Visualizing Space Science Experimental Data Using Machine Learning

Assist scientists in understanding complex raw data from space experiments.

Problem Statement

1 **NASA Experiments**

Scientists receive massive amounts of raw data.

2 **Data Interpretation**

Raw data is not easily interpretable.

3 **Machine Learning Model**

Clean, cluster, and visualize data for easier interpretation.

Dataset Overview

OSD-379

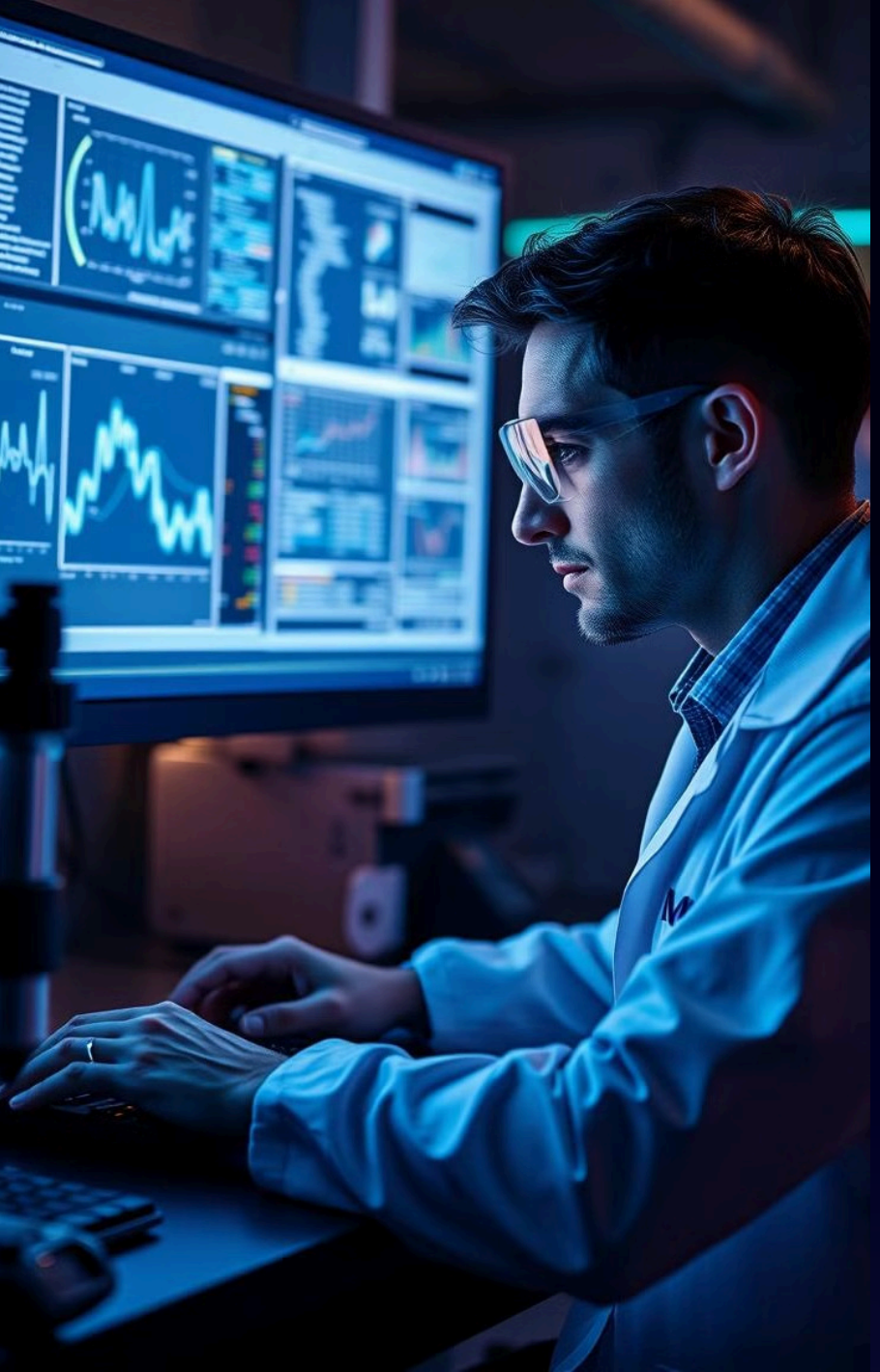
Kidney health of mice in space.

- Organ health metrics
- Genetic expression data
- Environmental data
- Time in space

OSD-665

Leg muscles of mice in space.

- Organ health metrics
- Genetic expression data
- Environmental data
- Time in space



Approach and Methodology

1

Data Preprocessing

Clean data by removing null values, outliers, and negative values.

2

Exploratory Data Analysis (EDA)

Understand data distribution and relationships between variables.

3

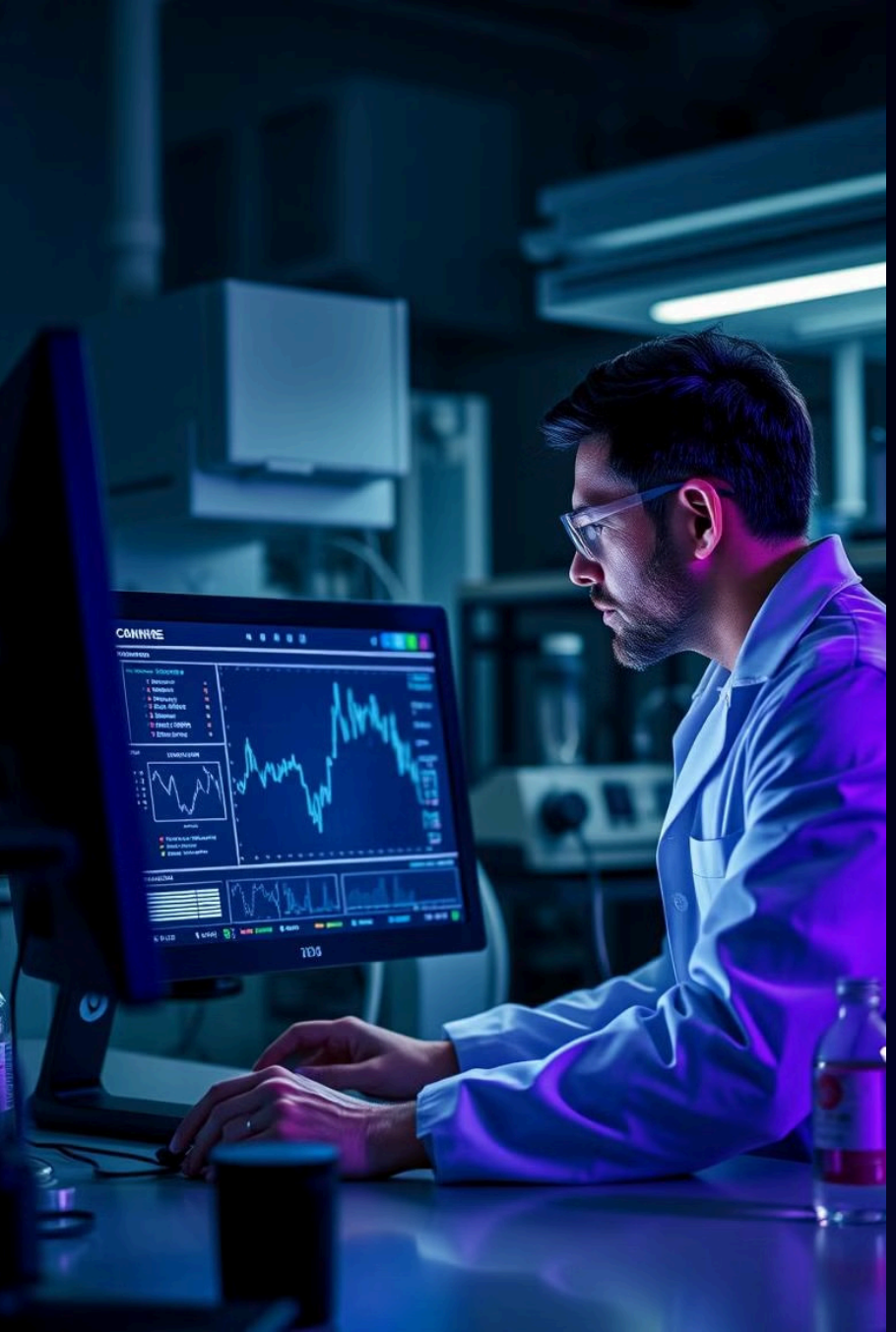
Clustering with K-Means

Group data into clusters based on similar features.

4

Feature Extraction & Visualization

Extract important features and create visualizations.



Flask Integration

1

Model Serialization

Convert model into a pickle file.

2

Flask Integration

Create a web application using Flask.

3

User Interaction

Users upload data and specify visualization type.

Technologies and Tools

Python

Core programming language.

Pandas, Numpy

Data manipulation and cleaning.

Matplotlib, Seaborn

Create visualizations.

K-Means Clustering

Group data based on similarities.

Flask

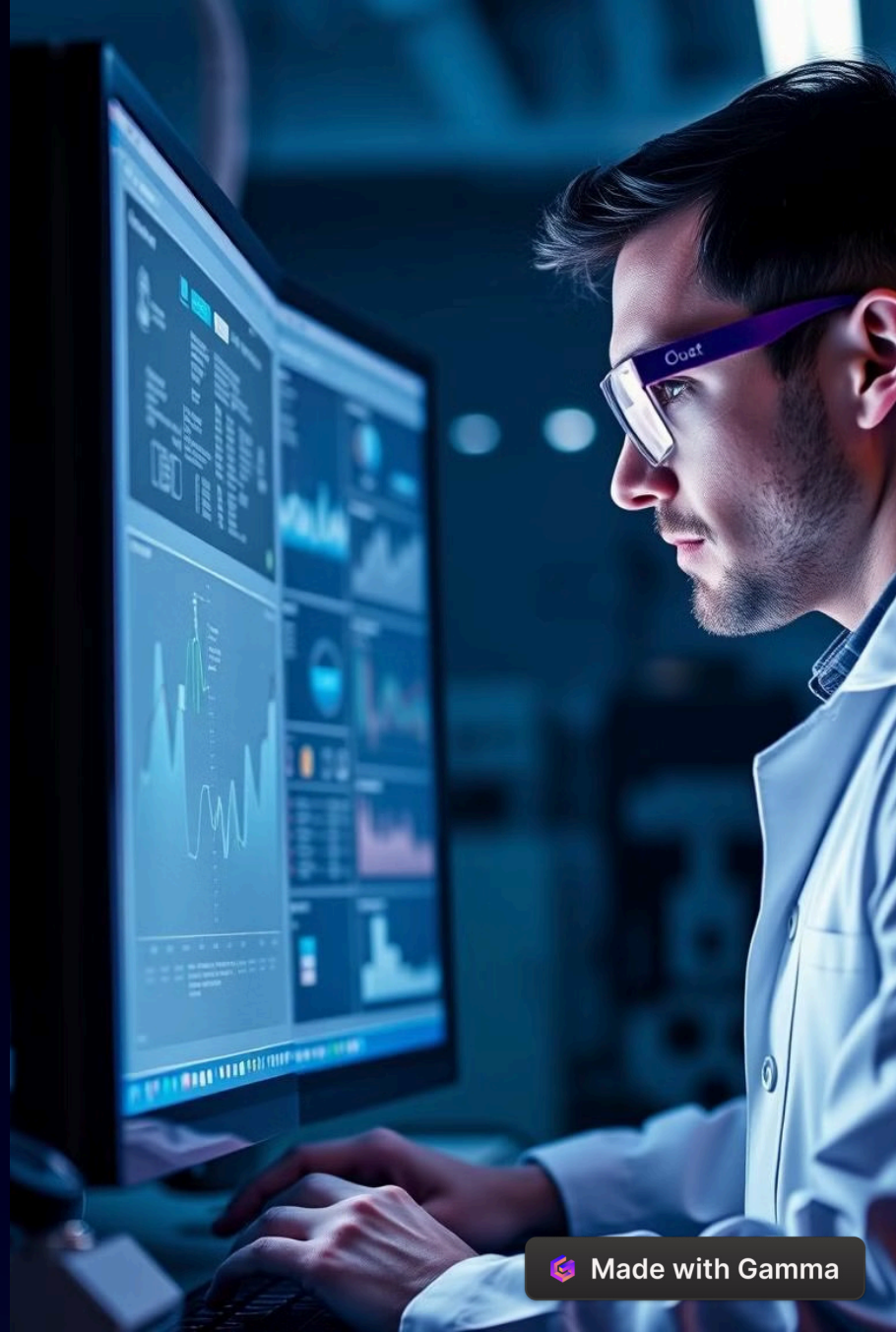
Build the web application.

Pickle

Model serialization.

Potential Challenges

Data Complexity	Proper data cleaning is crucial.
Feature Extraction and Clustering	Ensure clusters provide insights aligned with objectives.
Scalability	Handle larger datasets efficiently.



Future Scope

1 **Advanced Clustering Techniques**

Implement more advanced clustering algorithms.

2 **Real-time Data Processing**

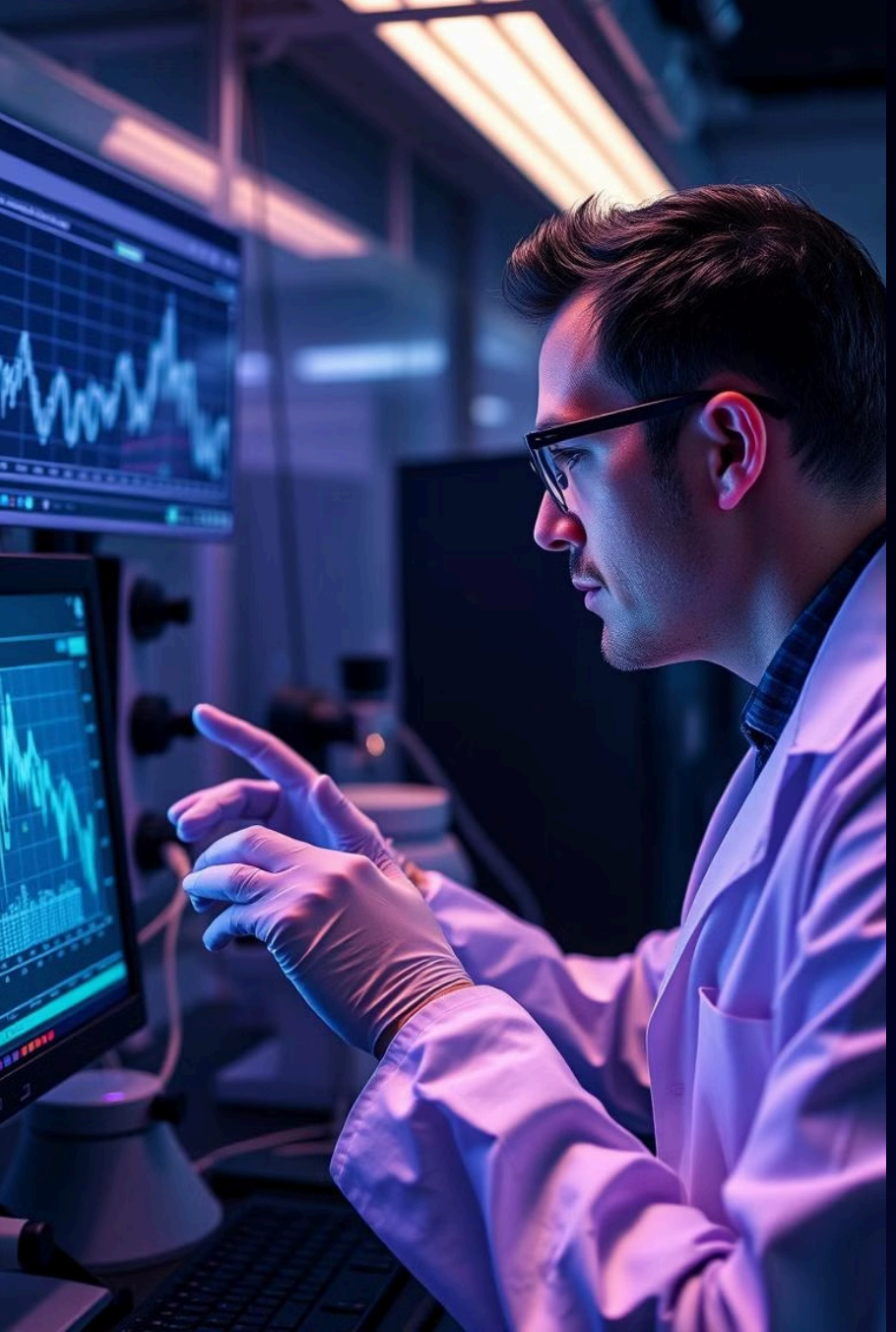
Allow real-time data processing and visualization.

3 **Improved User Interface**

Enhance the web app for user interaction and custom visualizations.

4 **Integration with AI**

Use AI techniques to predict outcomes and find hidden patterns.



Conclusion

Assist scientists in understanding complex space experiment data.