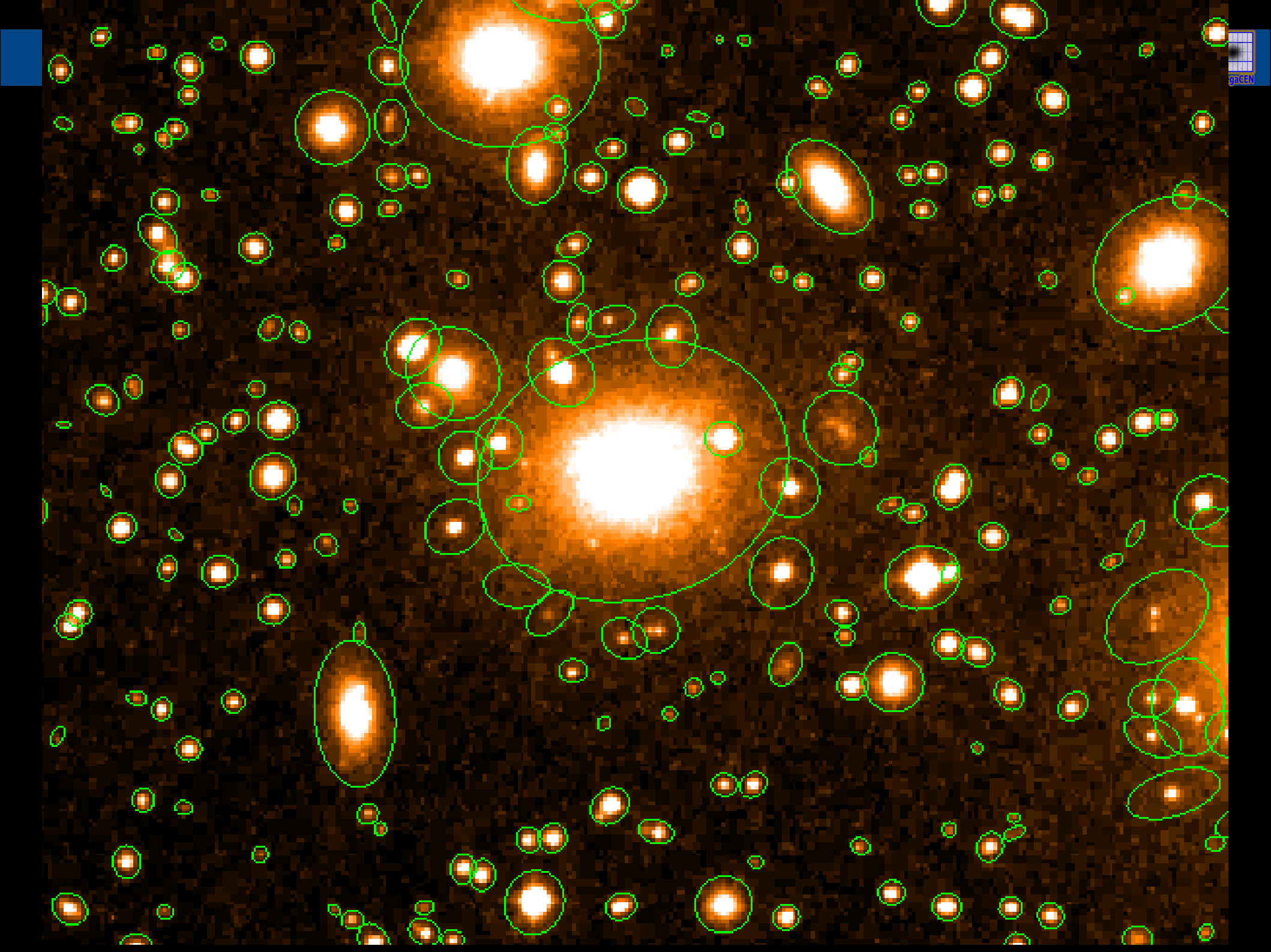


Virtual Observations 2012

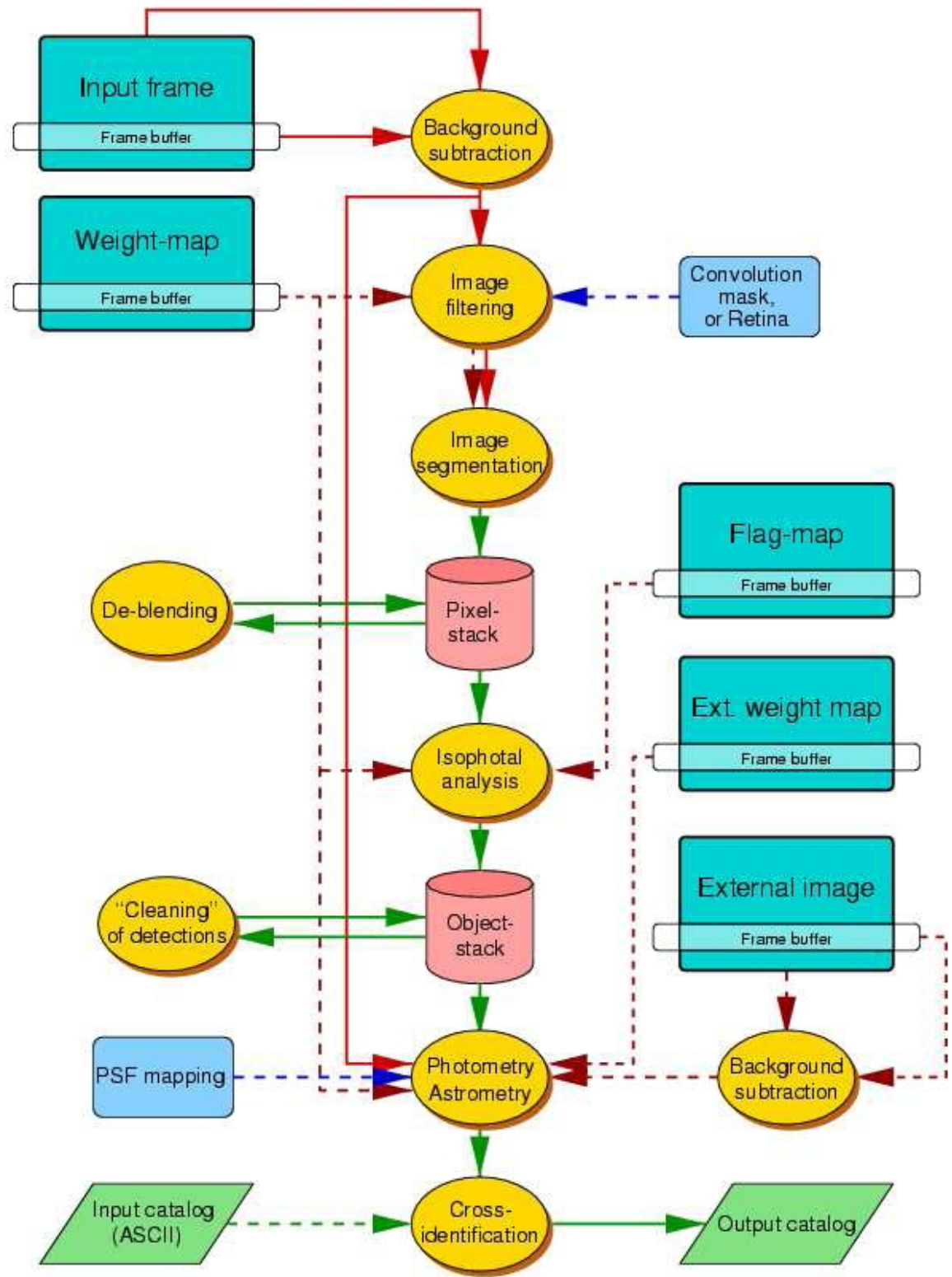
Source Extractor

- “Builds a catalogue of objects from an astronomical image”
- Author: Emmanuel Bertin, Astronomer at "Institut d'Astrophysique de Paris" (IAP)
- Website: <http://www.astromatic.net/> (source, docs and forum)
- Two manuals: the official one, and a ‘SE for dummies’ by Benne Holwerda



Steps:

- Determine the background: measure and subtract
- Filter by convolution (?)
- Determine which pixels are not part of the background (“thresholding”)
- Split these areas up into sources (“deblending”)
- Do photometry on the sources : count intensities and measure other properties like ellipticity
- Reconsider detections (“clean”)
- Classify objects



Three ways in using SExtractor:

- Standard way: on one image
- Dual mode: use the sources from one image and search for them in another image: Nice when searching for faint sources
- Cross-correlation mode: Like dual mode, but with a search radius and a priority.

Input file:

```
DETECT_MINAREA      [EDIT ME] # minimum number of pixels for a detection
DETECT_THRESH       [EDIT ME] # n times rms of background for detection
GAIN                 [EDIT ME] # detector gain in e-/ADU.
PIXEL_SCALE         [EDIT ME] # size of pixel in arcsec (0=use FITS WCS info).
MAG_ZEROPOINT       0.0          # magnitude zero-point
```

Output file:

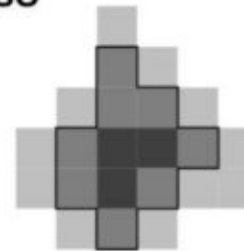
```
VECTOR_ASSOC
FLUX_MAX
X_IMAGE
Y_IMAGE
THETA_IMAGE
ELONGATION
ELLIPTICITY
FWHM_IMAGE
ERRX2_IMAGE
```

Coordinates & Magnitudes

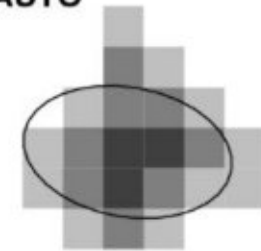


$$\begin{aligned} X2 &= \overline{x^2} = \frac{\sum_{i \in S} I_i x_i^2}{\sum_{i \in S} I_i} - \overline{x}^2, \\ Y2 &= \overline{y^2} = \frac{\sum_{i \in S} I_i y_i^2}{\sum_{i \in S} I_i} - \overline{y}^2, \\ XY &= \overline{xy} = \frac{\sum_{i \in S} I_i x_i y_i}{\sum_{i \in S} I_i} - \overline{x} \overline{y}, \end{aligned}$$

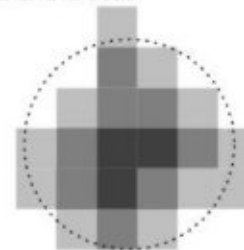
ISO



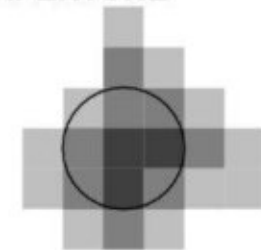
AUTO



ISOCORR



APERTURE



- Pros: speed, able to deal with crowded fields, controllable, decent photometry, dual-mode, can use weight/flag images.
- Cons: bad in classification, no fitting.
- PSF and galaxy fitting: experimental stage
- Alternatives: Docas (old), Daophot, Self organizing maps (SOM).
- Many tips in the dummy-guide.