Astronomical Image Processing Lab

Presentation Script

Slide 1 - main results (SUKORNO)

welcome, will be talking you through our project

given a deep-field astronomical image

created python scripts to extract objects from image

created catalogue of objects with details including their positions + magnitudes

plotted the number of objects against their magnitude

now will go through why we did this, how we did this and what it means

Slide 2 - title (SUKORNO)

mention background image is region of sky from sloan digital sky survey, corresponding

to area where FITS image was taken

(SLIDE 1 & 2: 1 min)

Slide 3 - original FITS

here is original FITS image

taken with R-band filter; if we look at datasheet for filter, see wide range of wavelengths from yellow to near IR.

allowing to detect good, large number of objects

using the Mosaic-1 camera, which is CCD camera, on the 4 m Mayall Telescope

Kitt Peak National Observatory.

point out obvious features:

large trails:

(which we can tell are stars by their sharp diffraction streaks)

saturated CCD pixels, overflow into neighbouring pixels

deteriorated edge:

multiple images stacked to form complete image, gaps in overlap at edges

need to take these effects into account during image processing

(SLIDE 3: 1 min)

Slide 4 - what we did (DAVID)

background isolated

fitted gaussian

3sigma and 5sigma as cutoffs for what's an object

object labelling using adjacent pixel scan

interpolation of gaps

background count subtracted to get true image

re-scanned for objects, collected true count values, stored in catalogue

count -> magnitude

plot of log(N)

Slide 5 - extra what we did (DAVID)

Baye's factor to distinguish between star + galaxy

works on simulated, not real -> nevertheless, proof of concept

(SLIDE 4 & 5: 3 min)

Slide 6 - Results & Errors (DAVID)

talk through catalogue, classification of objects

logN plot, galaxy saturation at threshold; what happens if cutoff is lower?

-> more of the straight line seen, but existing plot is unaffected since we are just detecting brighter objects

-> shows deep-field distribution of galaxies

-> how could we improve?

(SLIDE 6: 3 min)

Slide 7 - Discussion (SUKORNO)

now we have our results, need to interpret what they tell us about our universe.

comparing to existing literature from images taken in same survey using same MOSAIC camera and same R-band filter,

making crude assumption that 4,000 times lower area means 4,000 less objects,

we obtain reasonable count number for each magnitude group

galaxy extinction

galaxy evolution

errors in CCD image - optional if we're quick

(SLIDE 7: 2 min)