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D. Barret, F. Casoli, T. Contini, G. Lagache, A. Lecavelier, and L. Pagani (eds)

CAPABILITIES OF THE HYPERLEDA DATABASE

I. Vauglin[1], P. Prugniel[1 2], H. Courtois[1], D. Makarov[3], C. Petit[1], G. Mamon[4] and G. Paturel[1]

Abstract. Born in 1999 from the convergence between the LEDA and HYPERCAT, the extragalactic database HyperLeda is the result of a collaboration between Observatoire de Lyon, Observatoire de Paris, Sternberg Astronomical Institute of the Moscow Stale University and the Department of Astronomy of Sofia University.

The project has been supported by the Programme National Galaxies (PNG). Available through 8 mirror interfaces automatically maintained, HyperLeda is distributed worldwide and now integrated in the Virtual Observatory.

1 The strength and uniqueness of HyperLeda Capabilities

In the spirit of RC1, RC2 and RC3, Hyperleda provides an homogeneous description for a 3 million galaxy sample, complete up to the 18th B-magnitude. The strength of HyperLeda is to provide homogenized data and high quality cross-identifications. Hyperleda is now integrated in the Virtual Observatory and continues to provide an added scientific-value in the form of accurate cross-identifications and homogenization of the data.

2 The user interface and the software

The web interface of HyperLeda, **http://leda.univ-lyon1.fr**, is used for a wide range of applications. It answers the classical astronomical queries, like name or cone searches, allows to filter or order the results and to pass full SQL queries. The results are returned either as an HTML page with many relevant links or as other formats, including VOTable.
As an example, SQL searchs can be:
- To select galaxies with declination $> 80\,^\circ$ and to keep their names, morphological types, Bt magnitudes and velocity corrected for Virgo Infall, the SQL request is:

SELECT pgc,objname, type, bt, vvir
WHERE $objtype =' G'$ and de2000 > 80

-To display directly the Hubble constant average, calculated from galaxies having the same rotation velocity than M31 (concept of sosie galaxies , the SQL request must be:

SELECT $avg(vvir/10\,\hat{}((24.5 + btc - 3.8 - 25)/5))$ as H
WHERE $abs(log(vrot) - 2.393) < 0.03$ and $v > 500$ and $v < 2000$

With this last test, you can experiment the effect of Malmquist bias in a very simple way.

[1] Observatoire de Lyon, 69561 Saint-Genis-Laval, France
[2] GEPI, Observatoire de Paris, Pl J. Janssen, 92195 Meudon, France
[3] Special Astrophysical Observatory of the Russian Academy of Sciences
[4] Institut d'Astrophysique de Paris, 98bis Bd Arago, 75014 Paris, France

3 Impact of HyperLeda

The justification of the great effort to produce this database may be questionned in the era of large surveys providing massive datasets. There are three times less objects in HyperLeda than in NED. One of the reasons is that HyperLeda provides only objects for which multiple detections are cross-identified (from different surveys) or for which reliable measurements exist (like redshift from the SDSS). Naturally, our goal is not to compete with NED but to provide complementary services. The uniqueness of HyperLeda is to provide homogenized data and high quality cross-identifications.
The impact seen from citations in the literature shows that HyperLeda is widely used. We can use two sorts of indicators to measure the impact of the database:
(i) the number of requests processed every day:
As an example, for the month March 2005, the access rate to the homogeneous data on the Lyon's mirror was of 140 requests per day, 2000 access per day for compilations and 22 access for full SQL searches.
(ii) the number of citations of HyperLeda in the literature:
We counted the number of citations both for NED and for HyperLeda in A & A in the recent years. The citations are not just from the list of references, but from the entire text, using the search engines of A & A and University of Chicago Press. The results are given in the following table:

databases	Europe	US
hyperleda	188	201
NED	723	2138
Simbad	1139	1536
Vizier	264	269

Besides, a comparison of NED versus HyperLeda citations in the main astronomical journals (including ApJ, AJ, A & A, ApJL, ApJS, PASP and MNRAS) shows that the relative impact of HyperLeda in the last years has been continuously increasing.

Year	NED/HyperLeda citations
2001	7.9
2002	6.6
2003	6.0
2004	5.6
2005	5.7

In the coming years, the one of the main task in which HyperLeda takes on importance will be the determination of the distances for the widest possible sample of galaxies. According to the different distance ranges, the distances are measured either directly (in the Local Universe), or using the spectroscopic redshifts (up to $z = 0.3$), or from photometric and multiparametric redshifts at larger distances. Beside this project, HyperLeda would be used in different projects exploiting the wide or deep galaxies surveys.

References

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