Proper Motions exercise

The goal of this exercise is to build a simple pipeline which should find proper motions for the field obtained from 2 images with different epochs (2MASS and DSS1). The selection of software used in the task is up to the student (the use of topcat and Aladin is possible for visualization only!).

1. download 2MASS J and DSS1 R images from the page of werkcollege

2. make source extraction

3. find the centers of images using `ALPHA_J2000` and `DELTA_J2000` coordinates obtained in the previous step. Find radius of each field.

4. download regions of 2MASS and USNO-B1 catalogs from VizieR using parameters obtained in the step 3.

5. cross-identify your catalog for 2MASS J image with 2MASS-PSC catalog from VizieR, cross-identify your catalog for DSS1R image with 2MASS-PSC catalog and USNO-B1 catalog (for crossidentification between 2MASS-PSC catalog and your DSS1R image use a bigger radius)

6. use 2MASS-PSC as a reference catalog to find new coordinates for both images, use 2MASS-PSC catalog to find J magnitudes for your catalog, USNO-B1 catalog to find R1 magnitudes for your image (the linear regression is enough for all cases)

7. cross-identify final catalogs for your images (use a bigger radius - 3 arcsec, for example), calculate and draw proper motions (DSS1R - first epoch, 2MASS- second epoch)

Before starting an exercise draw SADT and ER diagrams. On SADT diagram decide which software to use for each operation. It is possible to find coefficients for all equations in MySQL, R or python.