ASTROVIEW - Innovation in Astronomical Research through Interactive Visualization and Semi-Automatic Annotation

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Project Overview

The ASTROVIEW project focuses on innovation in astronomical research through interactive visualization and semi-automatic annotation. There are two main objectives:

- **Extension of open-source software** for interactive visualizations and semi-automated annotations, integrating machine learning (ML) techniques to extract useful features from data.

- **Development of algorithms optimized for High Performance Computing (HPC) platforms**, aimed at improving the analysis and visualization of complex data.

ASTROVIEW wants to facilitate the management of large and complex astronomical datasets through interactive dashboards in order to make astrophysical research more efficient and reduce the time needed for data analysis and improve scientific collaboration globally
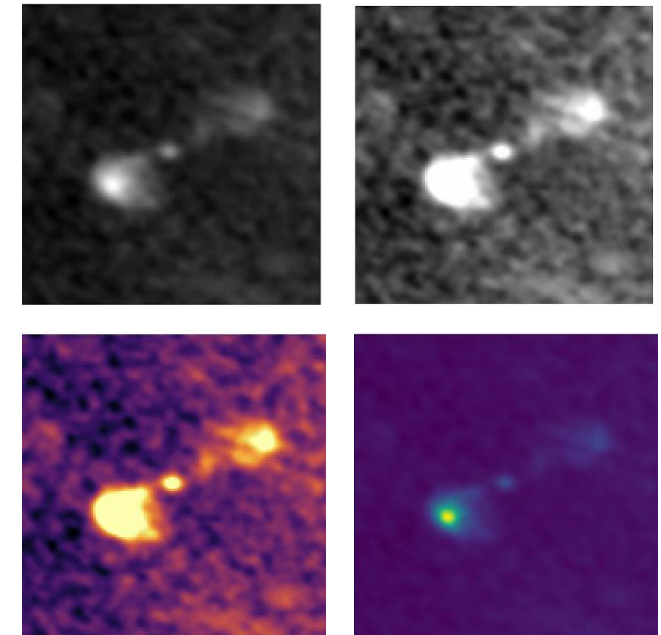

Figure 1. Astronomical images displayed with different types of normalization (e.g. MinMax, ZScale, sinh)

Technical Objectives

1. **Visualization and research:** dashboard features for sorting and filtering images based on metadata or for displaying N-dimensional images. Trying to achieve interactive and scalable experience for the visualization the dataset in 2D/3D

2. **Annotation:** manual and automatic image annotation. Users should be able to label images individually or collectively through the main or representation views. Automatic annotation will rely on machine learning models, with the system identifying potential conflicts between manual and automatic labels

3. **Save and export date:** dashboard features should allow users to save new labels, metadata, and the session state to resume work later. Users can export individual images, groups of images, or metadata from the system, providing flexibility for further analysis

Tools: Tensorboard, LabelStudio, LSE, Caesar-REST, PixPlot

Involved Staff and new recruitments

- Eng. **Mario Barbera**, PhD — Scientific Manager
- **Antonietta Cucinella**, MBA — Administrative Manager
- Eng. **Pietro Santoro**, MEng — Technical Manager
- **Simone Veneziano**, MSc — Senior Developer, Full-Stack Specialist
- **Sebastiano Gullotta**, BSc — Developer and Head of Cybersecurity Operations
- Eng. **Giovanni Enea**, MSc — Developer and Head of Quality Control
- Eng. **Adam Talleh**, MEng — Senior Developer, Software Architect
- **Ferrara Riccardo** — Developer and Cybersecurity Analyst
- **Matteo Oliva** — Junior Developer, Front-End Specialist
- **Emanuele Giunta** — Junior Developer, Back-End Specialist

New personnel will likely be recruited in alignment with the specific requirements of the project.

Timescale, Milestones, SAL

WP, Activities, Milestones, Deliverables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
WP1: Project Management												
1.1: Project Planning												
1.2: Activity Coordination												
1.3: Resource Management												
1.4: Reporting												
Milestone 1.1: Approval of the Project Plan		■										
Milestone 1.2: Semi-Annual Review and Adjustments						■						
Milestone 1.3: Project Conclusion and Final Report												■
Deliverable 1.1: Periodic Progress Reports (4 SAL)			■			■			■			■
WP5: Dissemination and Outreach												
5.1: 5.1: Preparation of Promotional Materials												
5.2: Scientific Publications												
5.3: Organization of a Training Event												
Milestone 5.1: First Scientific Publication									■			
Milestone 5.2: Organization of Training/Workshop											■	
Deliverable 5.1: Promotional Materials and Publications												■
Deliverable 5.2: Delivery of Workshop/Training Seminar												■

WP, Activities, Milestones, Deliverables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
WP2: State-of-the-Art Analysis												
2.1 Research and Bibliographic Analysis												
2.2 Evaluation of Existing Technologies												
2.3 Definition of Technical Requirements												
Milestone 2.1: Completion of Data Collection			■									
Milestone 2.2: Presentation of the Initial Analysis Report						■						
Deliverable 2.1: Literature and Technology Analysis Report			■									
Deliverable 2.2: Technical Specifications for Tool Development						■						
WP3: Development of Technologies and Tools												
3.1: Development of Interactive Visualization Tools												
3.2: Integration of Machine Learning and AI												
3.3: Implementation of Labeling and Editing Systems												
Milestone 3.1: Initial Prototype of the Dashboard Available							■					
Milestone 3.2: Complete Integration of AI Models								■				
Milestone 3.3: Full Implementation of the Editing System									■			
Deliverable 3.1: Dashboard Prototypes for Data Visualization							■					
Deliverable 3.2: Integrated Machine Learning and AI Models								■				
Deliverable 3.3: Interactive Labeling and Editing System									■			
WP4: Pilot,evaluation e fine-tuning												
4.1: Testing and Evaluation												
4.2: Optimization and Refinement												
Milestone 4.1: Completion of the First Feedback Cycle											■	
Deliverable 4.1: Test and Performance Analysis Report											■	
Deliverable 4.2: Optimized Post-Feedback Software												■