

In this poster we present the analysis of the CMD of M67 (proposed in the Stellar Population Challenge) performed with VO applications. We found that, although the VO environment is still not ready to perform a complete analysis, its use provides highly useful additional information for the analysis. Thanks to the current VO framework, we are able to identify stars in the provided CMD that are not suitable for isochrone fitting. Additionally, we can complete our knowledge of this cluster extending the analysis to IR colors, which were not provided in the original data but that are available thanks to the VO. On the negative side, we find it difficult to access theoretical data from VO applications, so, currently, it is not possible to perform completely the analysis of the cluster inside the VO framework. However it is expected that the situation will improve in a near future.

Preamble:

Although the M67 data could have been taken from the challenge page <http://www.astro.rug.nl/%7Estrager/challenge/> we prefer to take it directly from the VO. It allows an easy management of the data and its comparison with other databases.



Step 0:

Open the VO Tools (we will use PLASTIC applications, all can be opened from <http://plastic.sourceforge.net/apps.html>)

0.1 **Workbench:** PLASTIC tool. It allows to communicate applications. It is not strictly necessary to launch this application, since TOPCAT includes a PLASTIC daemon <http://software.astrogrid.org/nlp/workbench/workbench.jnlp>)

0.2 **TOPCAT:** Visualization tool for graphics and tabular data management <http://www.star.bris.ac.uk/~mbt/topcat/topcat-full.jnlp>

0.3 **Aladin:** Sky views and access to VO data <http://aladin.u-strasbg.fr/java/nph-aladin.pl?frame=get&id=Aladin-PROTO.jnlp>

0.4 Connect all the applications with PLASTIC (see the left figure)

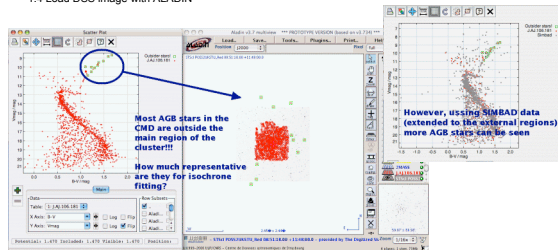
Step 1: using ALADIN

1.1 Load M67 data in ALADIN (if you write m67 in the marked window, ALADIN will search image and SIMBAD data automatically)

1.2 Load M67 data from Vizier with ALADIN (search Montgomery, catalogue A.AJ.106.181)

1.3 Load M67 data from 2MASS in Surveys with ALADIN

1.4 Load DSS image with ALADIN



Step 2: Identify sources using ALADIN & TOPCAT

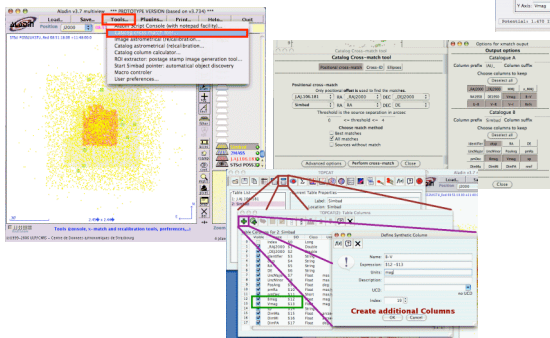
2.1 Send the A.AJ.106.181 table to TOPCAT

2.2 Plot the CMD with TOPCAT

2.3 Pass the mouse over the AGB region and identify the positions of the stars with ALADIN. It is found that most of the AGB stars are in the outer region of the cluster!!

2.4 More information about each source can be found with ALADIN.

2.5 It is found that there are more AGB stars, but they are in the outer parts of the cluster too.



Step 3: Cross correlate catalogs

2.1 Open **Tools** in ALADIN and select **catalog cross match tool**.

2.2 Cross correlate SIMBAD, 2MASS and A.AJ.106.181.

2.3 Send the resulting table to TOPCAT for plotting.

2.4 Include the needed columns using TOPCAT.

2.5 Plot the resulting CMD diagrams (now you can test if ALADIN and A.AJ.106.181 have the same values of Vmag, you have additional IR diagrams etc...)

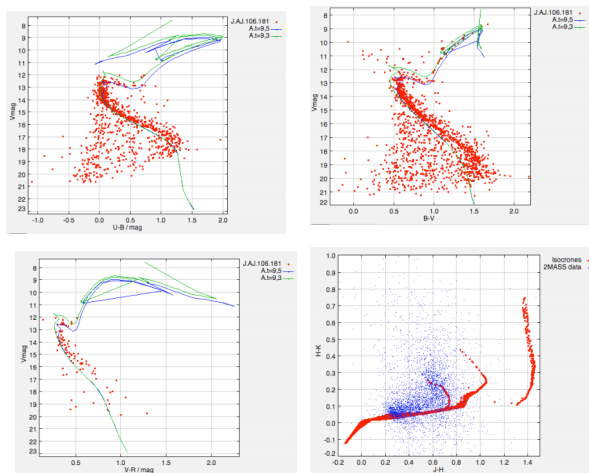
Step 4: Theoretical data & analysis

4.1 Unfortunately, there is no trivial way to access theoretical isochrones in the VO at this moment. It can be performed looking for a theoretical catalog in Vizier with ALADIN, (like we have done for the Montgomery data). However, theoretical catalogs includes a different information that one used in observations.

4.2 An alternative option is to download the theoretical data from somewhere, and load it in TOPCAT (with ASCII option in the load table).

4.3 A similar problem is posed in the data analysis (i.g. comparison of observational data with theoretical data)

4.3 The figures in the right shows a simple comparison performed with TOPCAT. At this moment, only a fit-by-eye can be done.



Conclusions:

1- The current VO status and applications allow to perform (and improve) the observational data access. It allows a better understanding of the physical problem involved (the science case) which is hardly obtained outside the VO framework.

2- Current VO status is not completely ready for the access to theoretical models. It is expected that the situation will improve in a near future (keep tuning...)

3- At present moment, VO allows to resolve several scientific cases. However, it is important to improve the access to theoretical data. This last task must be done inside the VO framework, and it is the people who produce this theoretical data who have a better idea about how the data can be distributed, which are the cautions of theoretical results and so on... So it is important that these persons get involved in the VO (i.e. IVOA), so their results can increase in visibility (an easier access), and analysis tools can be further developed.