ASTRONOMY LAB: Session II

Session Plan

1. Cosmic Ray Correction
2. Image Statistics
3. Image shifting
4. Co-adding

- **Cosmic Ray Correction**
  Cosmic rays can strike the CCD during an exposure leaving a characteristic signature: one or a few very high count pixel(s). They are normally quite unlike images of astronomical sources which distribute light over a larger area of the chip due to diffraction by the telescope optics and atmospheric turbulence. If not removed cosmic rays compromise with the photometry and often give rise to spurious detections.

  Use task 'cosmicrays' in noao.imred.crutila

  Your report should contain a figure which shows the uncorrected image and the cosmic ray corrected image. Scaling shoud be proper to appreciate the difference.

  Note:
  Usually, the default values are fine for removal of cosmic rays. Check it out. You can play around with the parameters to see the difference.
  One can run any task on a set of images. For instance, if you want to remove cosmic rays from all the images provided to you at one go using the default settings, then use the following
  input = @filelist List of images in which to detect cosmic rays
  output = cr_//@filelist File names appended by 'cr_'
  To make the file 'filelist', use the linux command 'ls fs*.fit> filelist'

- **Image Statistics**
  Use the task imstatistics in images.imutil to get the statistics of the images.

  Your report should include a table listing the obtained statistics of the images.

- **Image Shifting**
  The set of images provided to you are the J band images of a standard star FS24 from the UKIRT Faint Infrared Standard Stars. You can try to find out the JHK magnitudes of this star.
  Display the images to get an idea about the observing sequence.
  Why are there so many (five) sets of observations?
  Find out the coordinates of this star from the UKIRT catalogue.
  Download the 2MASS J frame around this star from the 2MASS website. Identify the star in your frame (take any one frame).
  Shift the images such that a particular star falls on the same pixel in all the image frames.
  Use the task 'imshift' in images.imgeom
  You will need the task 'imexam' to find out the coordinates

  Your report should include pre- and post-shifted images in pairs.

- **Co-adding**
  The individual exposures are embedded in the file names. Co-add the frames to improve the SNR.
  You will need to use the task 'imcombine' in images.immatch.
  What happens if you 'median' combine the images?
  By what factor do you expect the SNR to improve?

  Your report should include the final co-added image with proper scaling.