

Recent developments in VOIndia

Tushar Agrawal
Virtual Observatory India

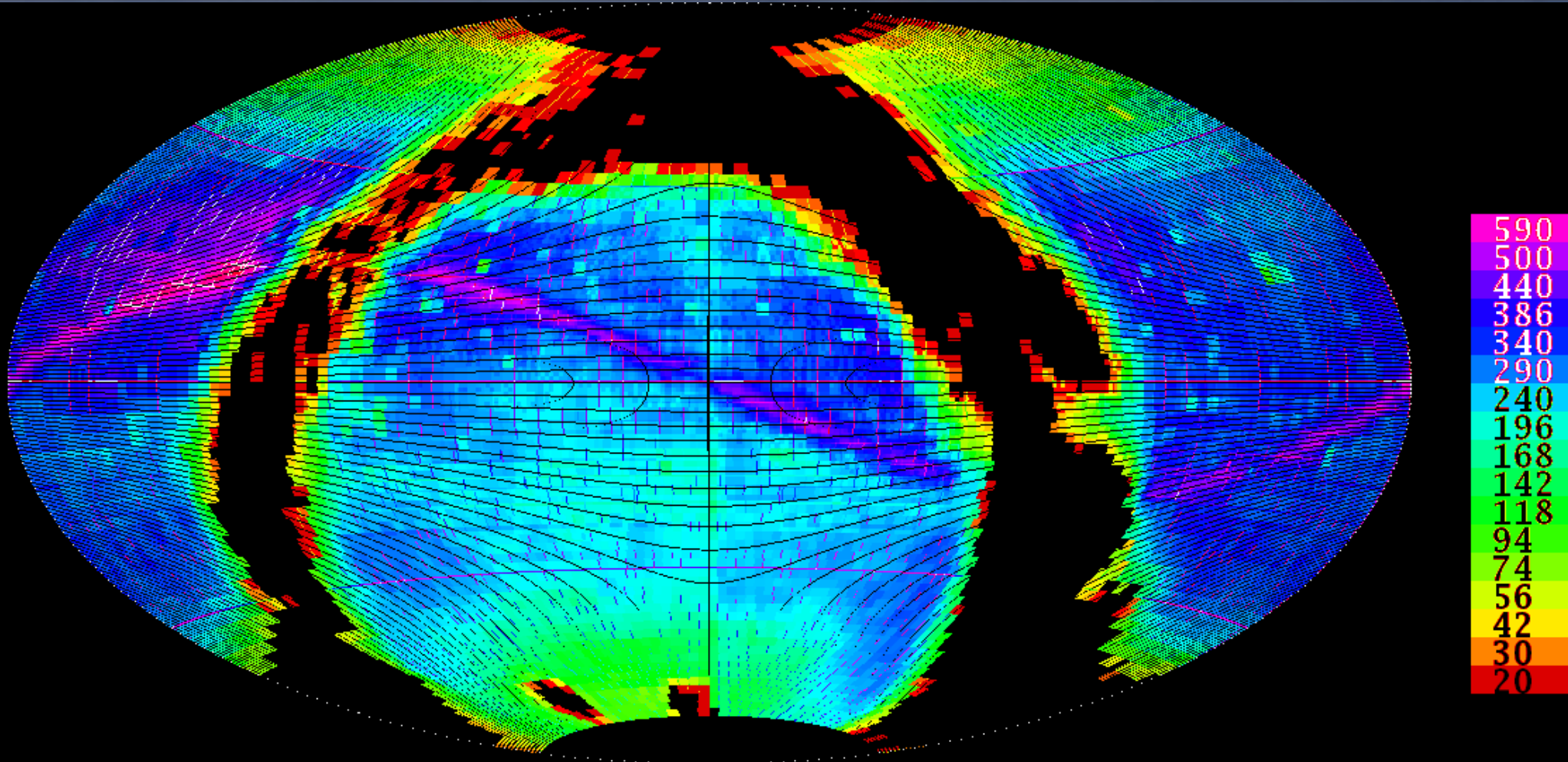
Outline

- CRTS Data Archive System
- VOPlot new features
- AstroStat feature enhancements

Catalina Real-Time Transient Survey

- The Catalina Real-Time Transient Survey covers thirty three thousand square degrees of the sky
- Catalina photometry covers objects in the range $-75^\circ < \text{Dec} < 70$
- It discovers rare and interesting transient phenomena
- A data archive system is in development to serve both catalog data and the images
- Data Size
 - Catalog data is 5.8 TB
 - Image data is more than 4.3 TB (compressed)

Catalina Real-Time Transient Survey



An aitoff projection of the sky region covered in equatorial coordinates (centered at RA = 0h)

CRTS Data Archive work so far

- Data Query Services
 - Search for photometry in a single location
 - Search for photometry in a multiple location
 - Retrieve photometry for a named object
 - Extract photometry by Catalina ID
- Multiple display options
 - As a html table
 - In a VOTable format
 - Result can be viewed with VOPlot and AstroStat
- Exporting resultset
 - As a Csv file, a Pdf document or as a Excelsheet

Simple cone search service

Catalina Real-Time Transient Survey

[Cone Search](#)[Multiple Cone Search](#)[Object Search](#)[Photometry Search](#)[Query Browser](#)[Image Access](#)

Cone Search Service

Object Name

[Resolve](#) SIMBAD NED

Select name resolver service.

RA (J2000) *

RA Example: 20h 10m 6s or 20 10 6 or 20:10:6 or in degree

DEC (J2000) *

DEC Example: 20d 10m 6s or 20 10 6 or 20:10:6 or in degree

Radius (arcmin) *

Database *

 Photcat Orpharcat

Display Options *

 HTML VOTable In VOPlot In AstroStat[Execute](#)

Cone Search Result: RAcent: 10.85612 Decent: 2.5086 Radius: 0.1 Database: Orpharcat Display Options: HTML

ID	RAcent	Decent	MagOffset	Magnitude
7100810201111004771	10.85278	2.5103	0.0	18.1685
7100810201111004793	10.85219	2.51131	0.0	19.1887
5112910201131003885	10.86081	2.50792	-0.068647	22.495
7100810201111004888	10.85159	2.51303	0.0	18.6818

4 items found, displaying all items1

Export The Result set:



Powered by Virtual Observatory India

Cone search result in other formats

ID	RAcent	Decent	MagOffset	Magnitude
710081020111004771	10.85278	2.5103	0.0	18.1685
710081020111004793	10.85219	2.51131	0.0	19.1887
5112910201131003885	10.86081	2.50792	-0.068647	22.495
710081020111004888	10.85159	2.51303	0.0	18.6818

PDF

A	B	C	D	E
ID	RAcent	Decent	MagOffset	Magnitude
7.10081E+18	10.85278	2.5103	0	18.1685
7.10081E+18	10.85219	2.51131	0	19.1887
5.11291E+18	10.86081	2.50792	-0.068647	22.495
7.10081E+18	10.85159	2.51303	0	18.6818

Excel

ID,RAcent,Decent,MagOffset,Magnitude
710081020111004771,10.85278,2.5103,0.0,18.1685
710081020111004793,10.85219,2.51131,0.0,19.1887
5112910201131003885,10.86081,2.50792,-0.068647,22.495
710081020111004888,10.85159,2.51303,0.0,18.6818

CSV

CRTS Data Archive work continues...

- Image Cutout Service (under development)
 - Functionality added to download images retrieved by the service
- Query Browser for customized queries
 - User can write advanced queries
 - Support for query validation
 - VOTable export option
- ...

Accessing images via SIAP

Catalina Real-Time Transient Survey

Cone Search

Multiple Cone Search

Object Search

Photometry Search

Query Browser

Image Access

Image Access Service

Object Name

Resolve

SIMBAD NED

Select name resolver service.

RA(J2000) *

RA Example: 20h 10m 6s or 20 10 6 or 20:10:6 or in degree

DEC (J2000) *

DEC Example: 20d 10m 6s or 20 10 6 or 20:10:6 or in degree

Radius (arcmin) *

Radius: Max 5 arcmin.

Execute

Image Search Result: RAcent: 119 Decent: 23 Radius: 0.1

Sr. No.		File Download Location
1	<input type="checkbox"/>	http://180.149.51.196:9090/s/taging/01_05FEB01_FB0102_0001.zip
2	<input type="checkbox"/>	http://180.149.51.196:9090/s/taging/01_05FEB01_FB0102_0002.zip
3	<input type="checkbox"/>	http://180.149.51.196:9090/s/taging/01_05FEB01_FB0102_0003.zip
4	<input type="checkbox"/>	http://180.149.51.196:9090/s/taging/01_05FEB01_FB0102_0004.zip

4 items found, displaying all items.1 false

✓ Select All

✗ Deselect All

↓ Download Checked

Powered by Virtual Observatory India

Query browser

Catalina Real-Time Transient Survey

Cone Search

Multiple Cone Search

Object Search

Photometry Search

Query Browser

Image Access

Query Browser Service

```
select * from MasterFrame limit 10;
```

✓ Check Query

▶ Execute Query

↵ Export VOTable

? Help

Query Result

MastFRAMEID	RAcent	Deccent	Telescope	SIZE	RAmin	RAmax	Decmin	Decmax	Magoffset
1001001	1.40583	-1.41111	1	2.8	0	0	0	0	0
1001002	4.21833	-1.41111	1	2.8	2.74641	5.69836	-2.85503	-0.00827	-0.170186
1001003	7.03083	-1.41111	1	2.8	0	0	0	0	0
1001004	9.84333	-1.41111	1	2.8	8.41927	11.2705	-2.83497	0.0114	-0.197926
1001005	12.65583	-1.41111	1	2.8	11.2313	14.0831	-2.83491	0.01149	-0.169185
1001006	15.46833	-1.41111	1	2.8	14.0436	16.8952	-2.83481	0.01147	-0.160873
1001007	18.28083	-1.41111	1	2.8	16.8561	19.708	-2.83506	0.01122	-0.183704
1001008	21.09333	-1.41111	1	2.8	19.6683	22.52	-2.83536	0.01097	-0.237129
1001009	23.90583	-1.41111	1	2.8	22.4805	25.3325	-2.83534	0.011	-0.278275
1001010	26.71833	-1.41111	1	2.8	25.2937	28.1455	-2.83536	0.01114	-0.24369

Powered by Virtual Observatory India

Catalina Real-Time Transient Survey

Cone Search

Query Browser Service

```
select * from Master;
```

✓ Check Query

▶ Execute Query

↵ Export VOTable

? Help

Query Result

"ERROR CODE: 1146, STATE: 42S02, MESSAGE: Base table or view not found message from server: 'Table 'CR TS.Master' does not exist'"

Powered by Virtual Observatory India

CRTS Data Archive people involved

- From Caltech
 - Ashish Mahabal
 - Andrew Drake
 - Mathew Graham
 - George Djorgovski
- From IUCAA
 - Ajit Kembhavi
 - Sarah Ponrathnam
 - Ninan Sajeeth Philip
 - Varun Bhalerao
- . . .



VOPlot

- Recently released version 1.8
- Support for TAP added
 - Returns a VOTable after querying to the service supporting TAP
- A fully updated helpset is now bundled within VOPlot
- Minor ticks has been included within the plot properties
 - User can view the points with a greater precision of the point location
- New Functionality Draw Line added
- VOPlot-lite is available as a java applet

VOPlot displaying list of available TAP services

The screenshot shows a window titled "Table Access Protocol" with a "Columns Registries" header. The main area is titled "Select Service" and contains a search bar for "Available TAP Services". The search bar has a "Key Word" field, a "Submit" button, and radio buttons for "AND" and "OR". Below the search bar is a table with three columns: "Short Name", "Title", and "AccessURL". The table lists two services: "SIMBAD TAP" and "GAVO DC TAP".

Short Name	Title	AccessURL
SIMBAD TAP	SIMBAD TAP query engine	http://simbad.u-str
GAVO DC TAP	GAVO data center TAP service	http://dc.zah.uni-he

Below the table is a horizontal scrollbar with the number "1" centered underneath it. The "Selected Resource Description" section contains the text: "This service provides TAP access to a simplified view of the SIMBAD database". The "TAP Parameters" section has a "TAP URL" field with the value "http://simbad.u-strasbourg.fr:80/simbad/sim-tap". At the bottom of the window are "Ok" and "Close" buttons.

Asynchronous query example

The screenshot shows the TAP Query Window interface. A modal dialog titled "Check asynchronous job status" is open, displaying the job ID "1357216736068A" and its status "PENDING". The main window shows the "Table Metadata" section with a table listing columns: Name, schema, table_name, table_type, description, and utype. The "ADQL Query" section contains a query for job status: "Job Status: Job has been successfully submitted. Job ID is 1357216736068A." Below this, the "Type Of Query" section has radio buttons for "Synchronous" and "Asynchronous" (selected), with a link "Status of submitted asynchronous jobs". The "Enter Query" section contains a SQL query: "SELECT basic.OID,RA,DEC,main_id AS 'Main identifier', coo_bibcode AS 'Coord Reference', nbref AS 'NbReferences', plx_value as 'Parallax', rvz_radvel as 'Radial velocity', ...". At the bottom, there are buttons for "Object By Identifier", "Submit Query", "Load", "Save as VOTable", "Back", and "Close".

Table Metadata

Table: T

Name	schema	table_name	table_type	description	utype

ADQL Query

Job Status: Job has been successfully submitted. Job ID is 1357216736068A.

Type Of Query

Synchronous Asynchronous [Status of submitted asynchronous jobs](#)

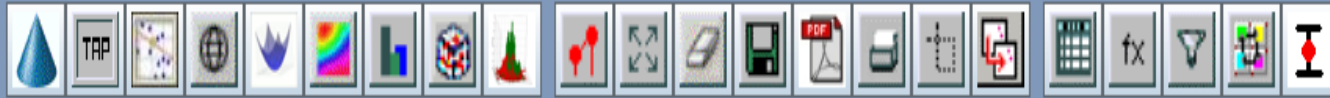
Enter Query

```
SELECT
basic.OID,RA,DEC,main_id AS "Main identifier"
,coo_bibcode AS "Coord Reference",
nbref AS "NbReferences",
plx_value as "Parallax",
rvz_radvel as "Radial velocity",
...
```

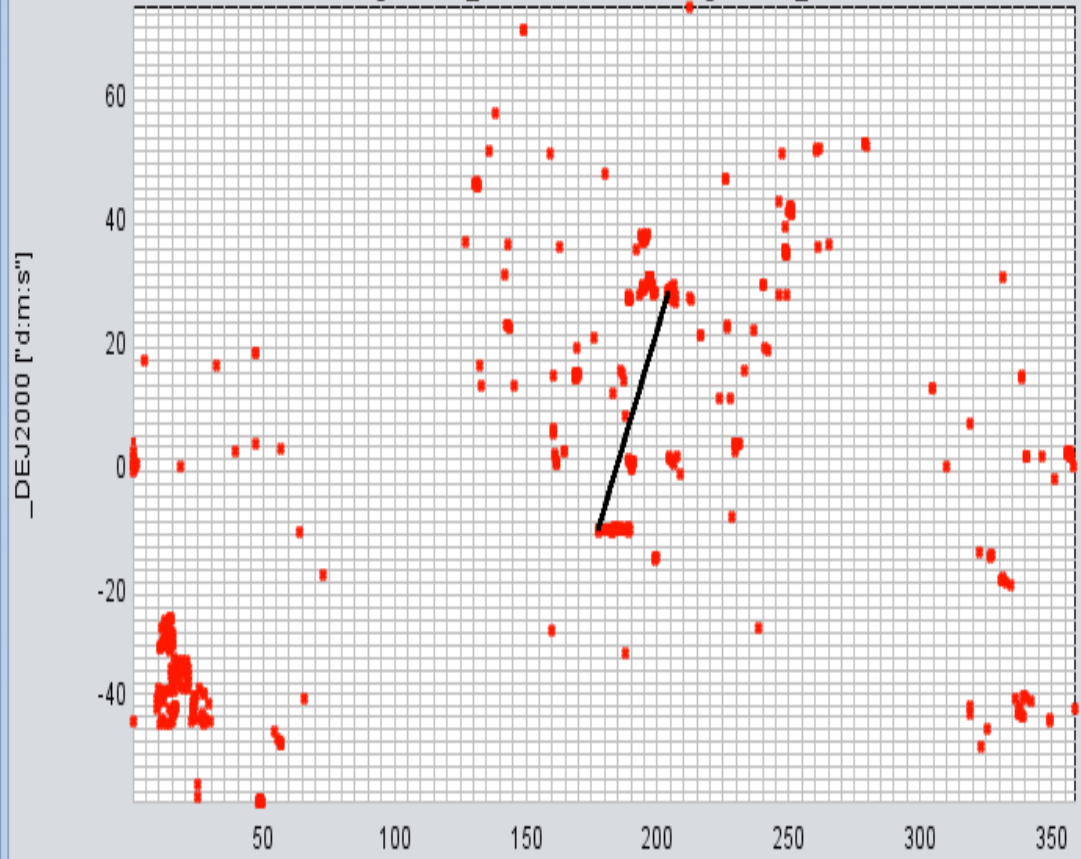
Object By Identifier ▼ Submit Query

The sample queries are taken from respective TAP service.

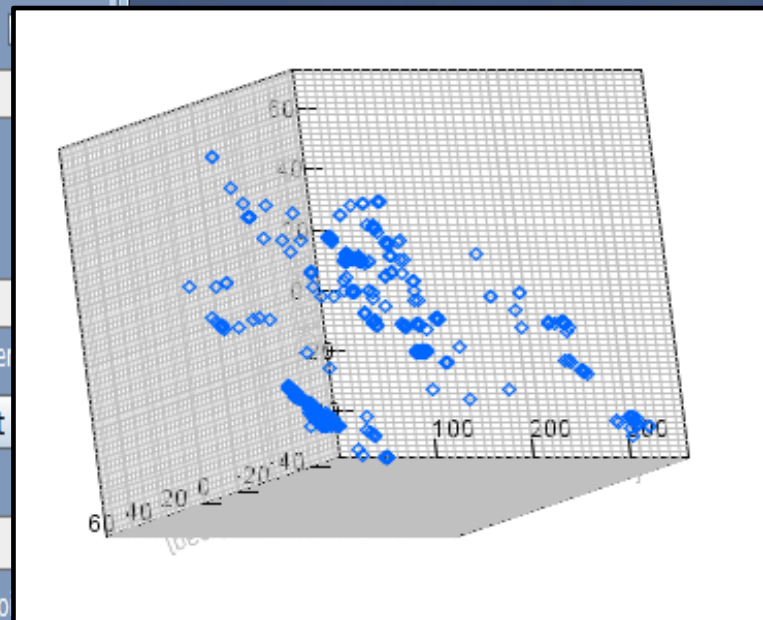
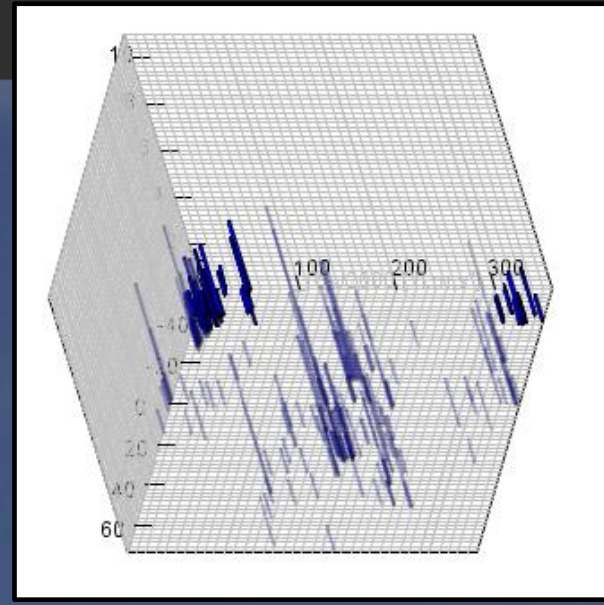
File Edit Mode View Functions Interop Help



Burbidge.xml - _RAJ2000 Vs Burbidge.xml - _DEJ2000



X : 347.8
Y : 66.9
No Of Plots: 1x1
X : Log Rev
_RAJ2000
Y : Log
_DEJ2000
Filter/Subset
 Over
Plot
Mode
Zoom
 Select po
on all active plots



From official page

Instructions for Incorporating VOPlot in a Web Application

Please click [here](#) for help on incorporating latest VOPlot-lite version in a web-based Application.

Click [here](#) for help on incorporating VOPlot (version 1.5 and below) in a web-based Application.

Note: If you are intrested in plotting huge catalogues like Tycho and UCAC, you can try VOMegaPlot or VOMegaPlot Client Server tool. VOMegaPlot supports only a subset of VOPlot's features.

Downloads

[WebStart](#) for **stable** version of VOPlot

[WebStart](#) for latest **beta** version of VOPlot

[Applet](#) version for latest VOPlot-lite

Version	Download File	Userguide	Released On
1.8	VOPlot1_8.zip (requires java 6 or above)	VOPlot_UserGuide_1_8	06 Feb 2013

AstroStat

- VO-I package for statistical analysis of astronomical data
- Released the beta version in February 2013
- Available as a web application tool and a standalone version
- Caters across three main test categories
- 31 different statistical tests are available
- Seamless integration with VOPlot

Table Access Protocol

Available TAP Services

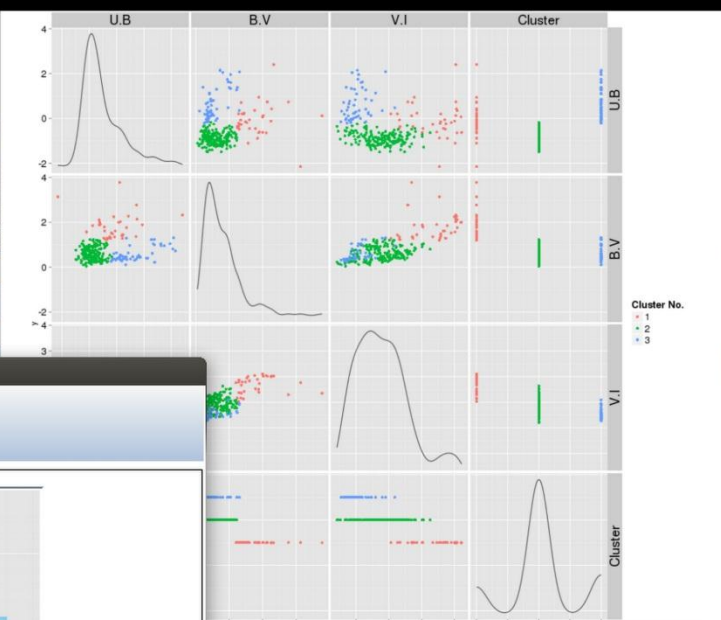
Short Name	Title	CDS SIMBAD
SIMBAD TAP	SIMBAD TAP query engine	CDS SIMBAD
Short Name has not been provided!!	CADC Table Query (TAP) Service	No information provided!!
GAVO DC TAP	GAVO Data Center TAP service	The GAVO Data Center
AIP GAVO TAP	AIP DaCHS TAP service	GAVO at Leibniz Universität Hannover

SELECT TEST CATEGORY

Exploratory | Advanced | Expert

SELECT EXPLORATORY TEST

- Anova
- BoxPlot
- Histogram
- Mean, Standard Deviation
- Pairs Plot
- Pearson, Kendall and Spearman correlation
- Probability Plot
- Quantile Quantile Plot
- Sample Generation
- Simple Linear Regression Analysis
- Weighted Mean
- XY Plot

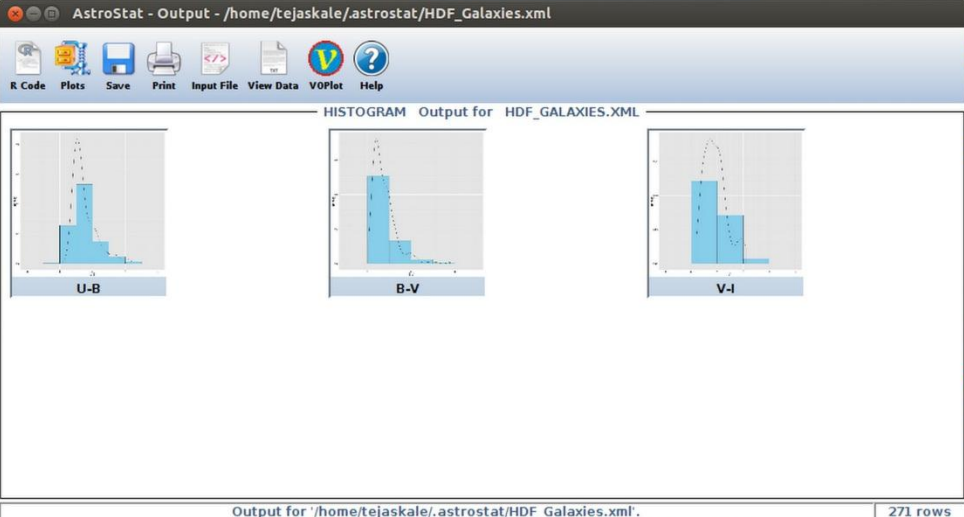


Regression-plot

The fitted model is:

$$y = mx + c$$

x-var (filename)	y-var (filename)	size	Slope (m)	Intercept (c)	RMS	r	t	P(> t)
V-I (HDF_Galaxies.xml)	U-B (HDF_Galaxies.xml)	267	-0.236(±0.1074)	-0.2758(±0.1097)	1.52e+02	-0.1337	-2.197	2.888e-02



Output for '/home/tejskale/astrostat/HDF_Galaxies.xml'. 271 rows

0.972	-0.175	0.159
0.236	0.764	-0.601
-0.016	0.621	0.784

Correlation Output For HDF_Galaxies.xml

var1	var2	size	f	r	t	P(> t)	CI-95%
log(V-I) (HDF_Galaxies.xml)	log(V-I) (HDF_Galaxies.xml)	271	265	-0.2269	-3.7933	1.842e-04	(-0.3378, -0.1099)

Spearman Rank Correlation Coefficient

var1	var2	size	rho	z	P(> z)
U-B (HDF_Galaxies.xml)	log(V-I) (HDF_Galaxies.xml)	271	-0.2141	3851510.6141	4.268e-04

Kendall Tau Correlation Coefficient

var1	var2	size	tau	z	P(> z)
U-B (HDF_Galaxies.xml)	log(V-I) (HDF_Galaxies.xml)	271	-0.1291	-3.1253	1.776e-03

AstroStat ongoing enhancements

- Additional tests
 - Will cover a broader range of statistical routines including
 - Time series analysis
 - Survival analysis
 - Non-parametric regression
 - Density estimation
- New features
 - Ability to create routines of tests with a single instruction
 - Support for creating a new column
 - Creating a filter
 - ...

Thank You !

Comments, feedback or suggestions, please email to
voindia@iucaa.ernet.in