Searching for Oscillating Stars in Orion-A

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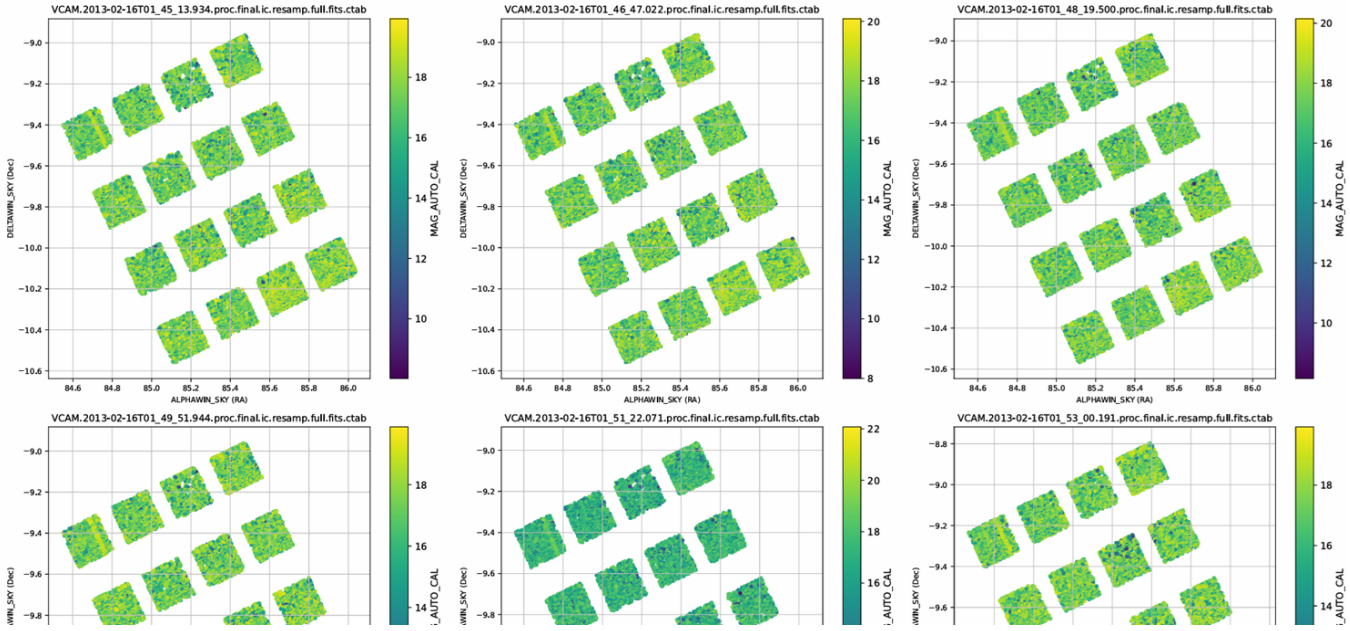
Introduction

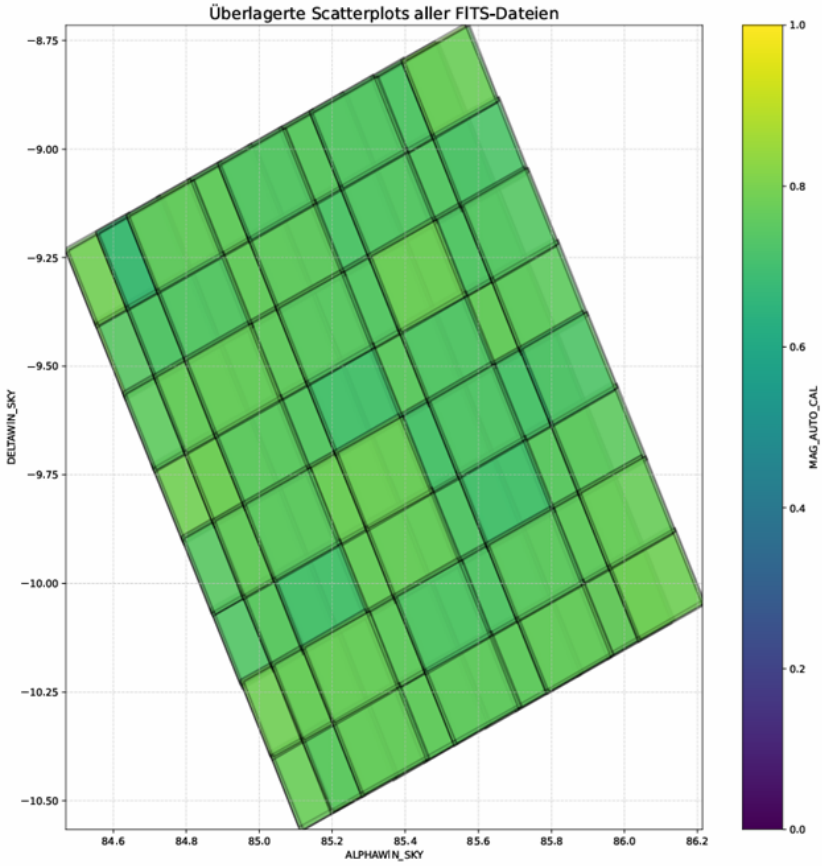
- The work aims to identify **oscillating stars** in the **Orion-A** molecular cloud.
- Some of these stars exhibit periodic brightness variations.
- The observations use a **4×4 tiled imaging approach** with a time offset of about 40 minutes between exposures.

observation Strategy



The tiles

Image Overlapping



Overlapping tiles

Data Processing & Analysis

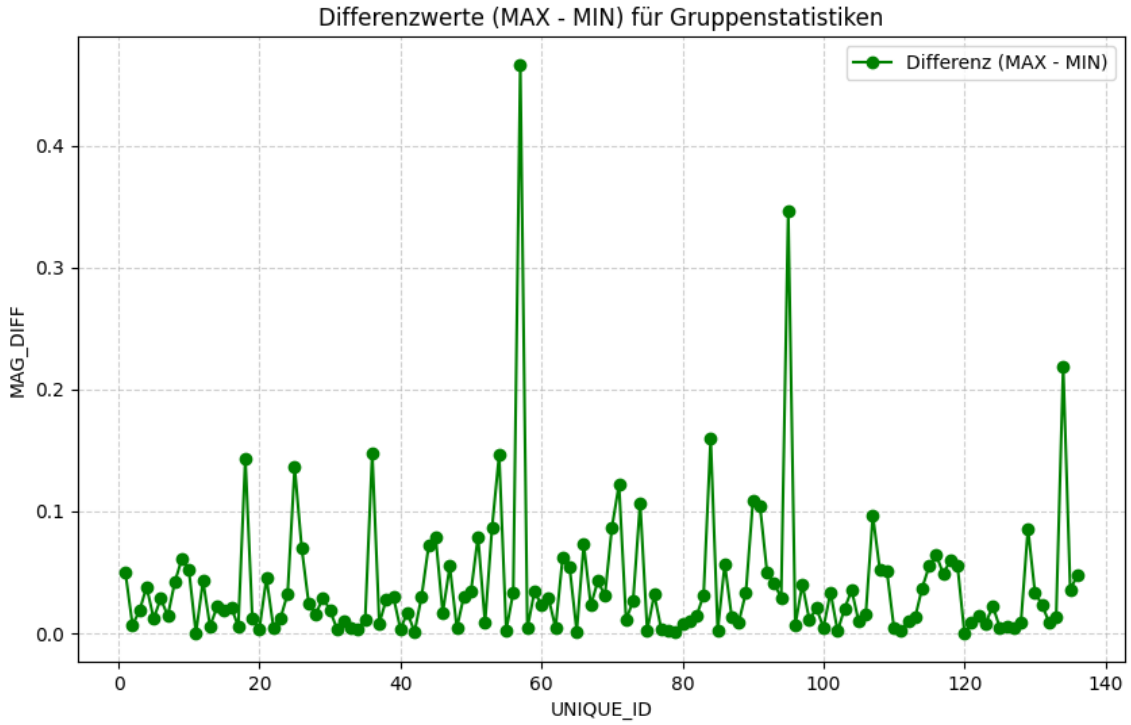
Brightness Comparison:

- Stars within overlapping tiles are compared over time.
- Significant brightness variations could indicate stellar oscillations.

Filtering for Oscillating Candidates:

- min/max-difference methods identify stars with periodic variations ??
- Non-variable sources serve as control objects.

Result of Work



Possible candidates

Conclusion

Overview:

- Consideration of measurement uncertainties.
- Checking the identified objects against databases (e.g., Gaia).
- Optimizing the search strategy.
- Candidates undergo additional photometric and spectral analysis.

References

- VISON - Vienna Survey in Orion, A&A 587, Year 2016
- FITS dataset

Data Processing & Analysis: KD-Tree Algorithm

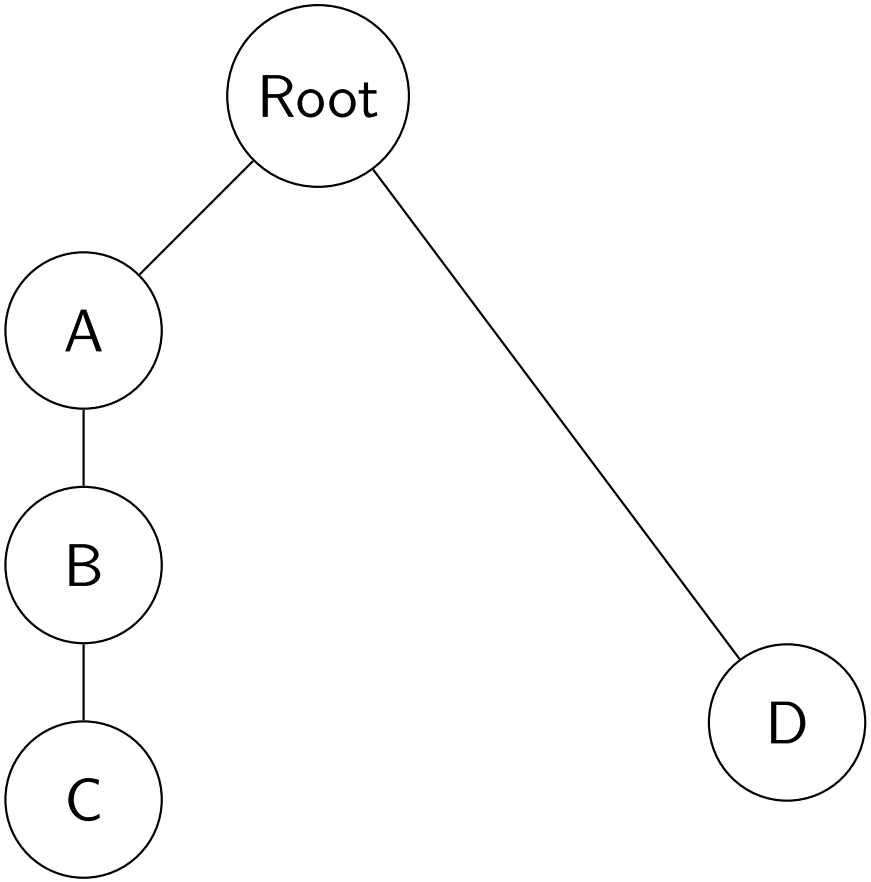
Overview:

- A **KD-Tree** (k-dimensional tree) is a data structure used for organizing points in a space with multiple dimensions.
- It is widely used for nearest neighbor searches, spatial partitioning, and clustering.

Algorithm Steps:

1. Select a splitting dimension (alternating between axes at each level).
2. Sort points along the selected dimension.
3. Choose the median point as the root.
4. Recursively build left and right subtrees.

KD-Tree Structure Sketch



Example of a KD-Tree structure