

I.FFT_COREGISTER: A NEW ALGORITHM FOR AUTOMATIC IMAGE REGISTRATION BASED ON F.F.T.

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This paper presents a new GRASS module for the automatic search of Ground Control Points (GCP). The classical methods are based on the identification of some correspondences between two images, one of these be the master image. At the time being, the image registration in GRASS is based on the manual identification of GCP: these points are used to define a transformation function to be applied to the slave image.

The most promising automatic registration algorithms are based on Fast Fourier Transform (FFT). An unknown displacement between two images can be determined by computing the maximum of the *cross-correlation* function.

In order to obtain a good registration image, a manual selection of matching areas has been introduced; this allows the use of images of any dimension and of any overlapping zone.

Given a matching zone, the algorithm defines many searching windows and computes the cross-correlation function; from the maximum value a couple of GCP is determined.

The computational burden is directly proportional to the selected matching areas, thus the module can be used even with limited resources. The module considerably reduces the searching time, as the user is required to identify only occurring errors.

Experimental data discussed in the paper show that the new algorithm's accuracy is comparable to the classical method in the presence of highly correlated images.