SPATIAL REGION FILTERING IN IRAF/PROS

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In order to analyze X-ray data, it is nearly always necessary to extract source and background events from a data set. Typically, this is done by defining geometric spatial regions of the data set to describe the source and background. For example, one might wish to extract source events from a circular or elliptical region centered at a particular pixel, and background events from a circular or elliptical annulus whose inner radius matches the source region. At the same time, it might be necessary to exclude one or more nearby sources from the source or background region in question. Thus, it might be necessary to define a pie-shaped region or even an entirely irregularly-shaped region to exclude.

A spatial filtering scheme called REGIONS has been implemented in IRAF/PROS to support these and other types of spatial region extraction. It allows users to create a spatial mask by specifying one or more ASCII geometric shape descriptors (box, circle, ellipse, pie, point, annulus and polygon) as regions to be included or excluded in the mask. In addition, two or more shapes can be combined using Boolean algebra to create an infinite variety of sophisticated regions.

Each geometric shape has a specific set of parameters that describe that shape. For example, a circle is described by a center and a radius, while a box is described by a center, length, width, and rotation angle. These quantities can be specified in units of pixels or, in cases where the target image contains world coordinate system information, they can be described in units such as RA and Dec.

Users can create region mask files by feeding an ASCII region descriptor to the IRAF/PROS *plcreate* task. Temporary masks can also be created from ASCII region descriptors by individual applications that call the routines in the region creation library. This library implements a yacc-based region parser that compiles the ASCII descriptors into "software CPU" instructions which are then executed to create the mask. The mask created from these region descriptors is a standard IRAF PLIO mask. It can be combined with other PLIO masks (e.g., exposure masks) to provide complete spatial filtering capabilities.

This presentation describes the capabilities of the above region filtering scheme. It also discusses the design philosophy guiding our work, as well as our plans for the future.