

# **Astronomy Field Trip Report**

**Daniel Vagg**

**MosIAC Software and NGC2420 Analysis**

# MosIAC

Mosaic Software for the IAC80 Telescope

Initial Proposal for the Field Trip:

**Analyse a galaxy cluster**

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Mosaic Software for the IAC80 Telescope

Initial Proposal for the Field Trip:

**Analyse a galaxy cluster**

**It's huge!**

# MosIAC

Mosaic Software for the IAC80 Telescope



COMA Galaxy Cluster

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Mosaic Software for the IAC80 Telescope



COMA Galaxy Cluster

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## Mosaic Software for the IAC80 Telescope

### Overview

- How can this be solved?
  - **Mosaic!**
- Basic Concept:
  - Acquire images with a region of overlap
  - “Stitch” them together using some algorithm

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Mosaic Software for the IAC80 Telescope

Implementation

1. Roughly arrange images using astrometry data
  - Align them more accurately through star locations
2. Align them using star patterns
  - A bit more tricky..

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Mosaic Software for the IAC80 Telescope

Implementation

- ~~1. Roughly arrange images using astrometry data~~
  - ~~○ Align them more accurately through star locations~~
2. Align them using star patterns
  - A bit more tricky..



# MosIAC

## Mosaic Software for the IAC80 Telescope

### Implementation

1. Reduce all images
2. Group images based on astrometry
3. Align images in each group
4. For each filter:
  - Find all stars, and make triangles
  - Align the triangles between images
  - Group aligned images into chains
  - Calculate image positions
5. Join everything together

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## Mosaic Software for the IAC80 Telescope

### Implementation

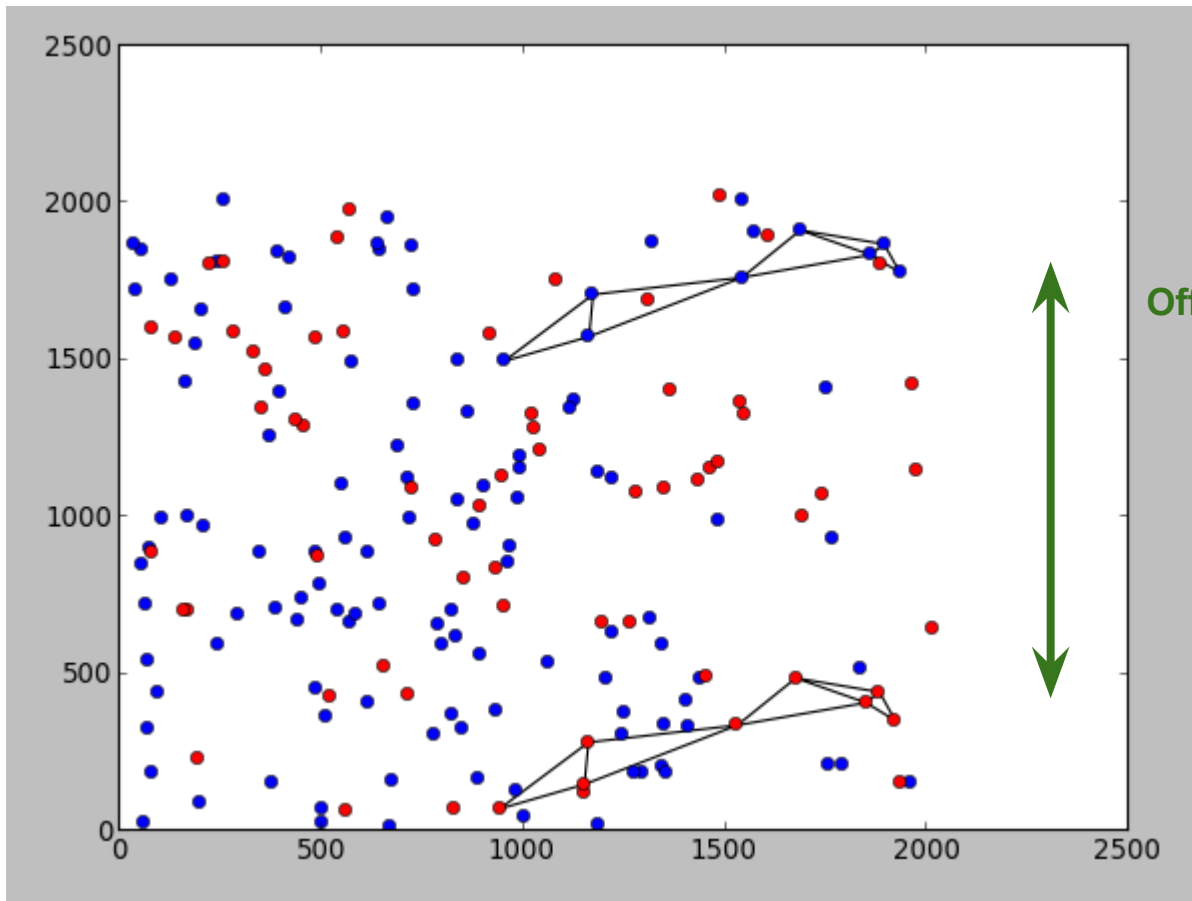
1. Reduce all images
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## Mosaic Software for the IAC80 Telescope

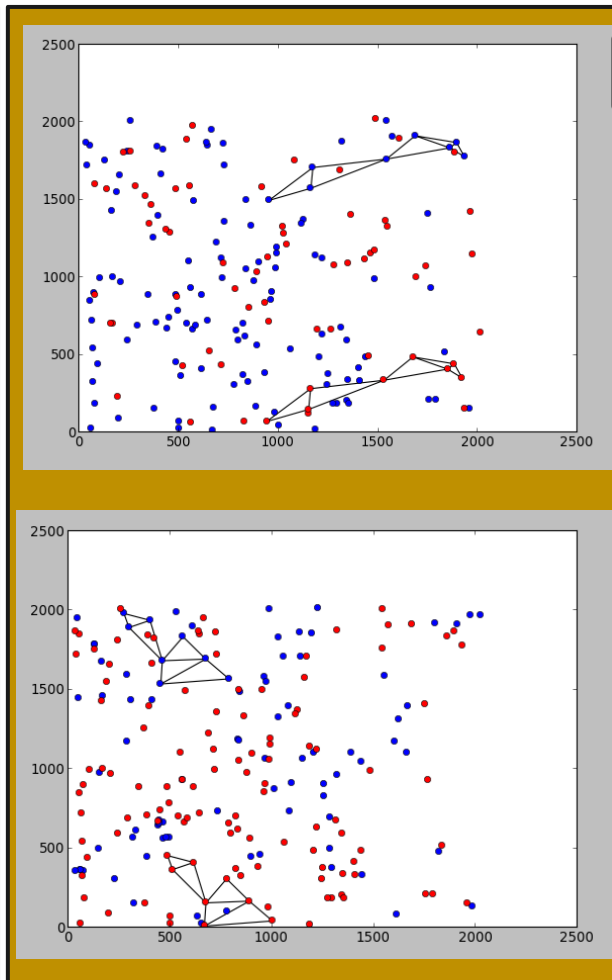
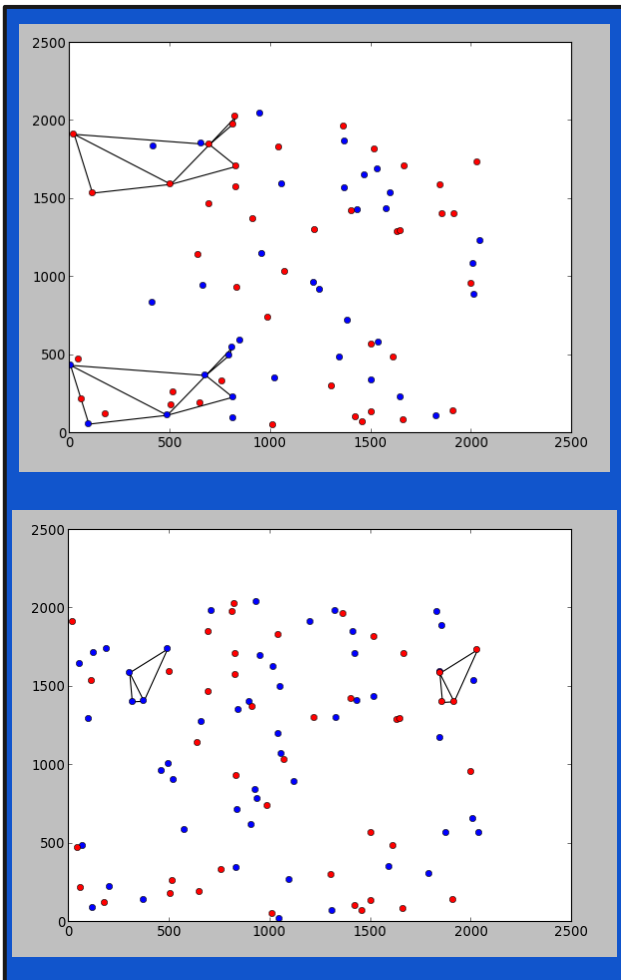
Implementation



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## Mosaic Software for the IAC80 Telescope

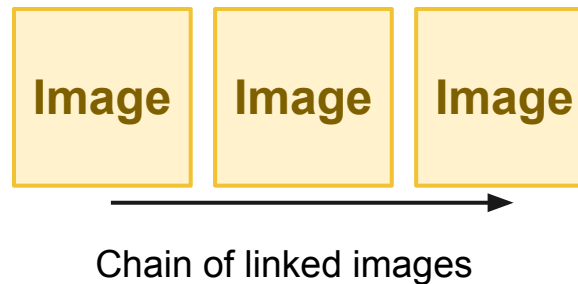
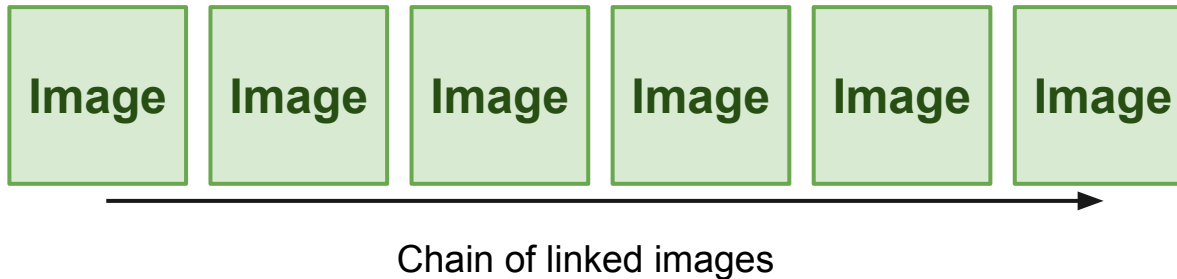
Implementation



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## Mosaic Software for the IAC80 Telescope

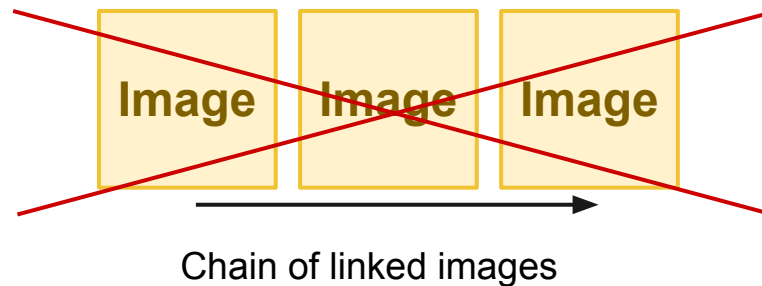
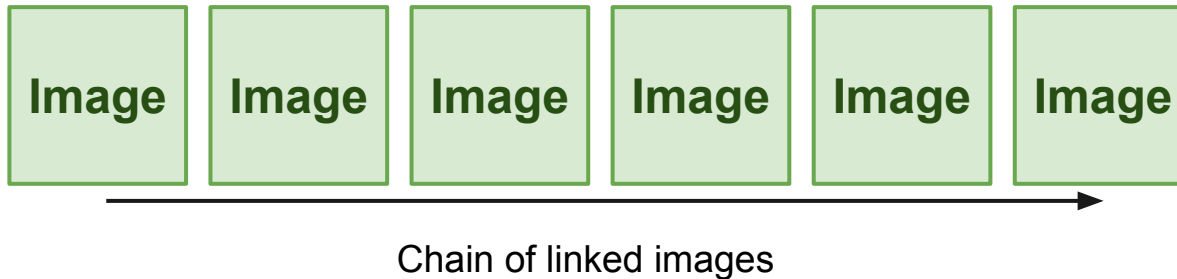
Implementation



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## Mosaic Software for the IAC80 Telescope

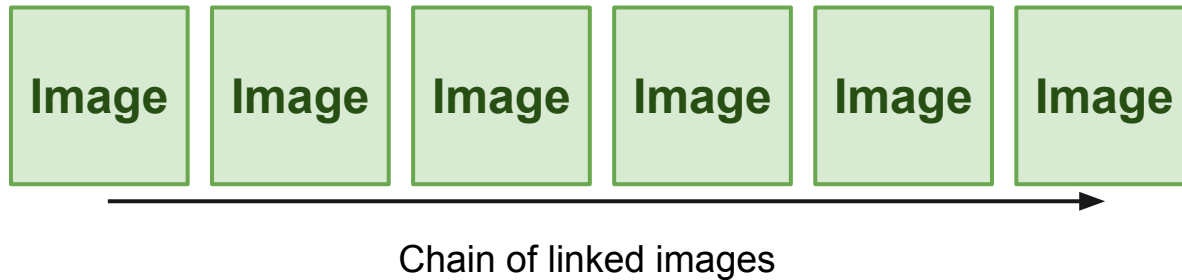
Implementation



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Mosaic Software for the IAC80 Telescope

Implementation

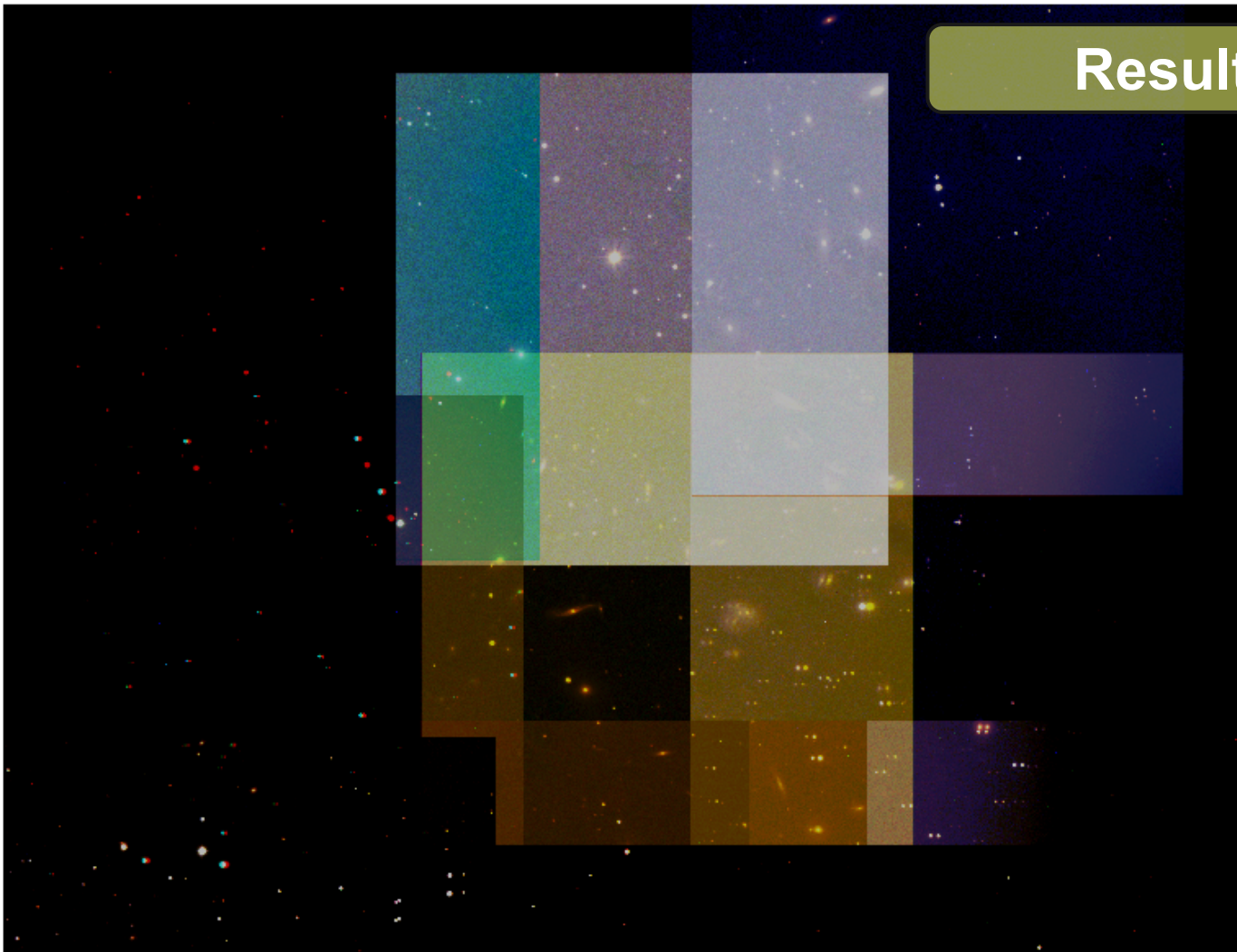


Convert relative offsets to absolute mosaic positions

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Mosaic Software for the IAC80 Telescope

Results

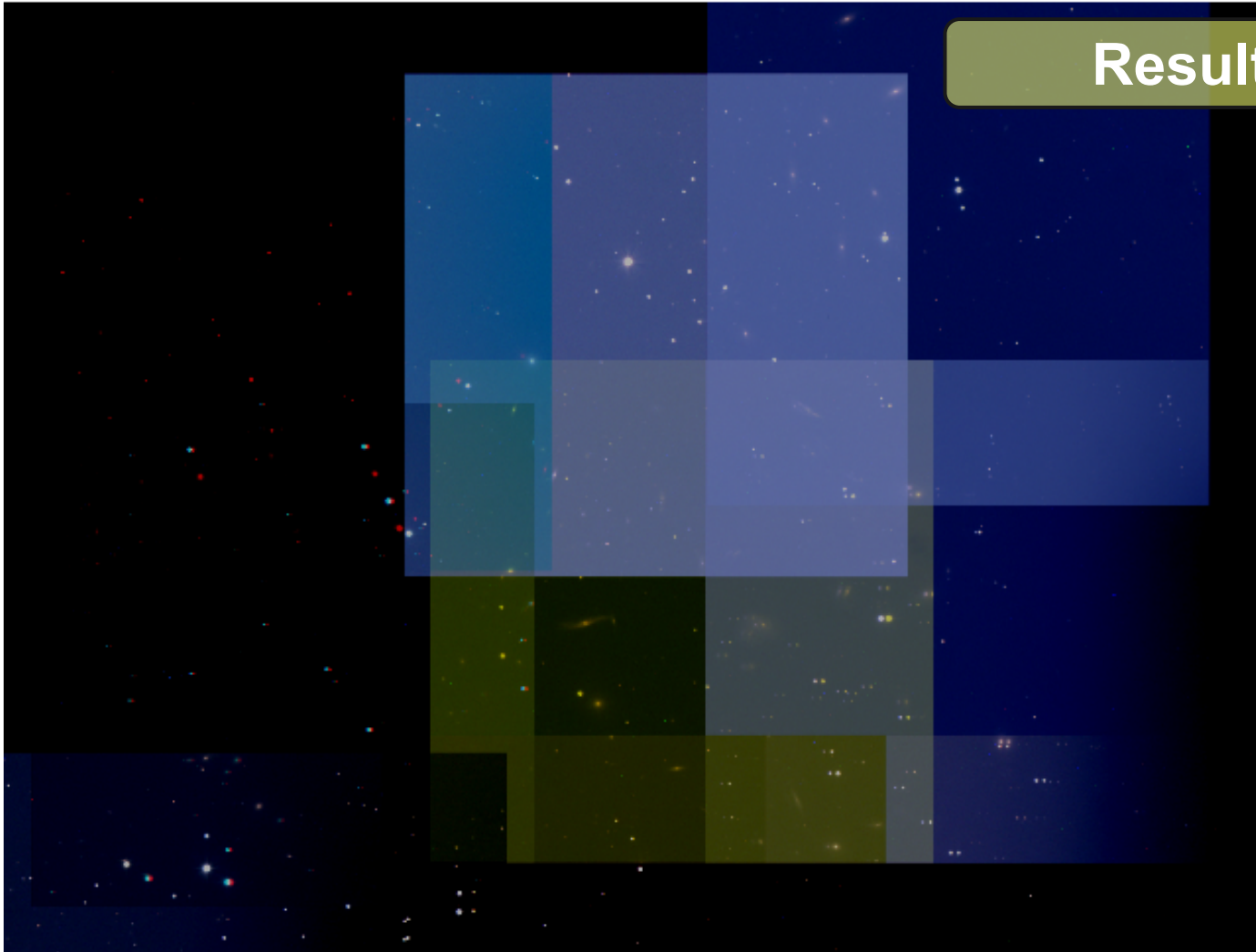




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Mosaic Software for the IAC80 Telescope

Results



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## Mosaic Software for the IAC80 Telescope

### Discussion

1. Alignment could be better!
  - a. A mix of both implementations may work
2. Some instrumental interference can be removed
  - a. Analysis and correction of background
  - b. Already attempted to some degree..
3. More refined triangle matching
  - a. Currently only checking all lengths match, technically correct
  - b. Matching angle of longest line will prevent some inaccuracies

# NGC 2420

Open star cluster analysis

Overview



# NGC 2420

## Open star cluster analysis

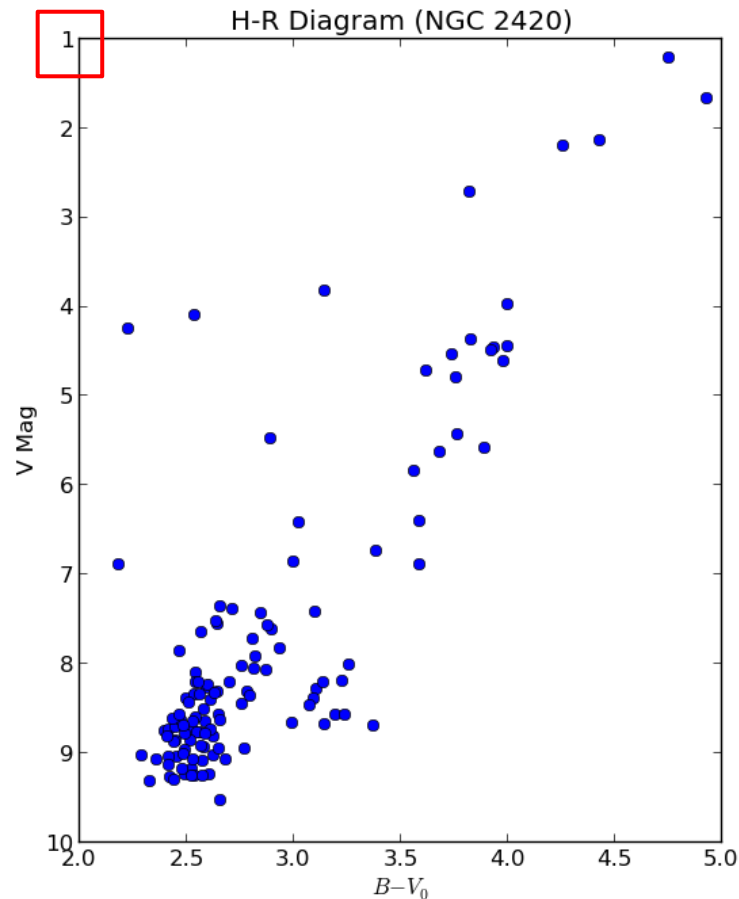
### Implementation

1. Reduce all images
2. Create median of images in each filter
3. Write images to file system
4. Locate all stars
5. Determine their magnitudes in each filter
6. Create HR-Diagram

# NGC 2420

## Open star cluster analysis

### Results

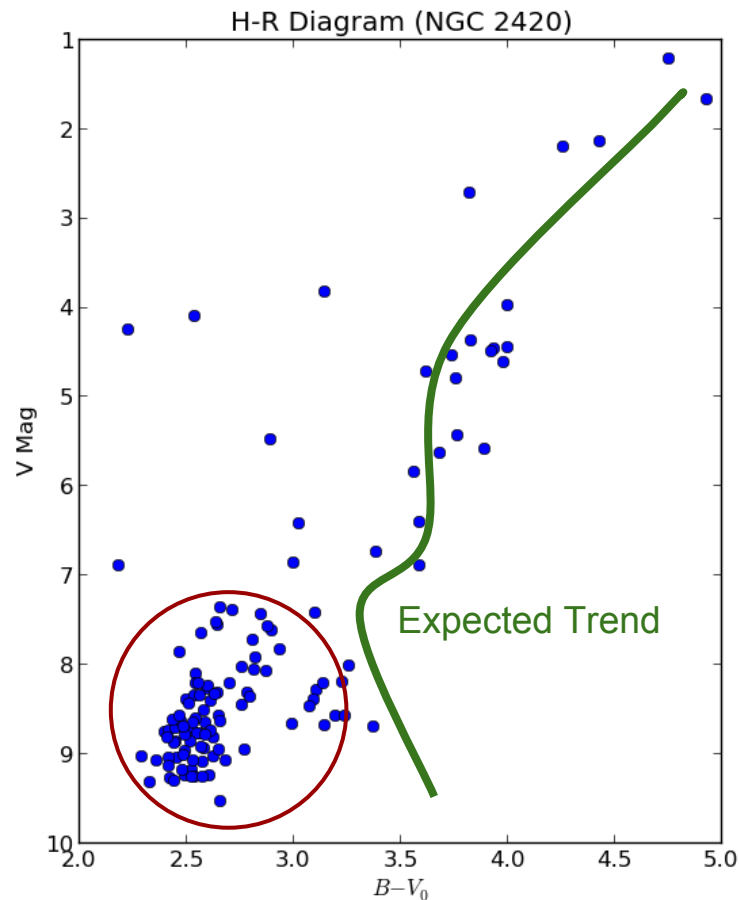


- Follows main sequence.. in a way
- Data is very strange..
- V magnitude of 1!?
- Calibration is incorrect!
- Trend is strange also..

# NGC 2420

## Open star cluster analysis

### Discussion

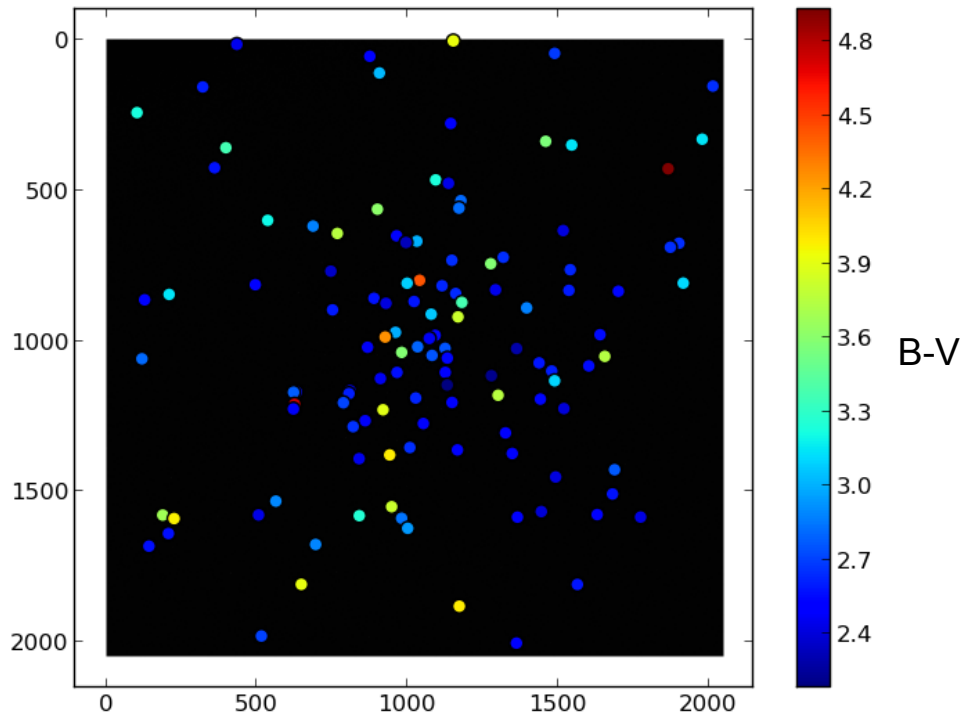


- Maybe it's an error in star selection?

# NGC 2420

## Open star cluster analysis

### Discussion

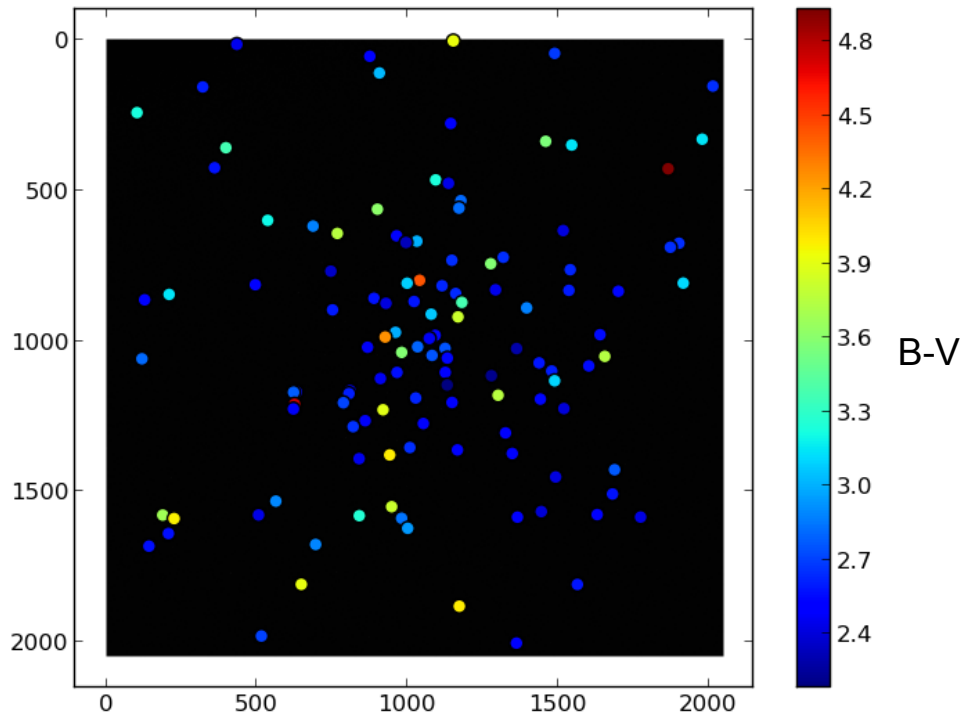


- Maybe it's an error in star selection?
  - Nothing obviously wrong

# NGC 2420

## Open star cluster analysis

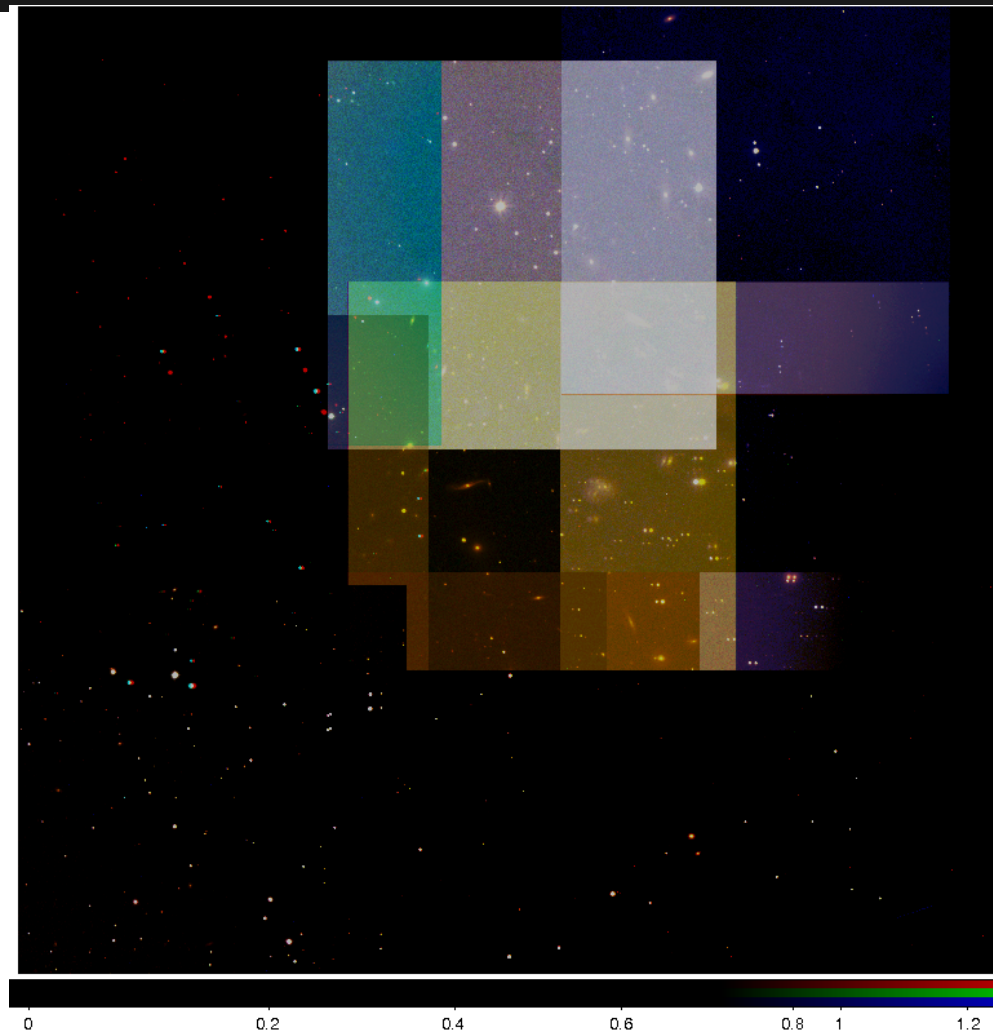
### Discussion



- Maybe it's an error in star selection?
  - Nothing obviously wrong
- TODO:
  - Add more sources for calibration
  - Determine absolute magnitudes
  - Determine luminosity
  - Convert B-V to temperature



# Thanks



# Thanks



Result of brief insanity!

At least it's pretty.

Additional use of code:  
A short career in Art?

10000 20000 30000