Multi-Sun Centroiding

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1 Introduction

`beta` is currently able to find the centers of these sun arrangements:

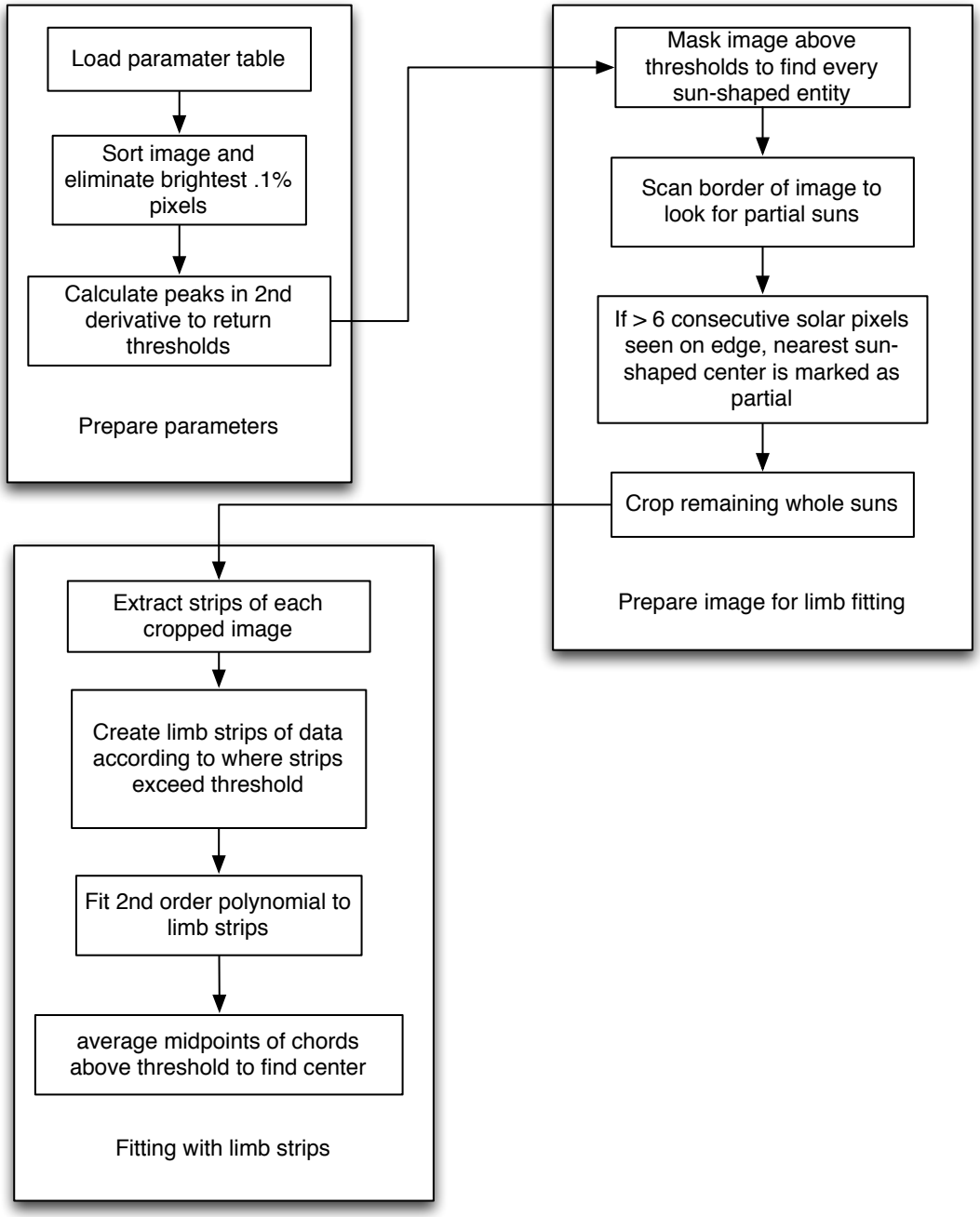
- R1 & R2
- R2 & R3
- R1 & R3
- R1 & R2 & R3
- R1 & partial R2
- R1 & partial R3
- R2 & partial R3
- partial R1 & R2
- partial R1 & R3
- R1 & partial R2 & R3
- partial R1 & R2 & R3
- R1 & partial R2 & partial R3
- partial R1 & partial R2 & R3
- partial R1 & R2 & partial R3

This program will not be developed further bar bug-fixes I haven't noticed.

2 Partial Suns

The current method to find the centers of any solar image is the following:

1. Load Image
2. Read parameters from pblock.txt
3. Sort image and cut off top .1% of pixels (top 1% was actually too much)
4. Smooth, take deriv, smooth again, take deriv again of sorted array, find peaks that correspond to difference solar regions and their thresholds
5. Mask image above thresholds to find centers of every shape, regardless of partial or not
6. Scan border of image looking for consecutive pixels above lowest threshold
7. If more than 5 pixels in a row, marks x and y position and tags nearest solar center as "partial"
8. Crop remaining whole suns
9. Extract 5 strips centered around cropped solar center for both X and Y direction
10. Extract a pair of limb strips for each long strip
11. Fit 2D polynomial to limb profile
12. Mark position where fitted polynomail crosses threshold
13. Average midpoints of chords to find limb-fitted centers


Load paramater table
Sort image and eliminate brightest .1% pixels
Calculate peaks in 2nd derivative to return thresholds
Prepare parameters
Mask image above thresholds to find every sun-shaped entity
Scan border of image to look for partial suns
If > 6 consecutive solar pixels seen on edge, nearest sun-shaped center is marked as partial
Crop remaining whole suns
Prepare image for limb fitting
Extract strips of each cropped image
Create limb strips of data according to where strips exceed threshold
Fit 2nd order polynomial to limb strips
average midpoints of chords above threshold to find center
Fitting with limb strips