

GUASOM analysis of the Alhambra survey

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October 2017

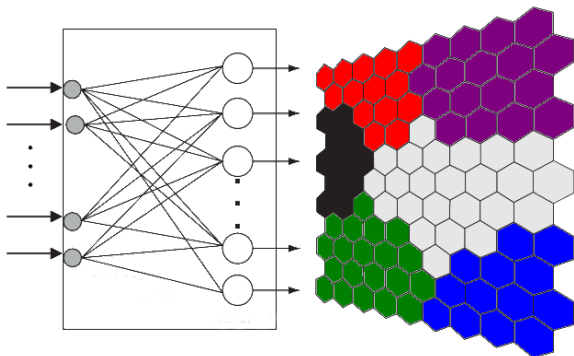
Alhambra Survey



- ▶ Ground survey
- ▶ $\sim 440,000$ objects
- ▶ Photometry in 23 different bands
- ▶ Star/galaxy probabilistic classification based on the size of the images on different bands
- ▶ Photometric redshifts computed using a bayesian method (BPZ) based on galaxy templates and originally published in the PEGASO library
- ▶ More info.: *Molino et al. The ALHAMBRA Survey: Bayesian Photometric Redshifts with 23 bands for 3 squared degrees. MNRAS vol. 441, pp. 2891-2922. 2014*

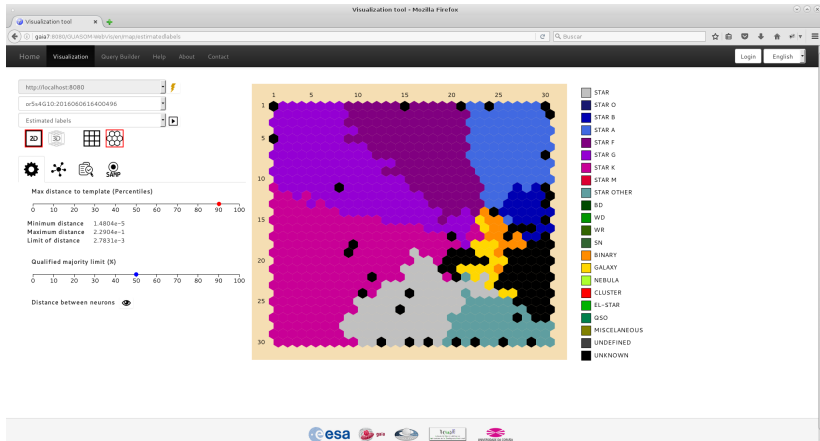
Self-Organized Maps (SOM)

- ▶ Artificial Intelligence (IA) — Artificial Neural Network (ANN)
- ▶ Unsupervised classification (Clustering)
- ▶ Dimensionality reduction
- ▶ Locality preservation



GUASOM

Gaia mission



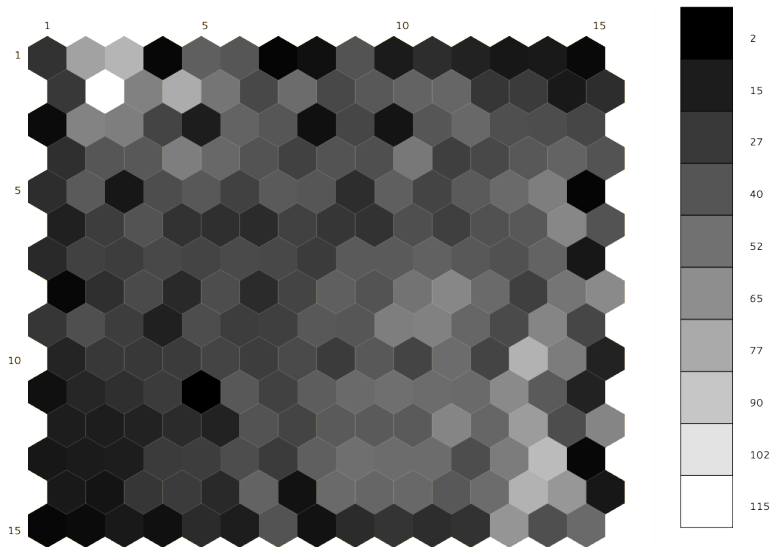
GUASOM

Alhambra Survey

- ▶ Cases of study:
 - ▶ Brightest objects ($F814W < 19$)
 - ▶ All objects
 - ▶ Galaxies
- ▶ Training data:
 - ▶ 23 bands
 - ▶ Missing values treatment → Mean value
 - ▶ Min/Max scaling

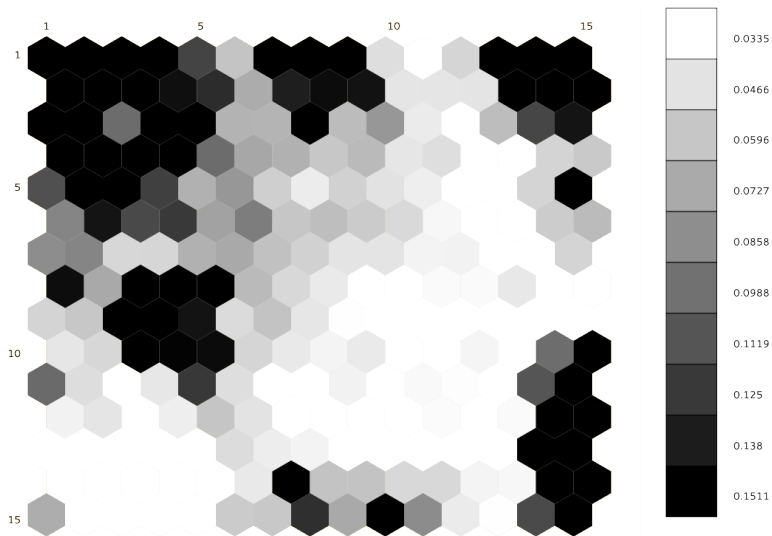
GUASOM — F814W < 19

Hits



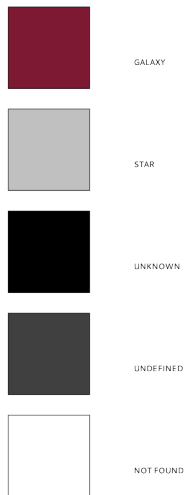
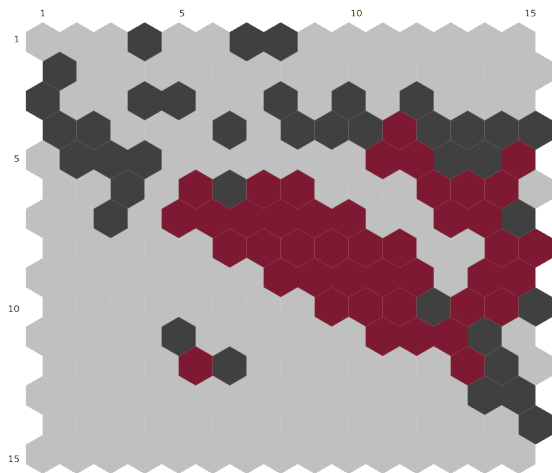
GUASOM — F814W < 19

U-Matrix



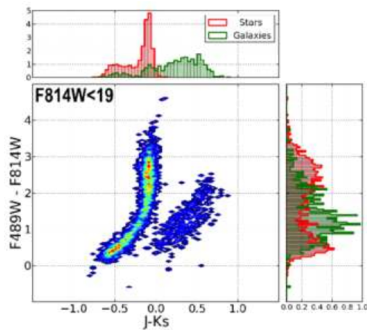
GUASOM — F814W < 19

Classification

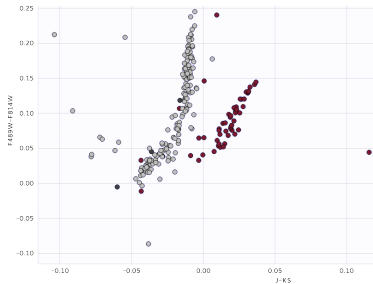


GUASOM — F814W < 19

Color - Color



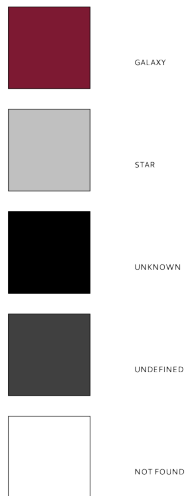
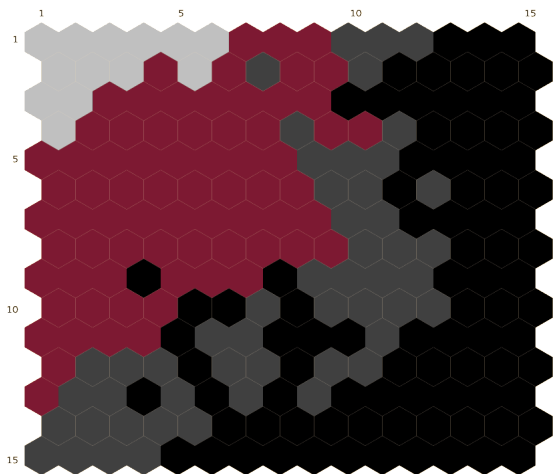
(a) Fig. 15 (left), Molino et al



(b) GUASOM

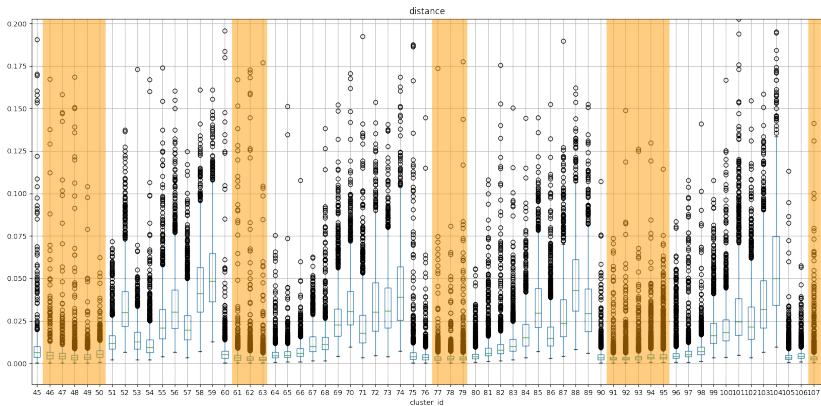
GUASOM — All data

Classification



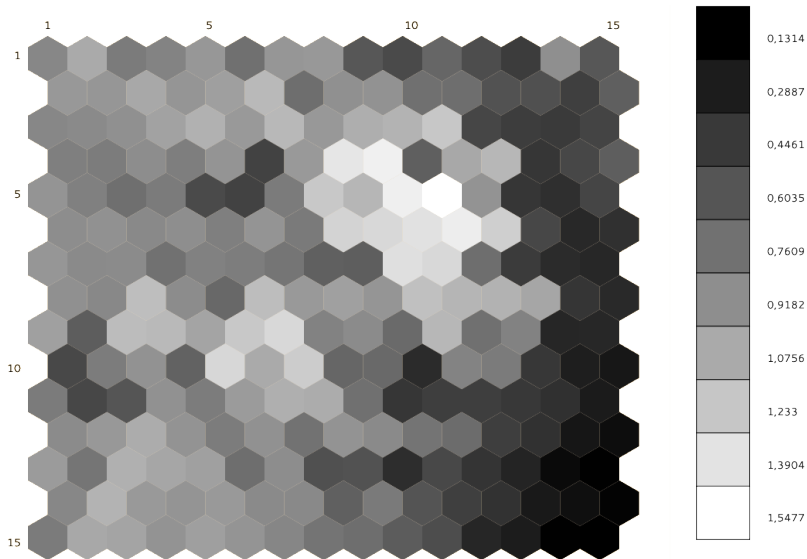
GUASOM — All data

Homogeneity



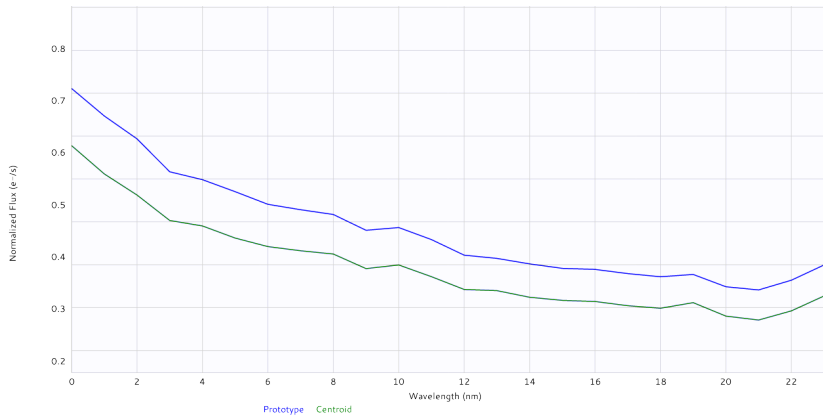
GUASOM — Galaxies

Redshift



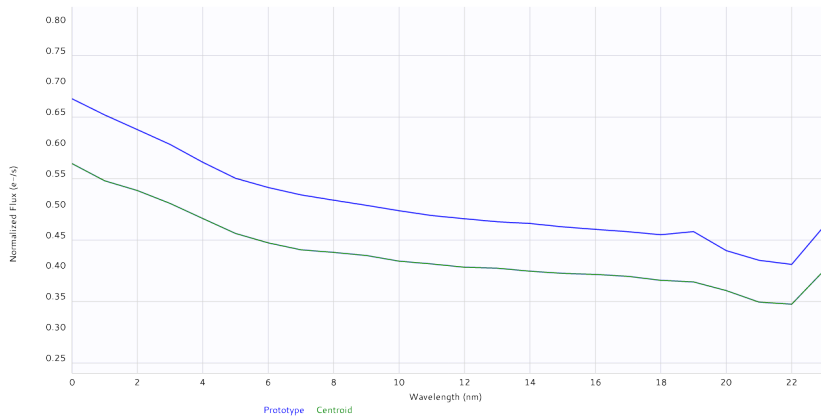
GUASOM — Prototypes

Star



GUASOM — Prototypes

Galaxy



GUASOM

Other features

- ▶ Connectivity to other tools through SAMP protocol:
 - ▶ TopCat
 - ▶ Aladin
 - ▶ Vaex
 - ▶ ...
- ▶ Crossmatch with external catalogs:
 - ▶ Simbad
 - ▶ SkyServer
 - ▶ ...

Conclusions

- ▶ Adaptive web visualization tool (GUASOM) for different surveys
- ▶ Powerful technique to group (unknown) data
- ▶ Connectivity features to integrate GUASOM with other tools
- ▶ Usable for J-PUS?