

SpaceBioViz Development*

Start

1. Define Requirements

- Identify target experiments (OSD-379, OSD-665)
- Determine visualization types (heatmaps, scatter plots, etc.)
- Establish scalability and performance goals

2. Data Retrieval

- Utilize NASA's Open Data Portal API
- Retrieve OSD-379 and OSD-665 datasets
- Handle data formatting and errors

3. Data Preprocessing

- Clean and normalize data
- Handle missing values
- Transform data into suitable formats

4. Visualization Framework

- Choose suitable visualization libraries (D3.js, Plotly, etc.)
- Develop customizable visualization templates

5. Visualization Generation

- Heatmaps
- Scatter plots
- Bar charts
- 3D visualizations (molecular structures, etc.)

6. Machine Learning Integration

- Clustering algorithms (k-means, hierarchical)
- Regression analysis (linear, non-linear)
- Statistical tests (t-test, ANOVA)

7. User Interface Development

- Web-based interface
- Intuitive navigation
- Customization options
- Real-time collaboration features

8. Testing and Validation

- Unit testing
- Integration testing
- User feedback and refinement

9. Deployment

- Cloud infrastructure (AWS, Google Cloud)
- Containerization (Docker)
- Load balancing and autoscaling

10. Maintenance and Updates

- Monitor performance and scalability
- Update visualization libraries and frameworks
- Refine tool based on user feedback

End

Sub-Flowcharts:

Data Preprocessing

1. Handle missing values
2. Normalize data
3. Transform data

Visualization Generation

1. Heatmap generation
2. Scatter plot generation
3. Bar chart generation

Machine Learning Integration

1. Clustering algorithm selection
2. Regression analysis selection
3. Statistical test selection

Decision Points:

1. Choose visualization library
2. Select machine learning algorithm
3. Determine scalability requirements

Feedback Loops:

1. User feedback and refinement
2. Performance monitoring and optimization