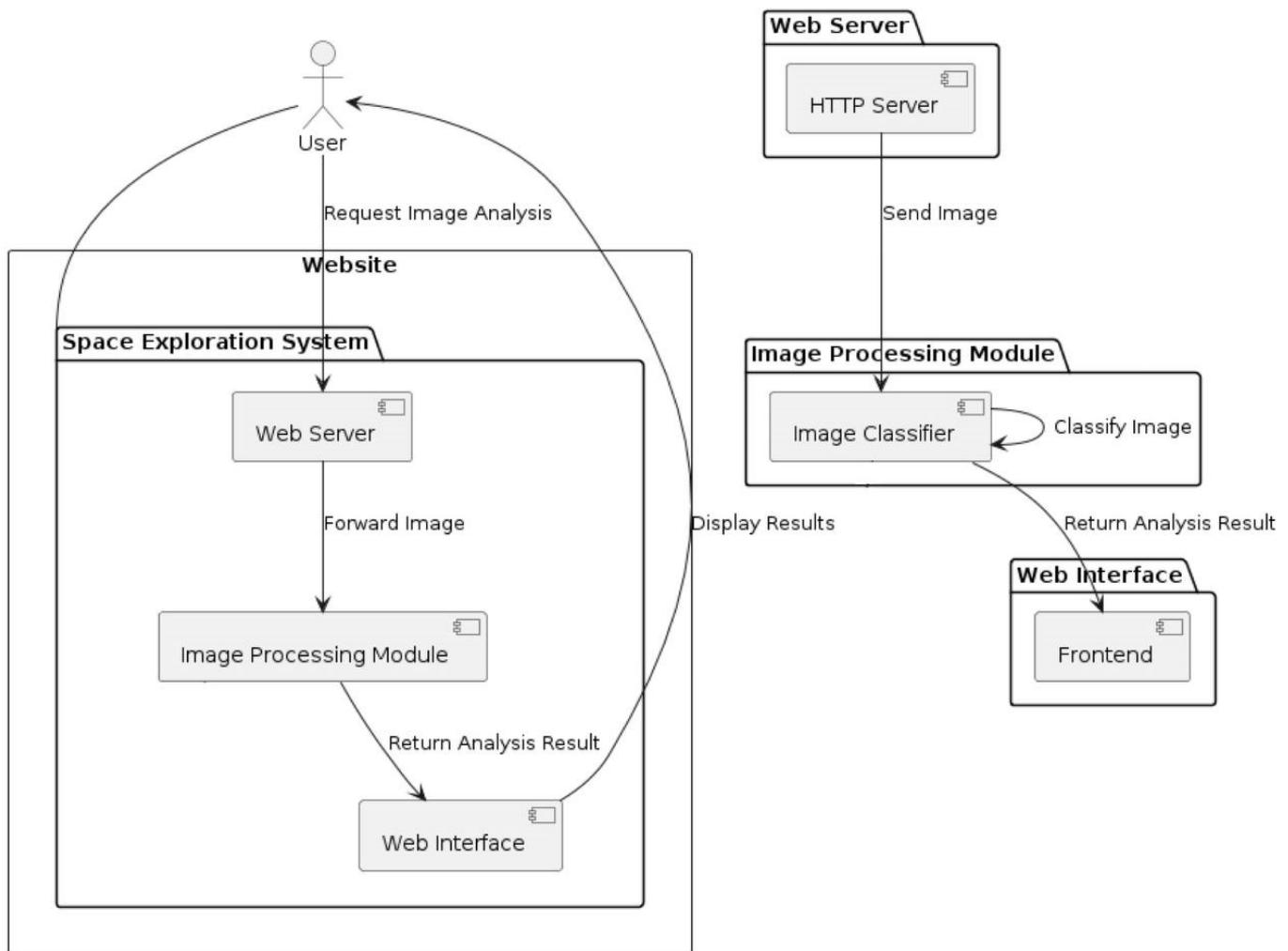


Figure 9 Data Flow Diagram Level 2

### 3.3 Class Diagram

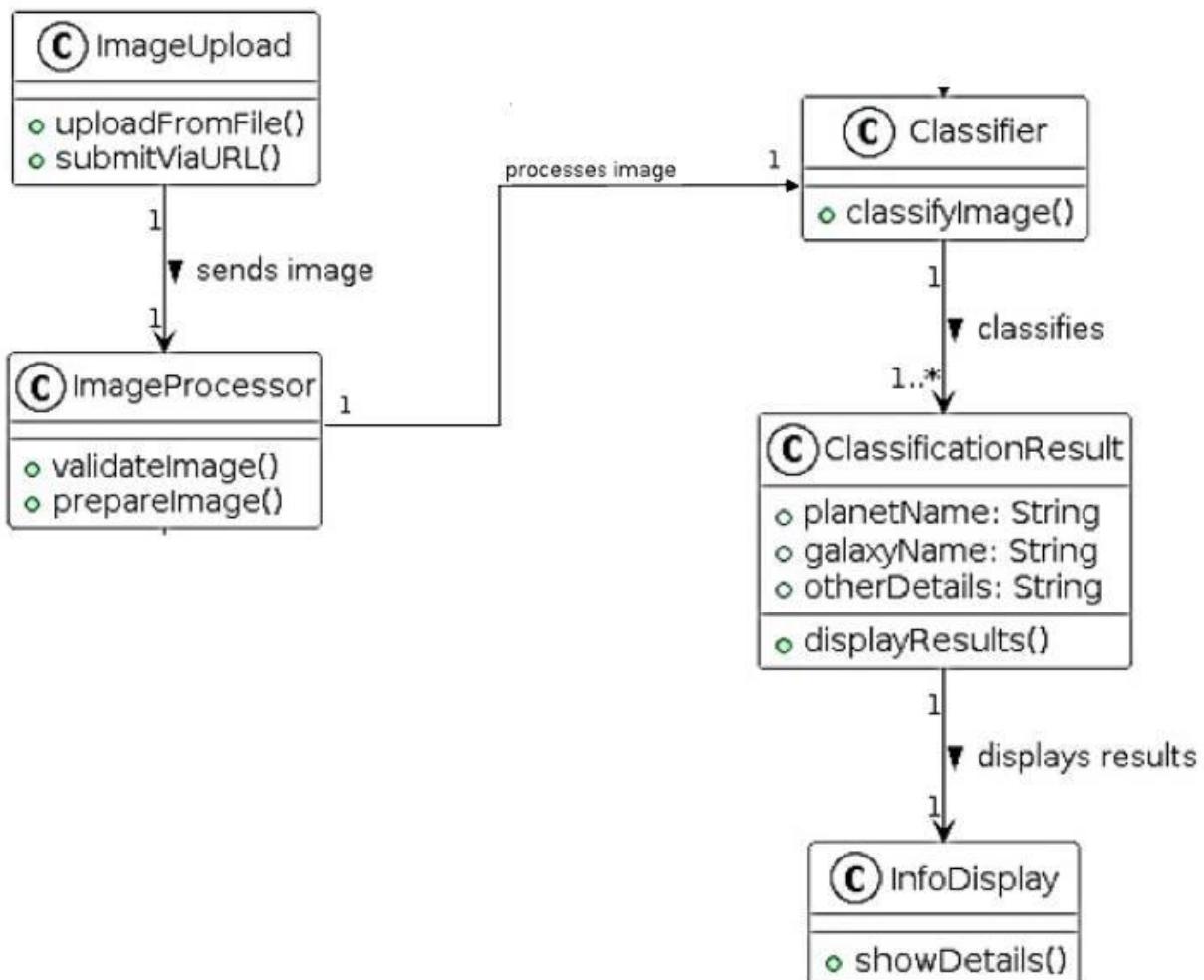


Figure 10 Class Diagram

## **4. SYSTEM IMPLEMENTATION**

### **4.1 Required Hardware & Software**

- Hardware**

S.No	Item	Description
1.	Processor	Core 15
2.	RAM	16.0 GB
3.	Processor Speed	3.0 GB
4.	Hard Disk	80 GB
5.	System type	64-bit operating system

- Software**

S.No	Item	Description
1.	Google Colab	training model environment
2.	Visual studio	Web sit environment
3.	HTML	For coding the websit
4.	Python	For Connect model with html
5.	Windows	Windows11

### **4.2 System Implementation**

- User Interface Development:**

We developed an attractive and user-friendly interface for the website. It included options for uploading an image or entering a Google image link.

- Image Upload**

When the user uploaded an image or entered a Google image link, we implemented a function to upload the image to our server.

- Image Analysis using the Model:**

We executed the model we created for classifying astronomical images. We utilized deep learning or artificial intelligence techniques to analyze the image and extract astronomical information from it.

#### 4. Displaying the Results:

After analyzing the image, we displayed the results to the user on the web page. We used the user interface to present the extracted astronomical information, such as the name of the planet or galaxy in the image.

### 4.3 Sample Code

#### **Model:**

```
import numpy as np  
  
import pandas as pd  
  
import tensorflow as tf  
  
from tensorflow import keras  
  
from tensorflow.keras import layers  
  
  
data_train_path = "Data/training_data"  
  
data_test_path = "/Data/test_data"  
  
data_val_path = "/Data/Val"  
  
  
img_width=180  
  
img_height = 180  
  
  
data_train = tf.keras.utils.image_dataset_from_directory(  
    data_train_path,  
    shuffle=True,  
    image_size=(img_width, img_height),  
    batch_size=32,
```

```
validation_split=False)

data_cat = data_train.class_names

data_cat

data_val=tf.keras.utils.image_dataset_from_directory(
    data_val_path,
    shuffle=False,
    image_size=(img_width,img_height ),
    batch_size=32,
    validation_split=False)

data_test=tf.keras.utils.image_dataset_from_directory(
    data_test_path,
    shuffle=False,
    image_size=(img_width,img_height ),
    batch_size=32,
    validation_split=False)

plt.figure(figsize=(10,10))

for image, labels in data_train.take(1):

    for i in range(9):

        plt.subplot(3,3,i+1)

        plt.imshow(image[i].numpy().astype("uint8"))
```

```
plt.title(data_cat[labels[i]])  
plt.axis("off")  
  
from tensorflow.keras.models import Sequential  
  
model = Sequential([  
    layers.Rescaling(1./255),  
    layers.Conv2D(16, 3, padding='same', activation='relu'),  
    layers.MaxPooling2D(),  
    layers.Conv2D(32, 3, padding='same', activation='relu'),  
    layers.MaxPooling2D(),  
    layers.Conv2D(64, 3, padding='same', activation='relu'),  
    layers.MaxPooling2D(),  
    layers.Flatten(),  
    layers.Dropout(0.2),  
    layers.Dense(128),  
    layers.Dense(len(data_cat))  
])  
  
model.compile(optimizer='adam',  
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),  
              metrics=['accuracy'])  
  
epochs_size = 25
```

```

history = model.fit(data_train, validation_data=data_val, epochs=epochs_size)

keras.utils.plot_model(model, show_shapes=True, rankdir="LR")

epochs_range = range(epochs_size)
plt.figure(figsize=(8,8))

plt.subplot(1,2,1)

plt.plot(epochs_range,history.history['accuracy'],label = 'Training Accuracy')
plt.plot(epochs_range, history.history['val_accuracy'],label = 'Validation Accuracy')
plt.title('Accuracy')

plt.subplot(1,2,2)

plt.plot(epochs_range,history.history['loss'],label = 'Training Loss')
plt.plot(epochs_range, history.history['val_loss'],label = 'Validation Loss')
plt.title('Loss')

from keras.models import save_model
save_model(model, 'space.h5')

```

### **app.py:**

```

from flask import Flask, request, render_template, redirect, url_for,
send_from_directory

from werkzeug.utils import secure_filename

import os # For file operations

```

```
import tensorflow as tf

import numpy as np

from PIL import Image

from io import BytesIO

import requests

import pandas as pd

# Configure Flask app

app = Flask(__name__)

# Define allowed extensions for uploaded files

ALLOWED_EXTENSIONS = {'png', 'jpg', 'jpeg'}

# Function to check allowed file extension

def allowed_file(filename):

    return '.' in filename and \
           filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS

def getData(label):

    df = pd.read_excel('static/SpaceExploration_data.xlsx')

    data = df[label]

    return data

@app.route('/', methods=['GET', 'POST'])
```

```
def upload_image():

    if request.method == 'GET':

        # Render the upload.html template for initial page load

        return render_template('upload.html')

    else:

        # Handle file upload on POST request

        file = request.files['file']

        image_url = request.form.get('imageLink')

        if image_url:

            # Handle image URL download

            try:

                response = requests.get(image_url, stream=True)

                response.raise_for_status() # Raise an exception for bad status codes

                image = 'ss'

                # Extract filename from URL

                filename = image_url.split('/')[-1]

                if response.status_code == 200:

                    # Open the image and save it to the static folder

                    image = Image.open(BytesIO(response.content))

                    image_path = os.path.join('static', 'downloaded_image.png')

                    image.save(image_path)

            # Continue with the prediction process using 'static/filename'
```

```
labels = ['asteroids',
          'earth',
          'elliptical',
          'jupiter',
          'mars',
          'mercury',
          'moon',
          'neptune',
          'pluto',
          'saturn',
          'spiral',
          'uranus',
          'venus']

image = tf.keras.utils.load_img(os.path.join('static', 'downloaded_image.png'),
target_size=(180, 180))

img_arr = tf.keras.utils.array_to_img(image)

img_bat = tf.expand_dims(img_arr, 0) # Add batch dimension

#model = tf.keras.models.load_model(os.path.join('static','space.h5'))

model = tf.keras.models.load_model('models/space.h5')

prediction = model.predict(img_bat)

score = tf.nn.softmax(prediction)

prediction_text = labels[np.argmax(score)]

planet_data = getData(prediction_text)
```

```

if prediction_text:

    return render_template('result.html', filename=filename,
image_url='downloaded_image.png', prediction=prediction_text,
planet_data=planet_data)

else:

    return render_template('upload.html', filename=filename,
image_url=f'{filename}', prediction="")

except requests.exceptions.RequestException as e:

    return render_template('upload.html', message=f'Error downloading image:
{e}')

elif file and allowed_file(file.filename):

    # Handle file upload

    filename = secure_filename(file.filename)
    file.save(os.path.join('static', filename))

    labels = ['asteroids',
              'earth',
              'elliptical',
              'jupiter',
              'mars',
              'mercury',
              'moon',
              'neptune',
              'pluto',
              'saturn',

```

```

'spiral',
'uranus',
'venus']

image = tf.keras.utils.load_img(os.path.join('static', filename), target_size=(180,
180))

img_arr = tf.keras.utils.array_to_img(image)

img_bat = tf.expand_dims(img_arr, 0) # Add batch dimension

# model = tf.keras.models.load_model('models/modelSaved.keras')

model = tf.keras.models.load_model('models/space.h5')

prediction = model.predict(img_bat)

score = tf.nn.softmax(prediction)

prediction_text = labels[np.argmax(score)]

planet_data = getData(prediction_text)

if prediction_text:

    return render_template('result.html', filename=filename,
image_url=f'{filename}', prediction=prediction_text, planet_data=planet_data)

else:

    return render_template('upload.html', filename=filename,
image_url=f'{filename}', prediction="")

else:

    return render_template('upload.html', message='No file selected or image URL
provided')

@app.route('/result/<filename>')

```

```

def show_result(filename):
    # No logic needed here, redirect to upload page
    return redirect(url_for('upload_image')) # Redirects to upload page

@app.route('/static/<path:filename>')

def serve_static(filename):
    return send_from_directory('static', filename)

if __name__ == '__main__':
    # Create uploads directory if it doesn't exist
    # os.makedirs('uploads', exist_ok=True) # Create uploads directory if missing
    app.run(debug=True)

```

### **html:**

- **None.html**

```

<!DOCTYPE html>

<html lang="en">
    <head>

        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <title>Space Exploration</title>
        <link rel="stylesheet" href="{{ url_for('static', filename='styles.css') }}">

```

```
</head>

<body>

<div class="background"></div>

<div class="container">

    <h1>Space Exploration</h1>

    <div class="search-box">

        <h2>Search by Link</h2>

        <input type="text" id="imageLink" placeholder="Enter image link">

    </div>

    <div class="upload-box">

        <h2>Upload Image</h2>

        <form method="post" enctype="multipart/form-data"> <input type="file" id="imageUpload" name="file" accept="image/*">

        <button type="submit">Search</button>

    </form>

</div>

<div id="result">

    <div id="imageInfo">{{ prediction or '' }}</div>

</div>
```

```
<script src="{{ url_for('static', filename='script.js') }}"></script>

</body>

</html>
```

- **Result.html**

```
<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Prediction Result</title>

<link rel="stylesheet" href="{{ url_for('static', filename='styles.css') }}>

</head>

<body>

<div class="background"></div>

<div style="display: flex;">

<div class="container">

<div style="display: flex; flex-direction: column;">

<div id="imageInfo">{{ prediction }}</div>

{{% if planet_data.empty %} 

<p>No data available for the predicted planet.</p>
```

```

{%- else %}

<table>

  <tr>
    <th>
      Average Distance from the sun
    </th>
    <td>
      {{ planet_data[0] }}
    </td>
  </tr>

  <tr>
    <th>
      Diameter
    </th>
    <td>
      {{ planet_data[1] }}
    </td>
  </tr>

  <tr>
    <th>
      Surface Composition
    </th>
    <td>

```

```
    {{ planet_data[2] }}  
  </td>  
  
  </tr>  
  
<tr>  
  <th>  
    Rotation Period  
  </th>  
  <td>  
    {{ planet_data[3] }}  
  </td>  
  </tr>  
  
<tr>  
  <th>  
    Revolution Period  
  </th>  
  <td>  
    {{ planet_data[4] }}  
  </td>  
  </tr>  
  
<tr>  
  <th>  
    Known No. of Moons  
  </th>  
  <td>
```

```

{{ planet_data[5] }}

</td>

</tr>

</table>

<h1 style="margin-top: 50px"></h1>

<p style="text-align: justify;"> {{ planet_data[6] }}</p>

{%- endif %}

</div>

</div>

<div class="container">



</div>

</div>

<script src="{{ url_for('static', filename='script.js') }}"></script>

</body>

</html>

```

- **Upload.html**

- 

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
<head>
```

```
<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Space Exploration</title>

<link rel="stylesheet" href="{{ url_for('static', filename='styles.css') }}">

</head>

<body>

    <div class="background"></div>

    <div class="container">

        <h1>Space Exploration</h1>

        <form method="post" enctype="multipart/form-data">

            <div class="search-box">

                <h2>Search by Link</h2>

                <input type="text" id="imageLink" name="imageLink" placeholder="Enter image link">

            </div>

            <div class="upload-box">

                <h2>Upload Image</h2>

                <input type="file" id="imageUpload" name="file" accept="image/*">

            </div>

            <button type="submit">Search</button>

        </form>

    </div>

</div>
```

```
<script src="{!! url_for('static', filename='script.js') !!}"></script>

</body>

</html>
```

- **Script.js**

```
console.log("Hello from scripts.js!");

function upload_image() {

    // show loading gif when processing

    console.log("uploading");

    var x = document.getElementsByClassName("loader");

    var i;

    for (i = 0; i < x.length; i++) {

        x[i].style.display = "block";

    }

    var x = document.getElementsByClassName("my-image-form");

    var i;

    for (i = 0; i < x.length; i++) {

        x[i].style.display = "none";

    }

}

function open_browser(){

    // open file browser

    $('#image_file').trigger('click');
```

```
}
```

```
function hide_know_more(){
```

```
    // when no button is clicked
```

```
    $("#know_more")[0].style.display="none";
```

```
}
```

```
$(document).ready(function(){
```

```
    $("input[type=file]").on('change',function(){
```

```
        // when file selected
```

```
        document.getElementById("image_url").value="";
```

```
        document.getElementById("imageName").style.display = "block";
```

```
        // document.getElementById("imageName").style.color = "white";
```

```
        document.getElementById("imageName").innerText = this.files[0].name;
```

```
    });
```

```
});
```

- **Styles.css**

```
/* Global styles */
```

```
body {
```

```
    margin: 0;
```

```
    font-family: Arial, sans-serif;
```

```
    background-color: #000;
```

```
    color: #fff;
```

```
}

.container {
    max-width: 800px;
    margin: 0 auto;
    padding: 20px;
    text-align: center;
}

h2 {
    font-size: 24px;
    margin-bottom: 10px;
}

input[type="text"],
input[type="file"] {
    width: 100%;
    padding: 15px;
    border: none;
    border-radius: 25px;
    font-size: 16px;
    background-color: rgba(255, 255, 255, 0.1);
    color: #fff;
    margin-bottom: 20px;
    box-shadow: 0 0 20px rgba(0, 0, 0, 0.3) inset;
}
```

```
button {  
    padding: 15px 30px;  
    background-color: #0066ff;  
    color: #fff;  
    border: none;  
    border-radius: 25px;  
    cursor: pointer;  
    font-size: 16px;  
    transition: background-color 0.3s ease;  
}  
  
button:hover {  
    background-color: #0052cc;  
}  
  
/* Home page specific styles */  
  
.background {  
    position: fixed;  
    top: 0;  
    left: 0;  
    width: 100%;  
    height: 100%;  
    background-image: url('s.jpg');  
  
    /* Add your background image */  
    z-index: -1;  
}
```

```
        animation: starsAnimation 20s linear infinite;  
    }  
  
  
    @keyframes starsAnimation {  
        from {  
            background-position: 0 0;  
        }  
        to {  
            background-position: 1000px 1000px;  
            /* Adjust as needed */  
        }  
    }  
  
  
.search-box,  
.upload-box {  
    background-color: rgba(0, 0, 0, 0.7);  
    border-radius: 15px;  
    padding: 20px;  
    margin-bottom: 20px;  
    box-shadow: 0 0 20px rgba(0, 0, 0, 0.3);  
}  
  
  
/* Add more styles as needed */  
  
#imageInfo {
```

```
    font-size: 90px;  
    font-weight: bold;  
    text-transform: capitalize;  
}
```

```
/* td {  
    background-color: #fff;  
    color: #000;  
    border-radius: 50%;  
} */
```

```
table,  
td,  
th {  
    border: 1px #fff solid;  
}
```

```
table {  
    height: 150px;  
    width: 100%;  
    border-collapse: collapse;
```

## 5. SYSTEM TESTING

### 5.1 Unit Testing

Unit	Testing	Result
Check model	Objective: Verify if the model correctly analyzes images and provides the names of celestial bodies.	The check was successful; the model accurately identifies celestial bodies.
Check connection model	Ensure the connection between the model and the web interface using Flask is functioning properly.	The check was successful; the model successfully connects with the Flask web interface.
Check URL	Confirm if the website properly receives image links copied by the user.	The check was successful; the website accurately receives image links.
Check Upload	Validate if the website correctly receives and processes uploaded image files.	The check was successful; the website accurately receives and processes uploaded images.

### 5.2 Integration Testing

In space exploration, a model has been created to classify images of celestial objects, and it has been integrated with a Flask web page using HTML. The model has been tested and has successfully achieved excellent performance in classification.

Additionally, performance testing has been conducted to ensure that the system responds quickly and efficiently to user requests on the website.

## 5.3 Testing reports

The testing process, comprising unit and integration testing, confirms the robustness and reliability of the system. The model accurately analyzes celestial objects, connects seamlessly with the web interface, and efficiently handles user requests. Performance testing further assures users of a responsive and efficient experience on the website.

# 6. SYSTEM DEMONSTRATION

## 6.1 System Screens Snapshots

```
File Edit Selection View Go Run Terminal Help ← → ⌂ GPFINAL
EXPLORER ... OPEN EDITOR Untitled12 (1)-checkpoint.ipynb C:\man app.py script.js launch.json none.html result.html upload.html Untitled12 (1)-c...
app.py > ...
1  from flask import Flask, request, render_template, redirect, url_for, send_from_directory
2  from werkzeug.utils import secure_filename
3  import os # For file operations
4  import tensorflow as tf
5  import numpy as np
6  from PIL import Image
7  from io import BytesIO
8  import requests
9  import pandas as pd
10
11 # Configure Flask app
12 app = Flask(__name__)
13
14 # Define allowed extensions for uploaded files
15 ALLOWED_EXTENSIONS = {'png', 'jpg', 'jpeg'}
16
17 # Function to check allowed file extension
18 def allowed_file(filename):
19     return '.' in filename and \
20           filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS
21
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Code
floating-point round-off errors from different computation orders. To turn them off, set the environment variable 'TF_ENABLE_ONEDNN_OPTS=0'.
2024-05-16 10:16:26.974111: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to
floating-point round-off errors from different computation orders. To turn them off, set the environment variable 'TF_ENABLE_ONEDNN_OPTS=0'.
* Serving Flask app 'app'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
2024-05-16 10:16:30.403394: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to
floating-point round-off errors from different computation orders. To turn them off, set the environment variable 'TF_ENABLE_ONEDNN_OPTS=0'.
2024-05-16 10:16:31.760190: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to
floating-point round-off errors from different computation orders. To turn them off, set the environment variable 'TF_ENABLE_ONEDNN_OPTS=0'.
* Debugger is active!
* Debugger PIN: 347-291-090
Ln 11, Col 22 Spaces: 2 UTF-8 CRLF Python 3.11.5 64-bit
18:10 16/05/2024 ENG UK Launch Chrome against localhost (GPFINAL)

```

Figure11 Link

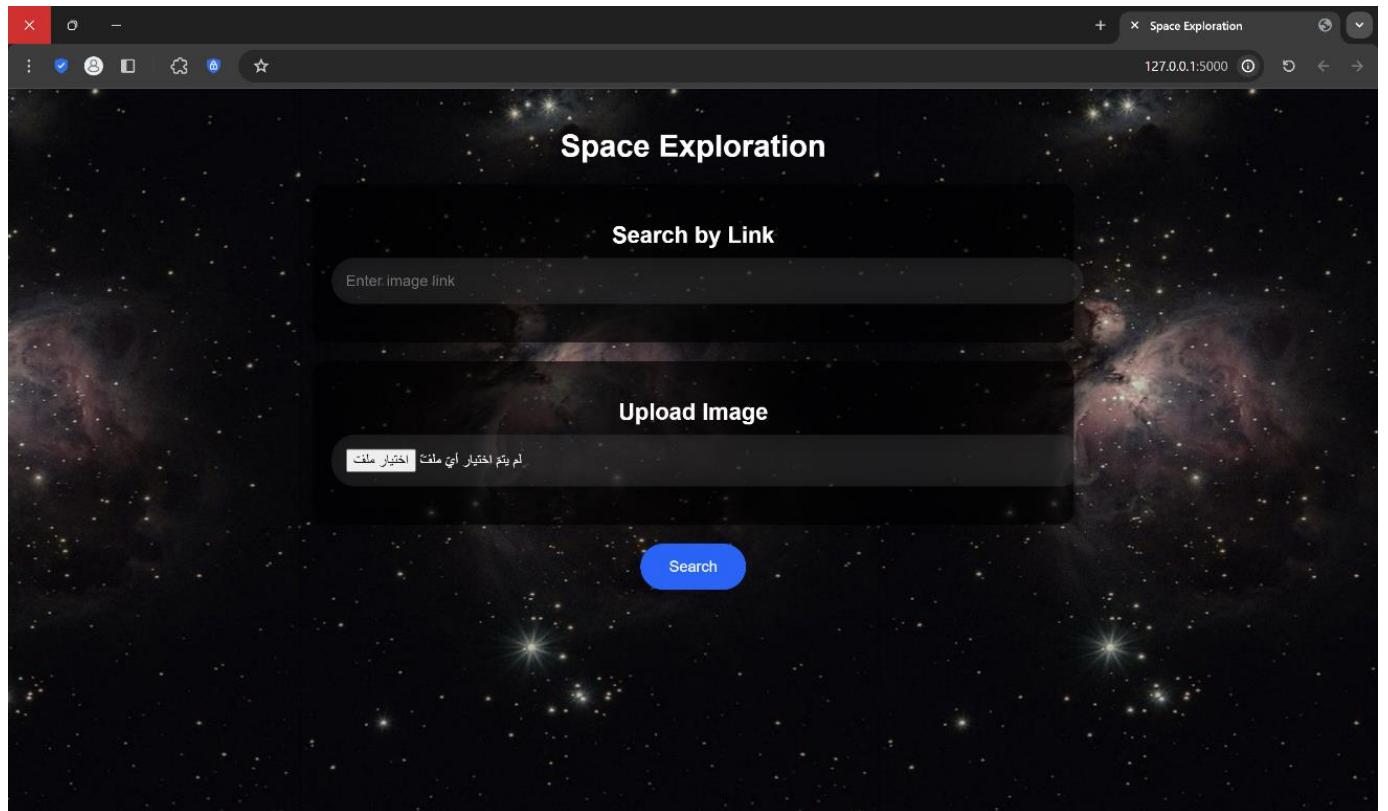


Figure 12 websit

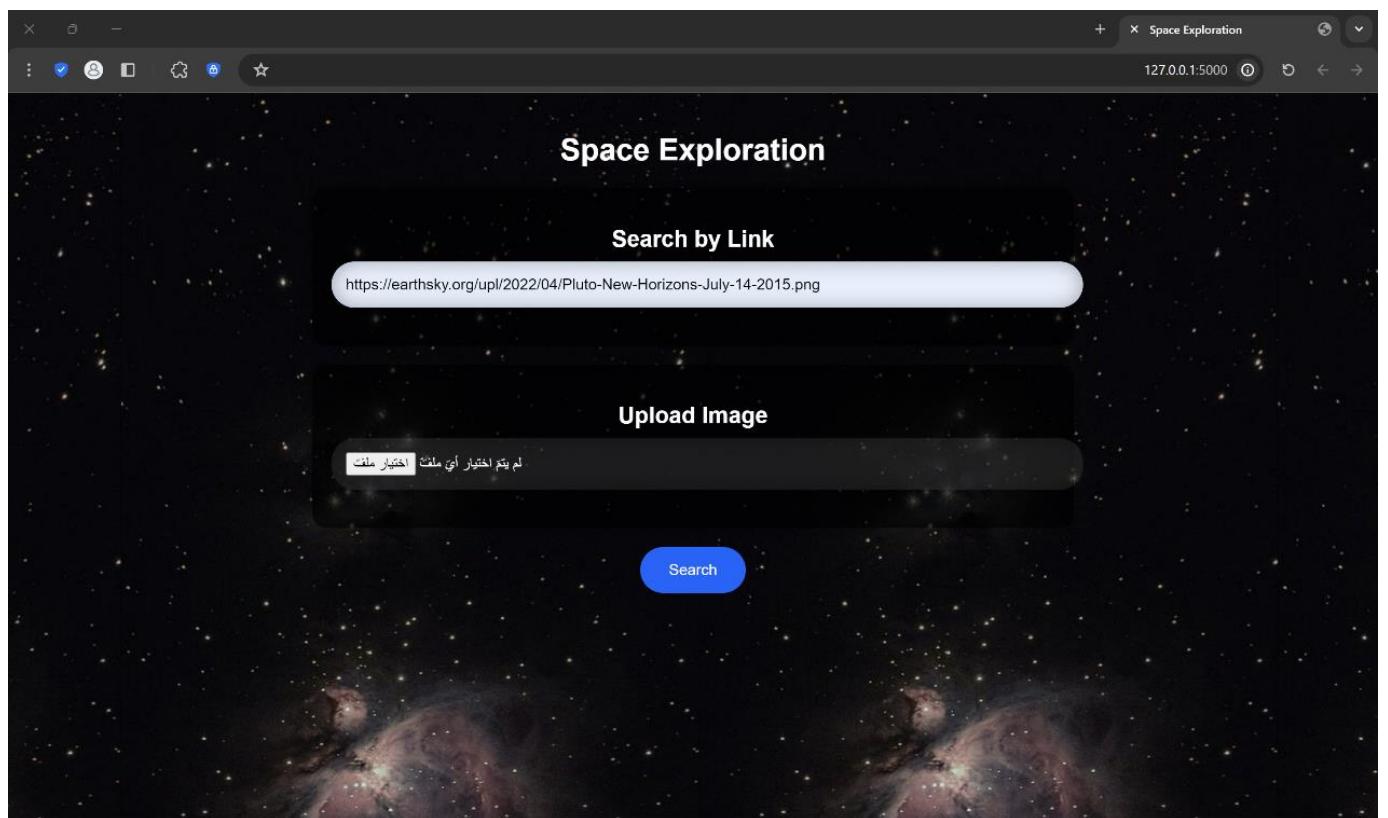
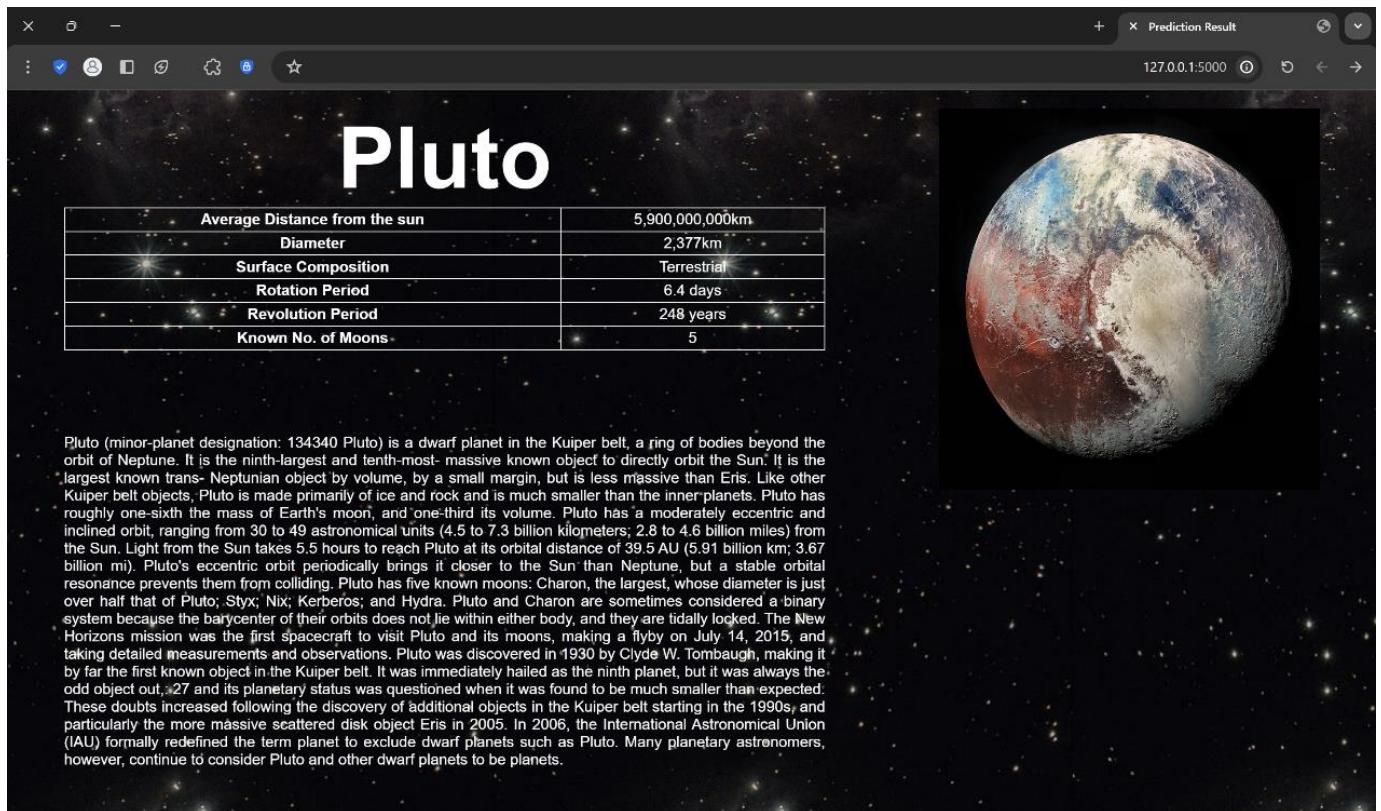
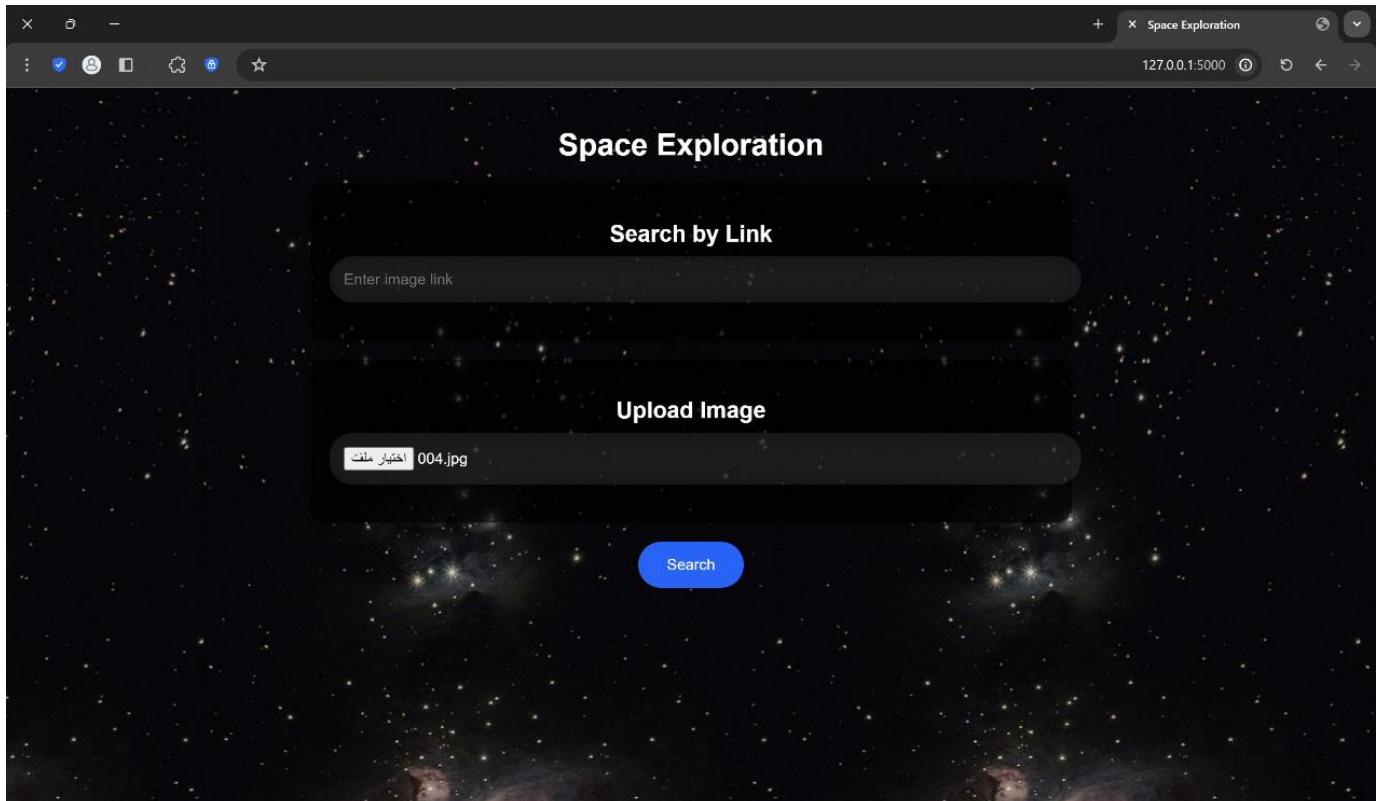


Figure 14 Search by Link



*Figure 13 result of Link*



*Figure 14 search by file*

**Earth**

Average Distance from the sun	149,600,000 km
Diameter	12,756 km
Surface Composition	Terrestrial
Rotation Period	23 hours, 56 mins
Revolution Period	365.25 days
Known No. of Moons	1

Earth is the third planet from the Sun and the only astronomical object known to harbor life. This is enabled by Earth being a water world, the only one in the Solar System sustaining liquid surface water. Almost all of Earth's water is contained in its global ocean, covering 70.8% of Earth's crust. The remaining 29.2% of Earth's crust is land, most of which is located in the form of continental landmasses within Earth's land hemisphere. Most of Earth's land is somewhat humid and covered by vegetation, while large sheets of ice at Earth's polar deserts retain more water than Earth's groundwater, lakes, rivers and atmospheric water combined. Earth's crust consists of slowly moving tectonic plates, which interact to produce mountain ranges, volcanoes, and earthquakes. Earth has a liquid outer core that generates a magnetosphere capable of deflecting most of the destructive solar winds and cosmic radiation. Earth has a dynamic atmosphere, which sustains Earth's surface conditions and protects it from most meteoroids and UV-light at entry. It has a composition of primarily nitrogen and oxygen. Water vapor is widely present in the atmosphere, forming clouds that cover most of the planet. The water vapor acts as a greenhouse gas and, together with other greenhouse gases in the atmosphere, particularly carbon dioxide (CO<sub>2</sub>), creates the conditions for both liquid surface water and water vapor to persist via the capturing of energy from the Sun's light. This process maintains the current average surface temperature of 14.76 °C (58.57 °F), at which water is liquid under normal atmospheric pressure. Differences in the amount of captured energy between geographic regions (as with the equatorial region receiving more sunlight than the polar regions) drive atmospheric and ocean currents, producing a global climate system with different climate regions, and a range of weather phenomena such as precipitation, allowing components such as nitrogen to cycle. Earth is rounded into an ellipsoid with a circumference of about 40,000 km. It is the densest planet in the Solar System. Of the four rocky planets, it is the largest and most massive. Earth is about eight light-minutes away from the Sun and orbits it, taking a year (about 365.25 days) to complete one revolution. Earth rotates around its own axis in slightly less than a day (in about 23 hours and 56 minutes). Earth's axis of rotation is tilted

Figure 15 result from file

**Elliptical**

Average Distance from the sun	-
Diameter	-
Surface Composition	-
Rotation Period	-
Revolution Period	-
Known No. of Moons	-

An elliptical galaxy is a type of galaxy with an approximately ellipsoidal shape and a smooth, nearly featureless image. They are one of the four main classes of galaxy described by Edwin Hubble in his Hubble sequence and 1936 work *The Realm of the Nebulae*, along with spiral and lenticular galaxies. Elliptical (E) galaxies are, together with lenticular galaxies (S0) with their large-scale disks, and ES galaxies with their intermediate scale disks, a subset of the "early-type" galaxy population. Most elliptical galaxies are composed of older, low-mass stars, with a sparse interstellar medium, and they tend to be surrounded by large numbers of globular clusters. Star formation activity in elliptical galaxies is typically minimal; they may, however, undergo brief periods of star formation when merging with other galaxies. Elliptical galaxies are believed to make up approximately 10–15% of galaxies in the Virgo Supercluster, and they are not the dominant type of galaxy in the universe overall. They are preferentially found close to the centers of galaxy clusters. Elliptical galaxies range in size from dwarf ellipticals with tens of millions of stars, to supergiants of over one hundred trillion stars that dominate their galaxy clusters. Originally, Edwin Hubble hypothesized that elliptical galaxies evolved into spiral galaxies, which was later discovered to be false, although the accretion of gas and smaller galaxies may build a disk around a pre-existing ellipsoidal structure. Stars found inside of elliptical galaxies are on average much older than stars found in spiral galaxies.

Figure 16 another Output

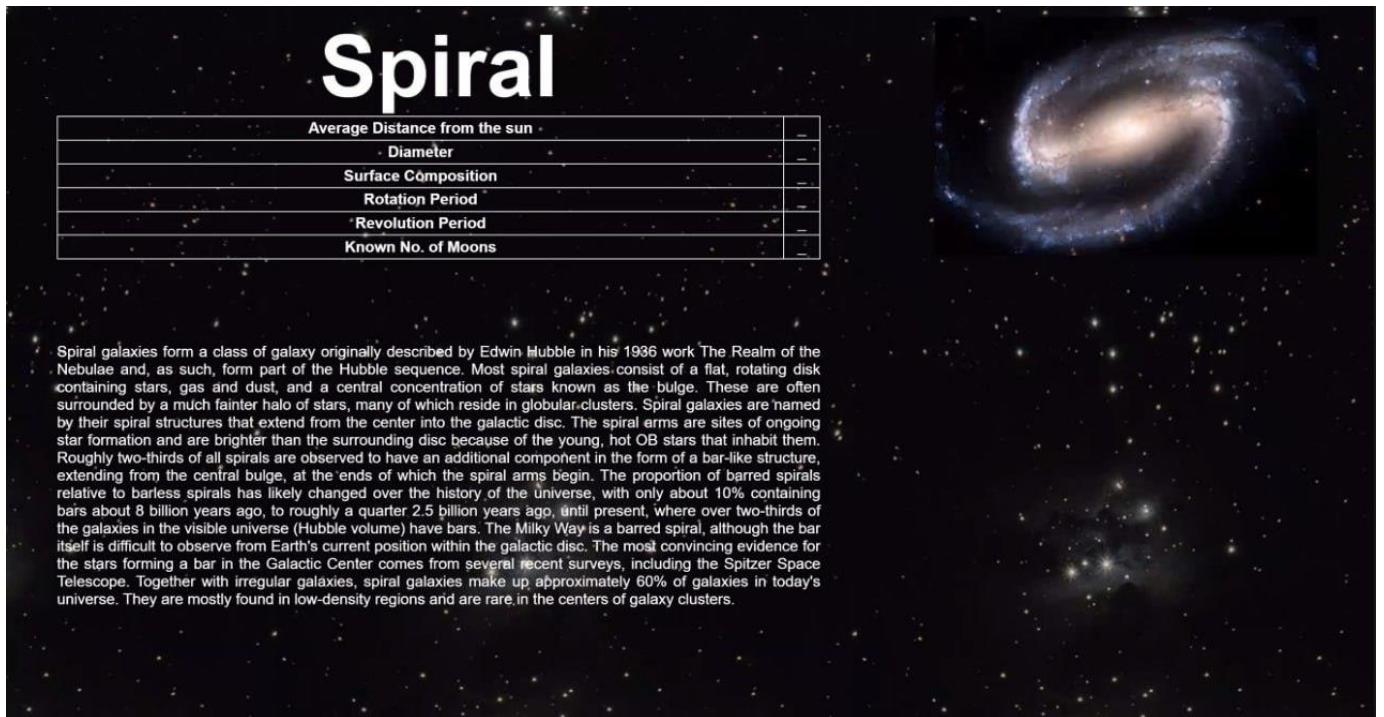


Figure 17 another Output

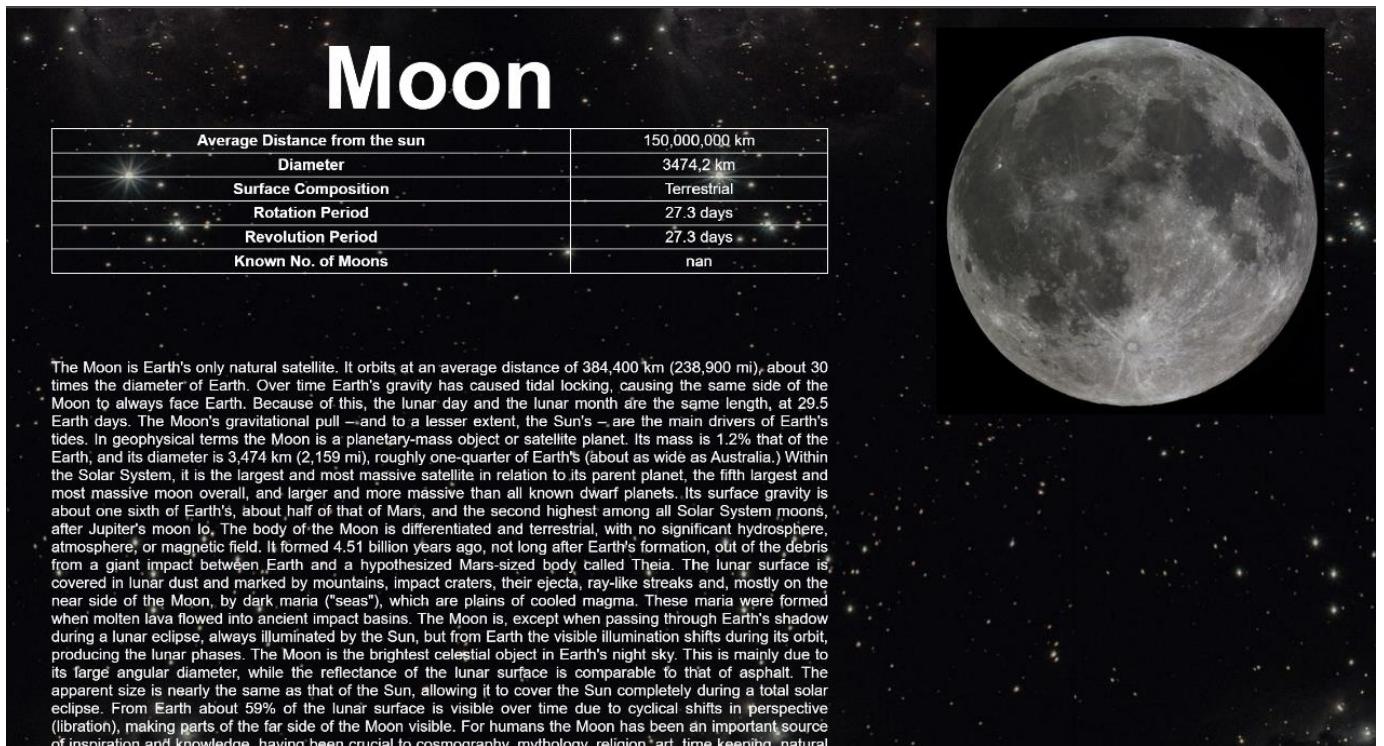


Figure 18 Output

# Neptune

Average Distance from the sun	4,496,976,000 km
Diameter	49,532 km
Surface Composition	Jovian
Rotation Period	16 hours, 7mins
Revolution Period	164.8 years
Known No. of Moons	14

Neptune is the eighth and farthest known planet from the Sun. It is the fourth-largest planet in the Solar System by diameter, the third-most-massive planet, and the densest giant planet. It is 17 times the mass of Earth, and slightly more massive than fellow ice giant Uranus. Neptune is denser and physically smaller than Uranus because its greater mass causes more gravitational compression of its atmosphere. Being composed primarily of gases and liquids, it has no well-defined solid surface. The planet orbits the Sun once every 164.8 years at an orbital distance of 30.1 astronomical units (4.5 billion kilometres; 2.8 billion miles). It is named after the Roman god of the sea and has the astronomical symbol , representing Neptune's trident. Neptune is not visible to the unaided eye and is the only planet in the Solar System that was found from mathematical predictions derived from indirect observations rather than being initially observed by direct empirical observation. Unexpected changes in the orbit of Uranus led Alexis Bouvard to hypothesise that its orbit was subject to gravitational perturbation by an unknown planet. After Bouvard's death, the position of Neptune was predicted from his observations, independently, by John Couch Adams and Urbain Le Verrier. Neptune was subsequently directly observed with a telescope on 23 September 1846 by Johann Gottfried Galle within a degree of the position predicted by Le Verrier. Its largest moon, Triton, was discovered shortly thereafter, though none of the planet's remaining 15 known moons were located telescopically until the 20th century. The planet's distance from Earth gives it a small apparent size, making it challenging to study with Earth-based telescopes. Neptune was visited by Voyager 2, when it flew by the planet on 25 August 1989; Voyager 2 remains the only spacecraft to have visited it. The advent of the Hubble Space Telescope and large ground-based telescopes with adaptive optics has allowed for additional detailed observations from afar. Like the gas giants (Jupiter and Saturn), Neptune's atmosphere is composed primarily of hydrogen and helium, along with traces of hydrocarbons and possibly nitrogen, but contains a higher proportion of ices such as water, ammonia and methane. Similar to Uranus, its interior is primarily composed of ices and rock; both planets are normally considered "ice giants" to distinguish

*Figure 19 Output*

# Mercury

Average Distance from the sun	57,900,000 km
Diameter	4,878 km
Surface Composition	Terrestrial
Rotation Period	59 days
Revolution Period	88 days
Known No. of Moons	0

Mercury is the first planet from the Sun and the smallest in the Solar System. In English, it is named after the ancient Roman god Mercurius (Mercury), god of commerce and communication, and the messenger of the gods. Mercury is classified as a terrestrial planet, with roughly the same surface gravity as Mars. The surface of Mercury is heavily cratered, as a result of countless impact events that have accumulated over billions of years. Its largest crater, Caloris Planitia, has a diameter of 1,550 km (960 mi) and one-third the diameter of the planet (4,880 km or 3,030 mi). Similarly to the Earth's Moon, Mercury's surface displays an expansive rupes system generated from thrust faults and bright ray systems formed by impact event remnants. Mercury's sidereal year (88.0 Earth days) and sidereal day (58.65 Earth days) are in a 3:2 ratio. This relationship is called spin-orbit resonance, and sidereal here means "relative to the stars". Consequently, one solar day (sunrise to sunrise) on Mercury lasts for around 176 Earth days: twice the planet's sidereal year. This means that one side of Mercury will remain in sunlight for one Mercurian year of 88 Earth days; while during the next orbit, that side will be in darkness all the time until the next sunrise after another 88 Earth days. Combined with its high orbital eccentricity, the planet's surface has widely varying sunlight intensity and temperature; with the equatorial regions ranging from -170 °C (-270 °F) at night to 420 °C (790 °F) during sunlight. Due to the very small axial tilt, the planet's poles are permanently shadowed. This strongly suggests that water ice could be present in the craters. Above the planet's surface is an extremely tenuous exosphere and a faint magnetic field that is strong enough to deflect solar winds. Mercury has no natural satellite. As of the early 2020s, many broad details of Mercury's geological history are still under investigation or pending data from space probes. Like other planets in the Solar System, Mercury was formed approximately 4.5 billion years ago. Its mantle is highly homogeneous, which suggests that Mercury had a magma ocean early in its history, like the Moon. According to current models, Mercury may have a solid silicate crust and mantle overlying a solid outer core, a deeper liquid core layer, and a solid inner core. There are many competing hypotheses about Mercury's origins and development, some of

*Figure 20 Output*

# Mars

Average Distance from the sun	227,936,640 km
Diameter	6,794 km
Surface Composition	Terrestrial
Rotation Period	24 hours, 37 mins
Revolution Period	687 days
Known No. of Moons	2

Mars is the fourth planet from the Sun. The surface of Mars is orange-red because it is covered in iron(III) oxide dust, giving it the nickname "the Red Planet". Mars is among the brightest objects in Earth's sky and its high-contrast albedo features have made it a common subject for telescope viewing. It is classified as a terrestrial planet and is the second smallest of the Solar System's planets with a diameter of 6,779 km (4,212 mi). In terms of orbital motion, a Martian solar day (sol) is equal to 24.5 hours and a Martian solar year is equal to 1.88 Earth years (687 Earth days). Mars has two natural satellites that are small and irregular in shape: Phobos and Deimos. The relatively flat plains in northern parts of Mars strongly contrast with the cratered terrain in southern highlands – this terrain observation is known as the Martian dichotomy. Mars hosts many enormous extinct volcanoes (such as Olympus Mons, 219 km or 13.6 mi tall) and one of the largest canyons in the Solar System (Valles Marineris, 4,000 km or 2,500 mi long). Geologically, the planet is fairly active with marsquakes trembling underneath the ground, dust devils sweeping across the landscape, and cirrus clouds. Carbon dioxide is substantially present in Mars's polar ice caps and thin atmosphere. During a year, there are large surface temperature swings on the surface between -78.5 °C (-109.3 °F) to 5.7 °C (42.3 °E) similar to Earth's seasons, as both planets have significant axial tilt. Mars was formed approximately 4.5 billion years ago. During the Noachian period (4.5 to 3.5 billion years ago), Mars's surface was marked by meteor impacts, valley formation, erosion, and the possible presence of water oceans. The Hesperian period (3.5 to 3.3–2.9 billion years ago) was dominated by widespread volcanic activity and flooding that carved immense outflow channels. The Amazonian period, which continues to the present, was marked by the wind as a dominant influence on geological processes. Due to Mars's geological history, the possibility of past or present life on Mars remains of great scientific interest. Since the late 20th century, Mars has been explored by uncrewed spacecraft and rovers, with

*Output21 Figure*

# Asteroids

Average Distance from the sun	400,00,000'km
Diameter	1cm - 950km
Surface Composition	-
Rotation Period	-
Revolution Period	-
Known No. of Moons	-

Asteroids, sometimes called minor planets, are rocky, airless remnants left over from the early formation of our solar system about 4.6 billion years ago. Most of this ancient space rubble can be found orbiting the Sun between Mars and Jupiter within the main asteroid belt.

*Figure22 Output*

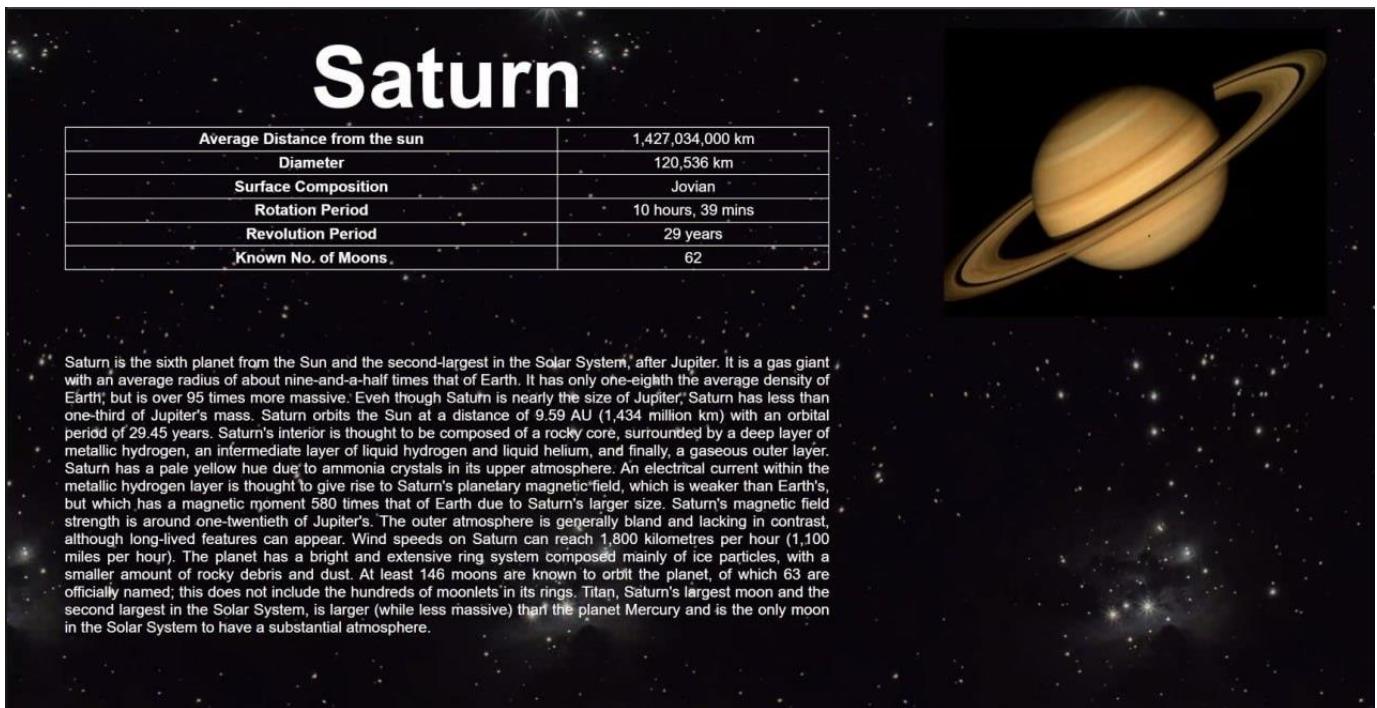


Figure23 Output

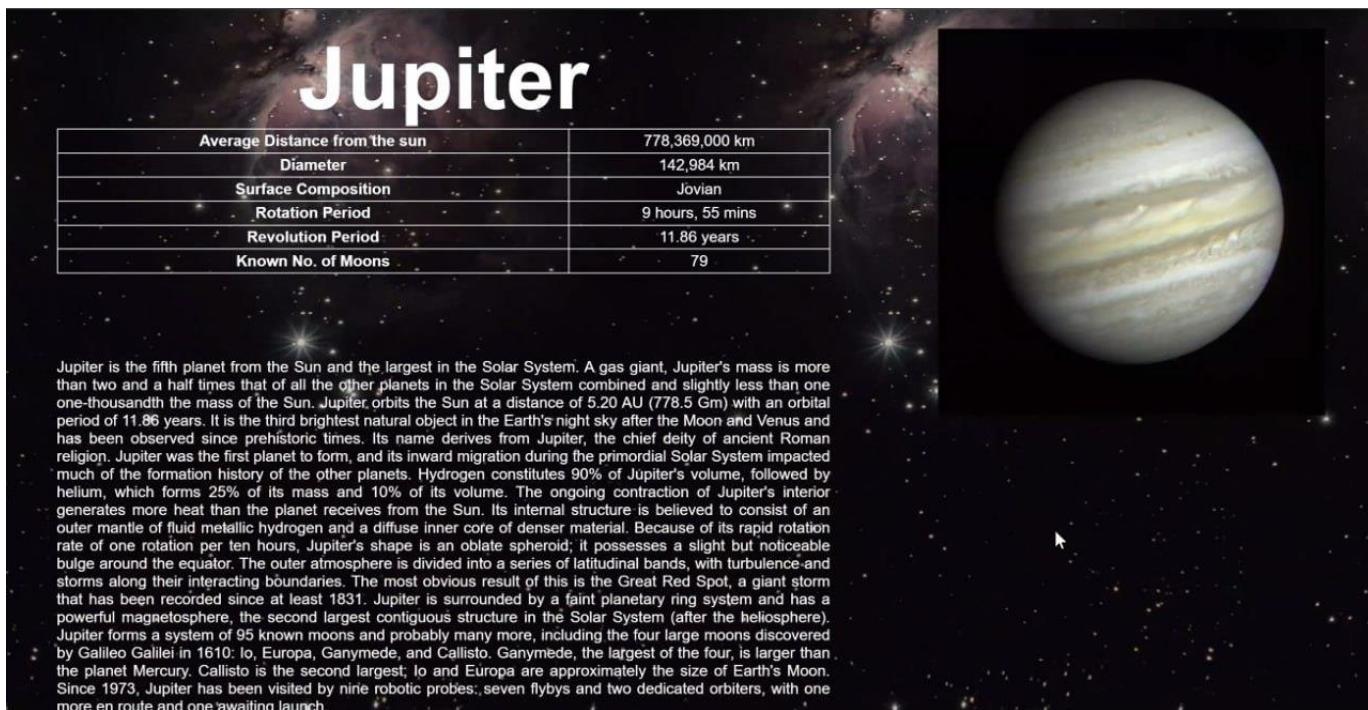


Figure24 Output

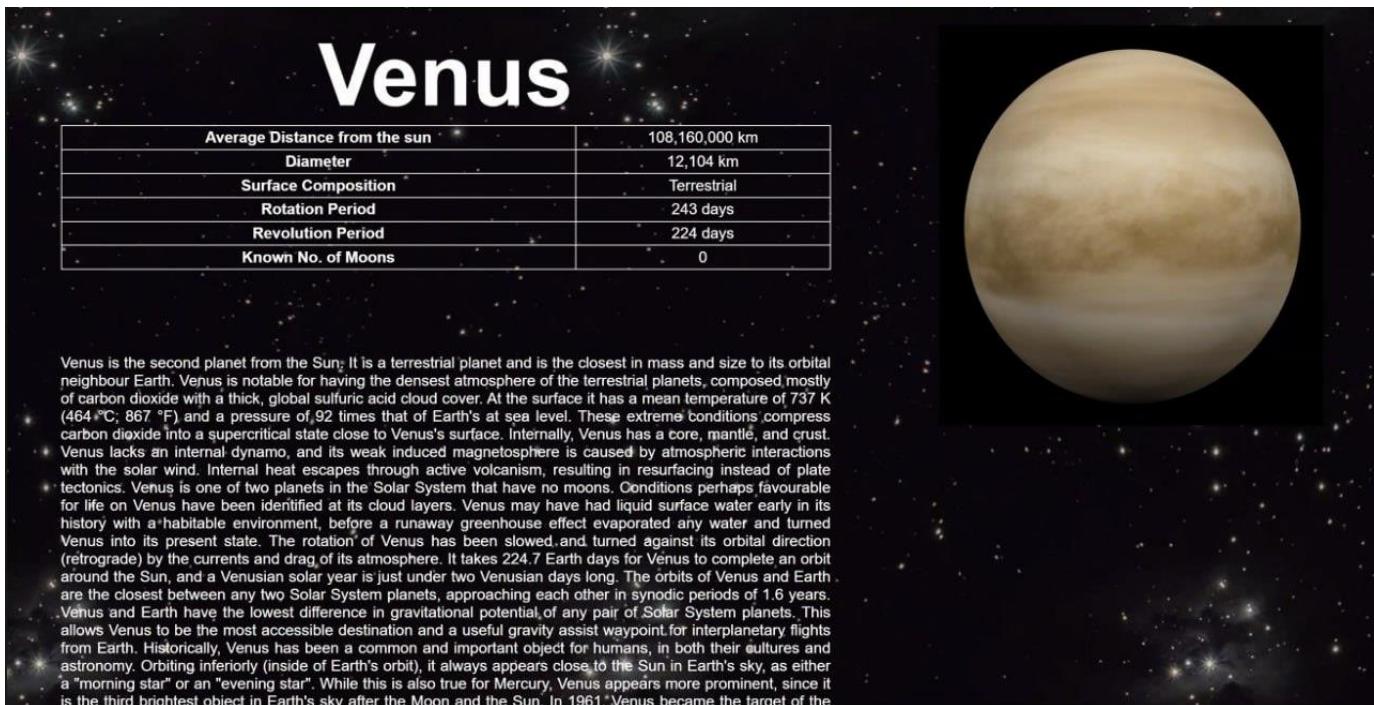


Figure 25 Output

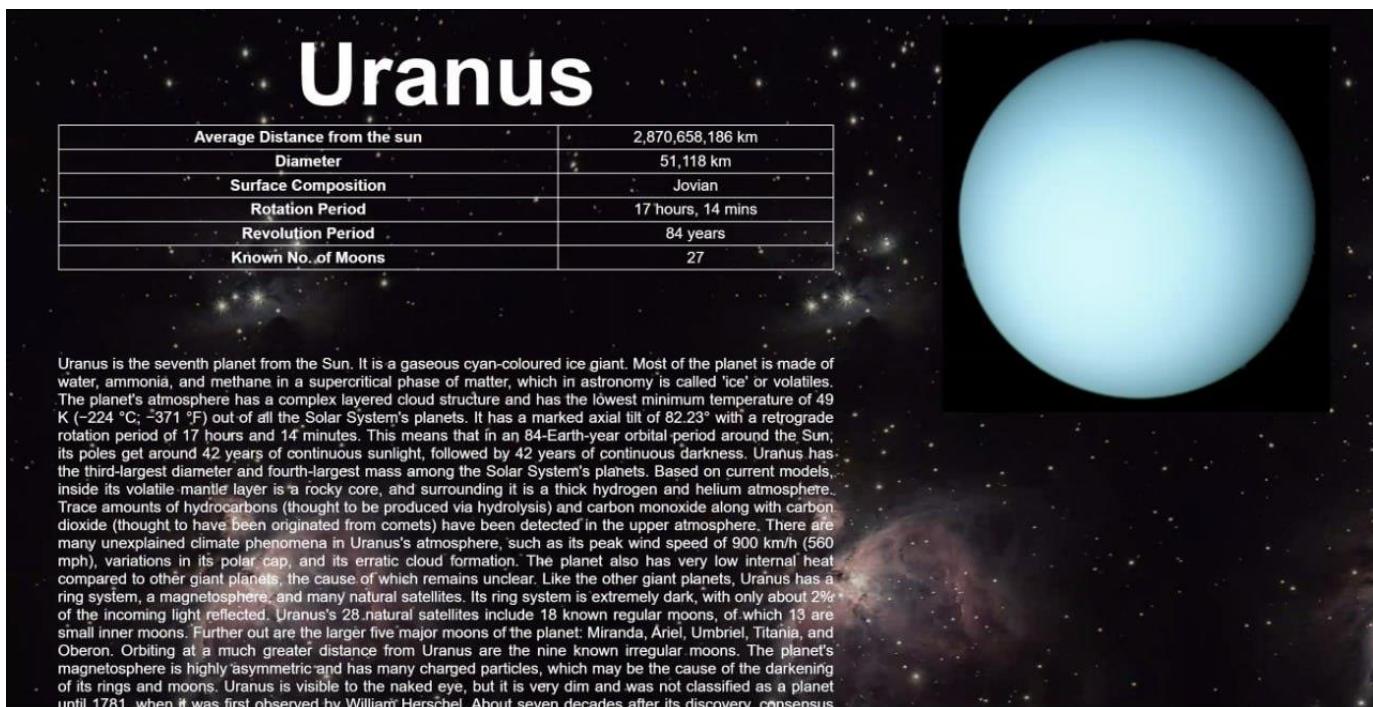


Figure 26 Output

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1		mercury	venus	earth	mars	jupiter	saturn	uranus	neptune	moon	asteroids	pluto	elliptical	spiral					
2	Distance	57,900,000	108,160,00	149,600,00	227,936,64	778,369,00	1,427,034,	2,870,658,	4,496,976,	150,000,00	400,000,00	5,900,000,	—	—					
3	Diameter	4,878 km	12,104 km	12,756 km	6,794 km	142,984 km	120,536 km	51,118 km	49,532 km	3474,2 km	1cm - 950km	2,377km	—	—					
4	Surface Con	Terrestrial	Terrestrial	Terrestrial	Jovian	Jovian	Jovian	Jovian	Jovian	Terrestrial	Terrestrial	Terrestrial	Terrestrial	Terrestrial	—	—	—	—	
5	Rotation Per	59 days	243 days	23 hours, 56:24 hours,	37:9 hours,	55:10 hours,	31:17 hours,	1:16 hours,	7:27.3 days	—	—	6.4 days	—	—					
6	Revolution P	88 days	224 days	365.25 days	687 days	11.86 years	29 years	84 years	164.8 years	27.3 days	—	248 years	—	—					
7	Known No.	c 0	0	1	2	79	62	27	14	—	—	5	—	—					
	Mercury is the first planet from the Sun and the Sun. It is a terrestrial planet and is the closest in the Solar System. In English, it is named after the ancient Roman god Mercurius (Mercury), having the densest atmosphere of the terrestrial planets.	Venus is the second planet from the Sun and Sun. It is the smallest planet and is the closest in size to its orbital neighbour Earth. Venus is notable for having the densest atmosphere of the terrestrial planets.	Earth is the third planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as the Sun. It is an orange-red star.	Mars is the fourth planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Mars. It is an orange-red star.	Saturn is the sixth planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Saturn. It is a large, yellowish-orange star.	Uranus is the seventh planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Uranus. It is a large, blue-green star.	Neptune is the eighth and farthest planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Neptune. It is a large, dark-blue star.	Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Earth's Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Sometimes called the minor planet Pluto, it orbits the Sun at an airless distance from the Kuiper belt, a ring of ice giant planets.	(minor-planet designation: 134340 Pluto) is a dwarf planet in the Kuiper belt, a ring of ice giant planets.	Elliptical galaxies form a type of galaxy with an originally approximate description by Edwin Hubble in shape and a smooth, nearly featureless image.	Galaxies	galaxies	galaxies	galaxies	galaxies	galaxies	
	Jupiter is the largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Saturn is the second largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Uranus is the third largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Neptune is the fourth largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Jupiter is the fifth largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Saturn is the sixth largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Uranus is the seventh largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Neptune is the eighth largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Earth's Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Sometimes called the minor planet Pluto, it orbits the Sun at an airless distance from the Kuiper belt, a ring of ice giant planets.	Elliptical galaxies form a type of galaxy with an originally approximate description by Edwin Hubble in shape and a smooth, nearly featureless image.	Galaxies	galaxies	galaxies	galaxies	galaxies	galaxies	
	Pluto is the ninth and tenth largest planet in the Solar System, after Jupiter. It is a gas giant with an average radius of about nine-and-a-half times that of Earth.	Mercury is the first planet from the Sun and the Sun. It is a terrestrial planet and is the closest in size to its orbital neighbour Earth. Mercury is notable for having the densest atmosphere of the terrestrial planets.	Venus is the second planet from the Sun and Sun. It is the smallest planet and is the closest in size to its orbital neighbour Earth. Venus is notable for having the densest atmosphere of the terrestrial planets.	Earth is the third planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Earth. It is a large, yellowish-orange star.	Mars is the fourth planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Mars. It is an orange-red star.	Saturn is the sixth planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Saturn. It is a large, yellowish-orange star.	Uranus is the seventh planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Uranus. It is a large, blue-green star.	Neptune is the eighth and farthest planet from the Sun and Sun. The Sun is a terrestrial astronomical object known as Neptune. It is a large, dark-blue star.	Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Earth's Moon is the only natural satellite of the Sun. It is a small, greyish-white star.	Sometimes called the minor planet Pluto, it orbits the Sun at an airless distance from the Kuiper belt, a ring of ice giant planets.	Elliptical galaxies form a type of galaxy with an originally approximate description by Edwin Hubble in shape and a smooth, nearly featureless image.	Galaxies	galaxies	galaxies	galaxies	galaxies	galaxies	

*Figure 27 data set*

## **7. CONCLUSION**

### **7.1 Summary**

The project "Space Exploration using AI Model" focuses on automating the classification and analysis of celestial body images through the use of artificial intelligence. The manual process of analyzing these images is labor-intensive and subjective, leading to inconsistencies and inefficiencies. By leveraging AI techniques such as deep learning and image recognition algorithms, an AI model is developed to accurately classify celestial body images and provide informative descriptions.

The model is trained using a large dataset of labeled images, enabling it to recognize patterns and features specific to different celestial bodies. Once trained, the model can classify new images and extract relevant information about the identified celestial bodies. This automated approach eliminates the need for time-consuming manual analysis, allowing researchers to focus on higher-level tasks and interpretations.

The potential applications of this project range from assisting astronomers in their research to providing accessible and interactive information about celestial bodies to the general public. By automating the classification process, astronomers can efficiently analyze vast amounts of data, uncovering new insights and accelerating their discoveries. Additionally, the AI model can be integrated into educational platforms and public outreach initiatives, allowing people of all backgrounds to explore and learn about the wonders of the universe.

The utilization of AI techniques, such as deep learning and image recognition algorithms, ensures the model's adaptability to new and complex celestial images. As the model continues to learn and improve its classification accuracy, it can keep pace with evolving scientific knowledge and advancements in space exploration. This dynamic nature of the AI model enables researchers to stay at the forefront of astronomical discoveries and encourages further innovation in the field.

The successful implementation of the "Space Exploration using AI Model" project highlights the transformative power of AI in pushing the boundaries of space exploration, unlocking new discoveries, and inspiring future advancements in our understanding of the universe. By combining the strengths of artificial intelligence and human expertise, we can delve deeper into the mysteries of space, expand our knowledge, and foster a greater appreciation for the vastness and complexity of the cosmos.

## **7.2 Limitations and Future Work**

### **Limitations :**

- The application interface is only in English
- The project does not cover predicting or providing information about upcoming celestial events or phenomena.

### **Future Work:**

To improve our website in the future, we have the following plans:

- Celestial Events Focus: We will provide predictions and information about upcoming celestial events or phenomena.
- Multilingual Support: Our website will support multiple languages to cater to a wider audience.
- Mobile Application: We will develop a user-friendly application to make accessing our website easier for users.

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