Astronomical Image Processing Lab Instructions – Robot style

So far:

* Structure called catalog created with data parameters
* Data read in as catalog.image.data
* A1\_SourceDetect programme – pixels are put into single column array with associated ids, ordered max to min with ids ‘frozen’ with pixel values, chopped between chosen lower and upper threshold, returned into blank (zero) matrix with pixel value
* Lower threshold is calculated as max background noise – histogram of data made, approx. Gaussian background with sources on top, take peak of curve as max of Gaussian background and ‘mirror’ first half to create theoretical background Gaussian, then take lower threshold as x standard deviations greater than mean

NEED A WAY TO DETERMINE CLUSTERS -

* Subtract source pixel array from image array to create zero groups ? then write code to take x pixel wide ring around zero pixel groups and average to find local background?
* Determine cluster groups – several potential methods, potentially look for grouped ids (consecutive and with fixed gap for image height), look within source pixel array for local maxs (surrounding pixels are less than pixel)
* Once a cluster group is determined, mask with average of surrounding noise or set to zero and move onto next. – leans towards going through maxes
* Find brightest pixel in source map
* Circular aperture centred on that pixel
* Begin very small and take note of electron counts from pixels within aperture
* Incrementally increase radius of aperture and keep counting
* Once number of counts stops increasing, stop increasing aperture size
* Mask region within “final” aperture and repeat process
* NB problems with overlapping sources / non-circular sources close together

DETERMINE LOCAL BACKGROUND

* Could be taking centre of pixel (=brightest point?) and doing transcript recommended 12 pixel circle
* Could take fixed width pixel border around source pixel points and average
* Either way subtract background/pixel \* number of source pixels
* Consider arperture size and effects/way to minimize

FLUX CALIBRATION

* Use stored calibration factor MAGZPT and associated error MAGZRR with equation (5) to convert total counts per source to source magnitudes.

CATALOG

* Now we have a structure hopefully containing the source pixels, their associated background, the final counts for the cluster and its central x,y coordinate, the converted magnitude and errors

NUMBER COUNT PLOT

* For each magnitude