GADIL: A Prototype Design and Development of Astronomical Digital Image Library through GSDL

Md. Nurul Alam

(Scientific Assistant – A (Library), Physical Research Laboratory,alam@prl.res.in)

Pragya Pandey

(Scientific Assistant – A (Library), Physical Research Laboratory, praggyap@prl.res.in)

Abstract:

Purpose: This paper is an attempt to provide a mechanism for the development of digital library for astronomical images (GADIL) - an online system based on open source software (GSDL) and its use for astronomy community and educational users in India.

Design/Methodology /Approach: The system is based on open source software (GSDL, Apache, PERL, GRE and Imagemagik).GADIL can be used both offline mode -self-installable CD-ROM, and online through www. It would allow the users to search, browse and download astronomical images.

Findings: The paper provides information about GADIL. It suggests that how it can serve as an ideal access tool of research ready scientific images so as to enhance astronomer's productivity and increase public awareness of astronomy as a subject.

Research limitation: This is a prototype study, with the only limitation that a few samples have been considered. This will be investigated further with a wider population which will improve the GADIL System.

Practical Implication: These results suggest that system like GADIL could be useful in Astronomical research field and general public awareness programs.

Originality/Value: The paper describes an original application of astronomical images. It shows the importance of GADIL in Astronomical Research and awareness context. It would therefore be of great interest to scientists, scholars and general public.

Keywords: GADIL, GSDL, Astronomy, Images

_____

Introduction :

Digital libraries are composed of collection of digital objects, including text, image, video and audio along with the methods for access and retrieval, and for selection organization and maintenance of the collection.

Robust and flexible digital libraries collection management and presentation software is essential for creating and delivering digital collections. But digital library technologies and contents are not static, continuous evaluation and investment are required to maintain the digital library. As the needs of managing digital collections have increased greatly in the recent years. Some library software vendors such as DiMeMa Luna Imaging Inc. , Endeavour Information System Inc. etc. have released commercial digital library management system. To avoid expensive license fees, a good option is to implement an open source alternative . Open Source application in particular allow developers and users to modify and tailor it to their own particular needs. Like commercial software ,open source software will not be a perfect solution , but open source software at least gives developers and user the opportunity to modify functionality and create interfaces for integration with other softwares. Some major open source software projects for building and maintaining digital collections are DSpace, Fedora, Eprints and Greenstone. It is a suite of software for building and distributing digital library collections that provides a way of organizing information and publishing it on the internet or on removable media (e.g., CD ROM / DVD). Greenstone aims to empower users, particularly universities and research libraries to build their own digital library collection in the fields of education science and culture.

Importance of Images in Astronomy :

Astronomy is a subject with its roots in the studying of images. These images are a part of the presentation of scientific result and hence their archival for present and future use is necessary. There is a vast range of images of astronomical objects available on the internet. However finding images of a specific object can sometimes be fairly difficult. The purpose of the Greenstone Astronomical Digital Image Library (GADIL) is to collect astronomical, research-ready images and make them available to the astronomical community and the general public.

Objectives:

The aim of building Greenstone Astronomical Digital Image Library (GADIL) is :
- To increase the astronomers' productivity through easy access to data.
- To provide an easy access to the scientific-quality images for the purpose of scientific and educational use.
- To encourage the further use of images that respects the scientific integrity of the data.
- To help astronomers in preparing figures for talks or papers.
- To create an interest in Astronomy among teenage student.
- To increase public awareness and understanding of Astronomy as a subject.

Scope: The prototype is confined to a small sample of astronomical images available freely from the World Wide Web

Literature Review:

1. Bus and Coach Photo.com Image library is a comprehensive image collection developed by TATA Group. It is commercial website for display of numerous buses and coaches manufactured by the company.
   http://www.busandcoach.com/simpleSearch.aspx?mode=all&list=1
2. Gandhi serve: A charitable foundation has created an online image archive of Art, Carton, Documents, correspondence etc. related to Mahatma Gandhi.
   http://www.gandhiserve.org/cgi- in/if2/imageFolio.cgi?direct=Art/Drawings
3. Headlines India.Com, an electronic news media has archived images related to India's news headlines
   http://www.headlinesindia.com/Archive/image_archive.jsp?j=1
4. National Archive of India has created a repository of images for the use of administrator and scholars.
   http://nationalarchives.gov.in/photo_gallery.html
5. Free lance artist have created image libraries of own work for demonstration and publicity.

Methodology:

1.   *Study of the subject:*

As astronomy is a vast subject, a detailed analysis is required to understand the intension and extension ideas of the subject. This has bee done by defining the subject and identifying the division and sub division of the subject Astronomy. While doing so, Thesaurus and Subject Heading Lists have been important tools.

2.   *Data Collection:*

Sample data has been collected through keywords search from the internet .

3.   *Software Requirements and Installation:*

   a.   Apache Web server
   b.   JRE
   c.   GSDL
   d.   Imagemagik

Greenstone Librarian Interface (GLI):

The simplest way of building a new collection is to use Greenstone Librarian's Interface. This allows to collect set of documents , import or assign metadata and build them into a greenstone collection .The Librarian interface can be run in one or four modes : Librarian assistant , librarian , Librarian system specialist and expert .The modes control

the level of details within the interface and can be changed through preference in the file menu.

Creation of New Collection

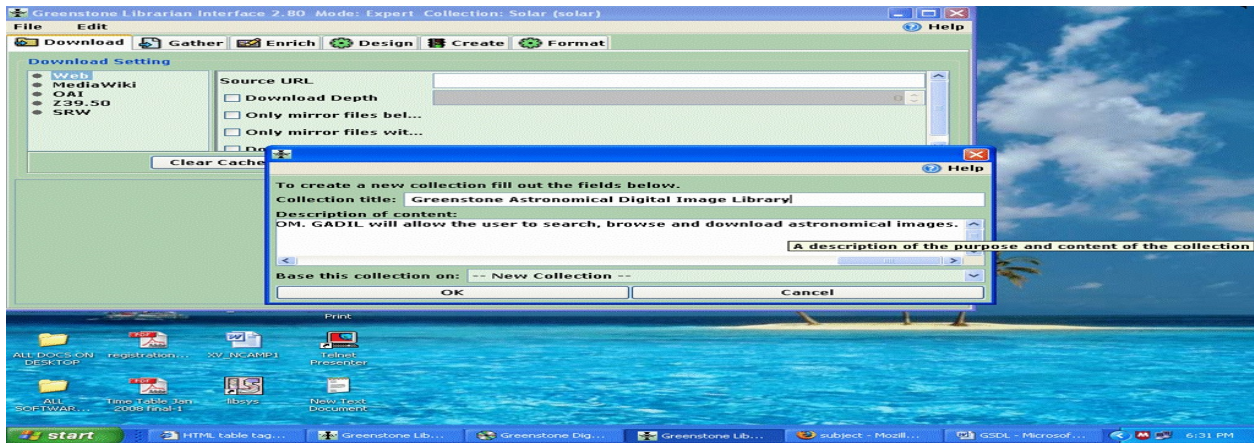To create a new collection open the file menu and choose new. The following screen will appear

Fig: New Collection

Selection of Metadata

Software provides various kinds of metadata , which can be selected on the basis of requirement   Here new metadata set has been created. which interprets the basic image data like object type and name , description , format (jpg,bmp) height , width and resource identifier.

Gathering

Gathering implies to select the files which we wish to include in the collection we are building. Dragging and dropping the files will solve the purpose.
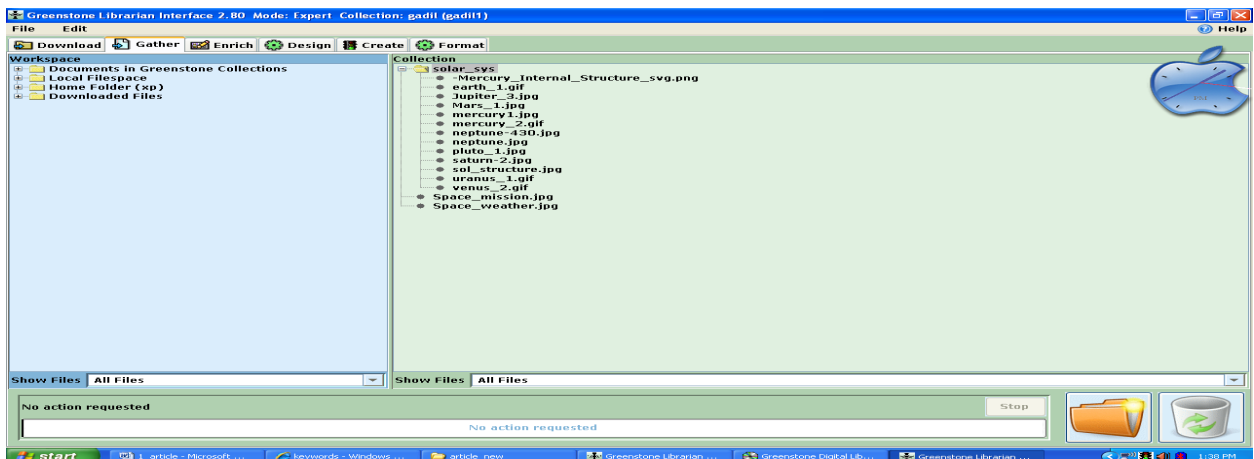
Fig: Gathering

Adding metadata to the document.

While adding metadata to the document the enrich panel comes into play , the enrich tab brings a panel of information . On the left is the document tree representing the collection , while on the right metadata can be added to individual documents . if we want to view the document to which we are assigning metadata , double clicking on the document in left pane will open the document using the appropriate program.
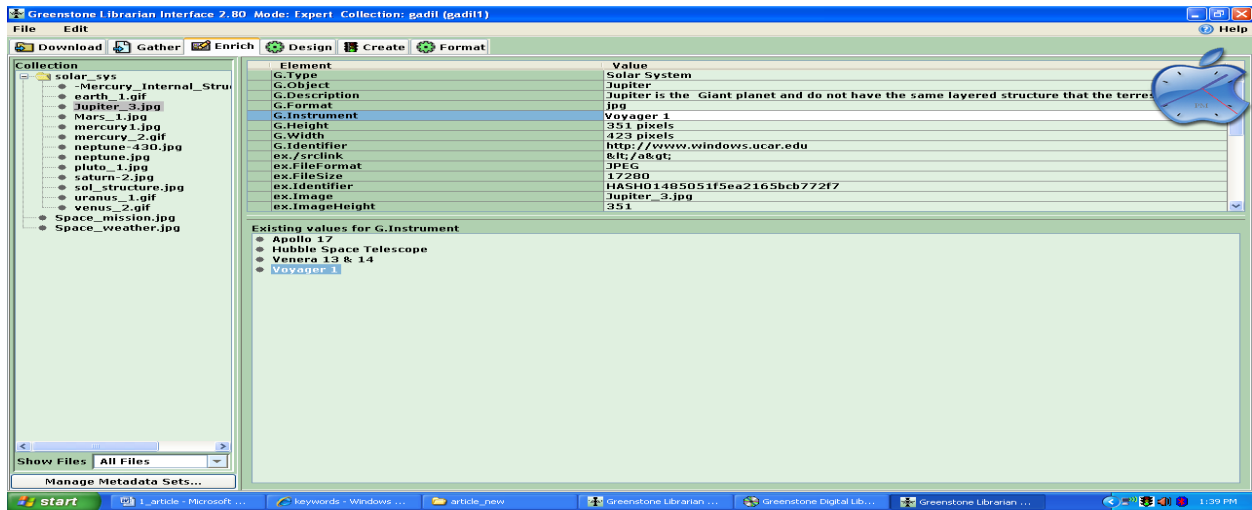
Fig: Metadata

Designing the collection:

Document Plug-in : In greenstone documents and metadata specifications are imported by software modules called plugins. Plugins enable Greenstone to support many different document formats . It explains them and in what order they occur. how we specify what plugins to use , what parameters to pass to .
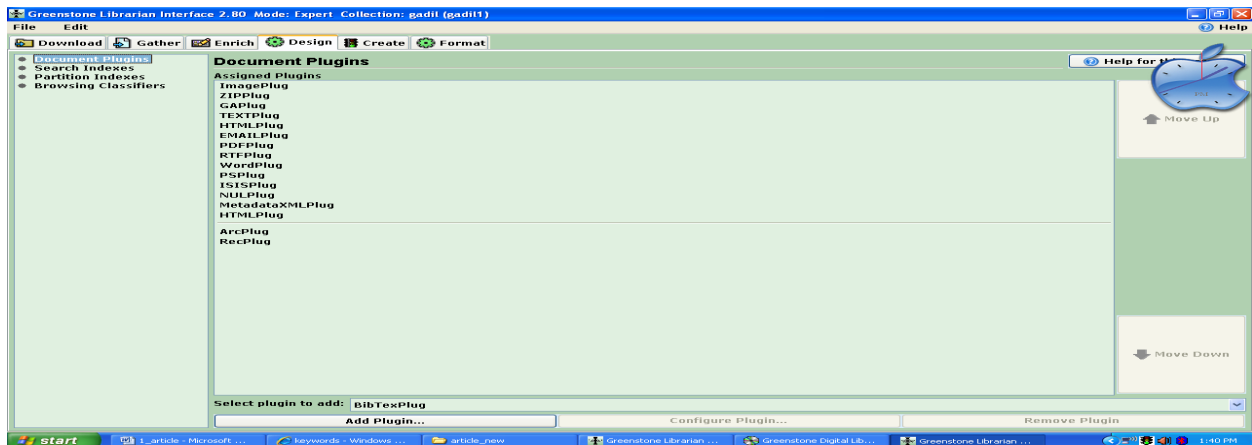
Fig: Document Plug-in

Indexing:

Indexes specify what parts of the collection are searchable. To manipulate an index command , the search index is chosen in the design panel. Browsing classifiers allows the user to browse the documents in a collection, the browsing structures are generated automatically from the metadata that is associated with each document in the collection. Browsing classifiers are set up in the design panel. Classifiers generate a hierarchical structure that is used to display a browsing index.
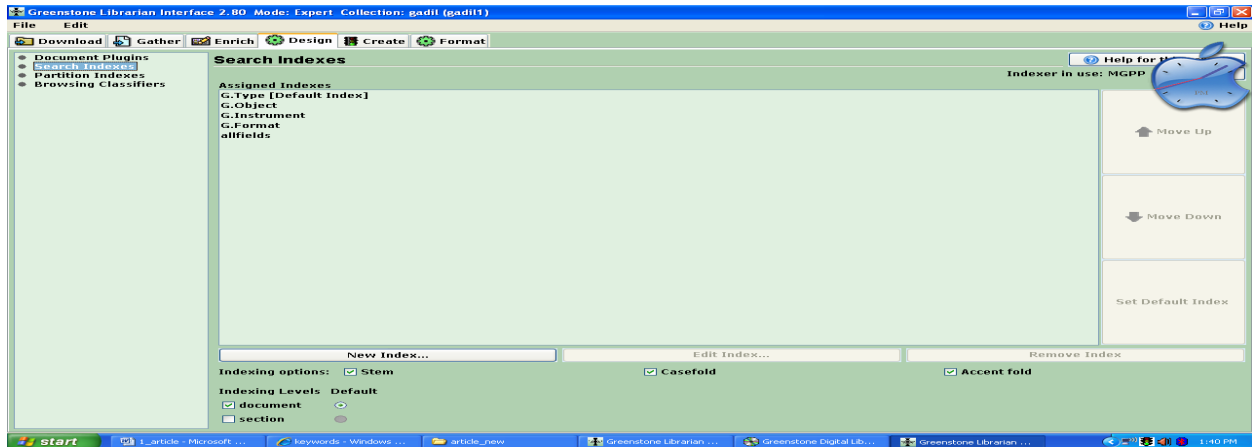

Fig: Index

Format Feature:

Greenstone library web pages are generated dynamically when requested. Format commands are used to change the appearance of these pages – particularly how documents are shown in browsing and search result list. To manipulate a format command the format feature section is chosen in the design panel , here use of html tags, metadata values , some customized format string items and conditional expressions , is made.
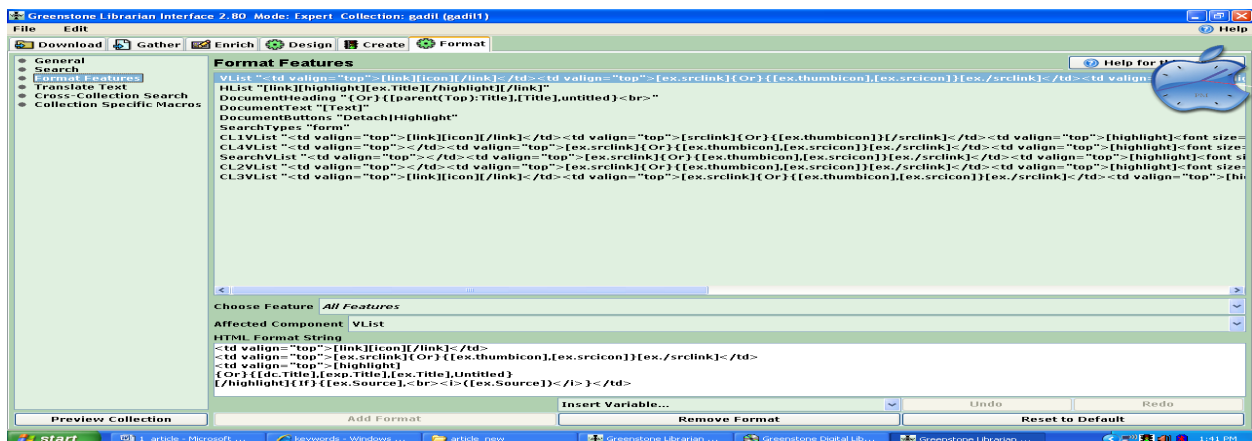

Fig: Format Feature

Functionality / Workability of GADIL:

The GADIL: Greenstone Astronomical Digital Image Library is a collection
of Astronomical Research Ready Images which can be made available to the
Astronomical community and the general public. It can be regarded as the indigenous
prototype digital image library developed using open source software (GSDL)

The collection can be accessed through icons on the home page of the GADIL and the
collection has its own "about page" which gives us information about collection. About
page provides different browsing classifiers for finding information such as search
facility, type of image, subject, instrument used etc.

How do we start GADIL?

The GADIL is available for every user's computer through off line self installable CD-
ROM and on the internet through www (http://172.0.0.1/cgi-bin/library.exe).GADIL
home page will appear and clicking on the icon of GADIL – about page will get
displayed giving us information about the collection and how to find information in the
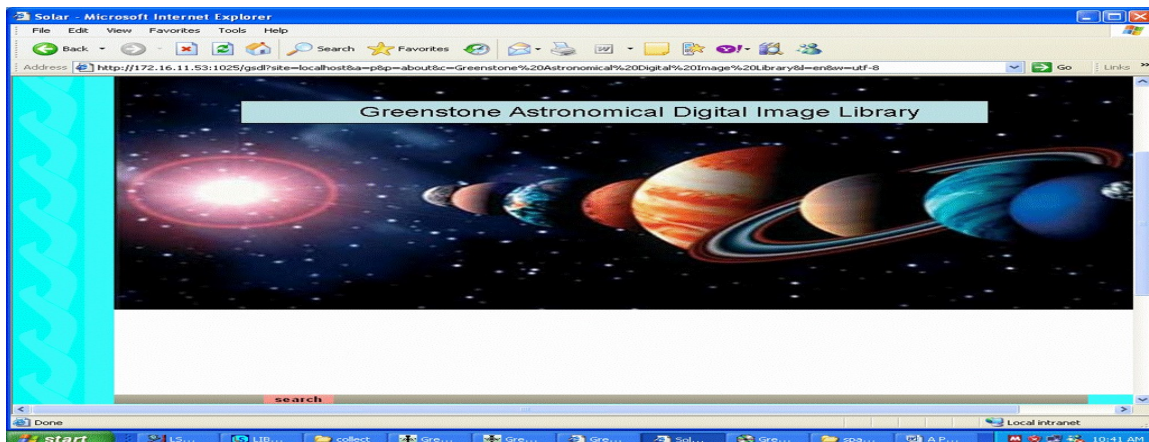GADIL collection.

Fig: Home page

Fig : About page of GADIL

Q. What can we find from GADIL?

All the Astronomical research-ready images - which can be searched, browsed and downloaded from GADIL

Q. How do we find a certain image?

A certain astronomical image can be found in two ways – simple search and advanced search. For simple search – click the" search" button. Fill up the field image name e.g Sun in the search field – Image Object and then click begin search.
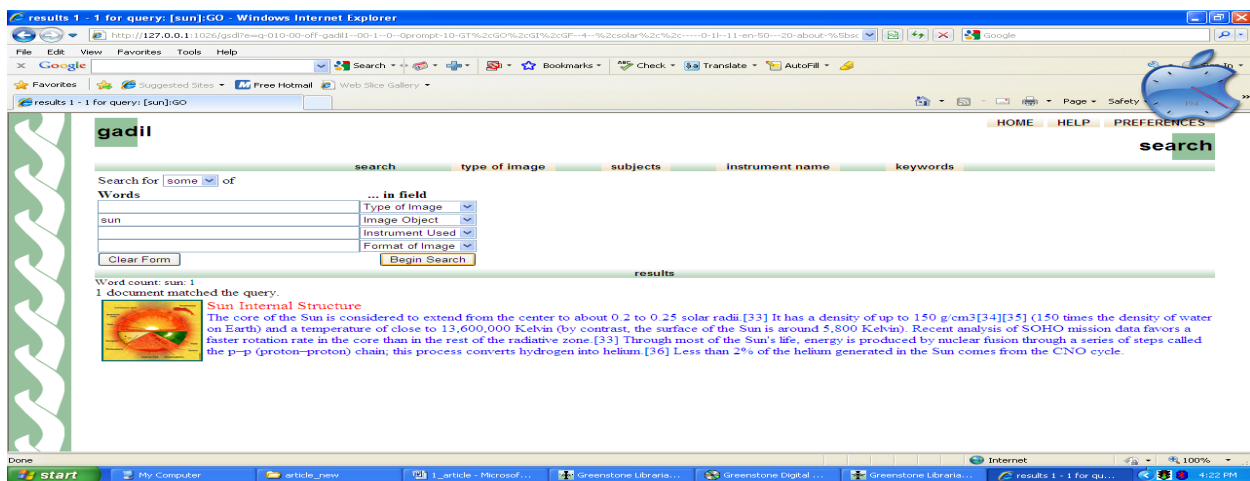

Fig: Simple Search

For advanced search – different search field (like Type of Image , Image Object , Instrument Used and Image Format etc) can be combined with each other and linked with logical operators: AND,OR and NOT
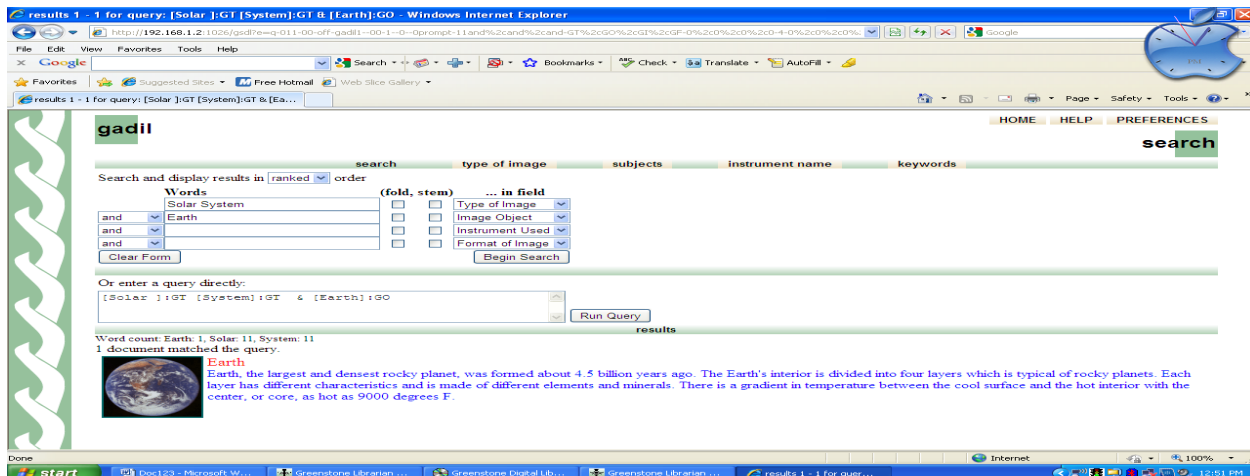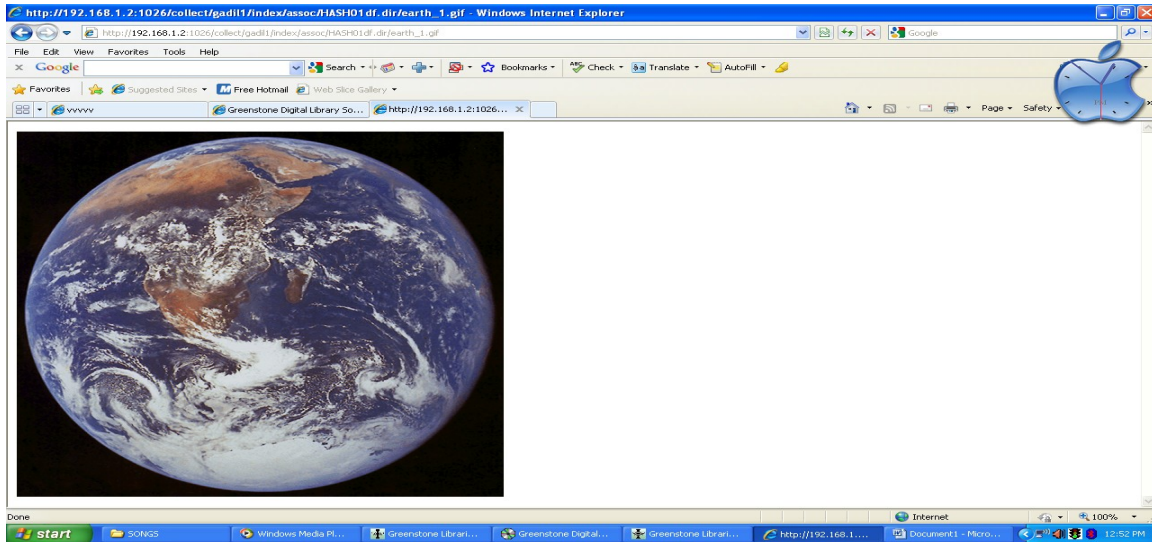

Fig: Advanced search

Fig: Image result in Original Size

Q. How do we find type of images?

Click on browsing classifier "type of image ". A list of image name will appear in an ascending order as shown in the figure:
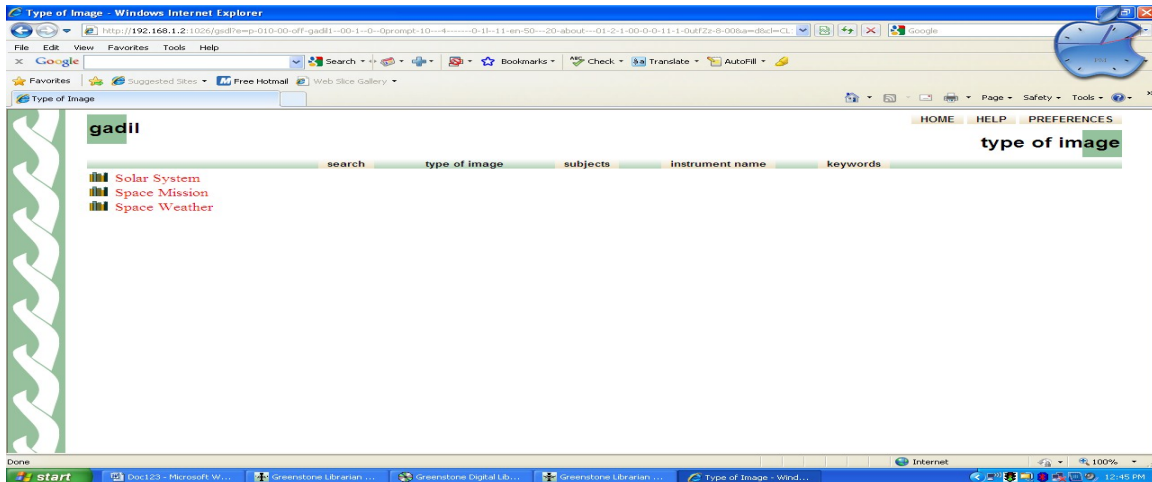
Fig: Type of images in the collection

After clicking on a particular type of image name, one screen will appear which gives the list of images with description of that particular type of image as shown in the figure :
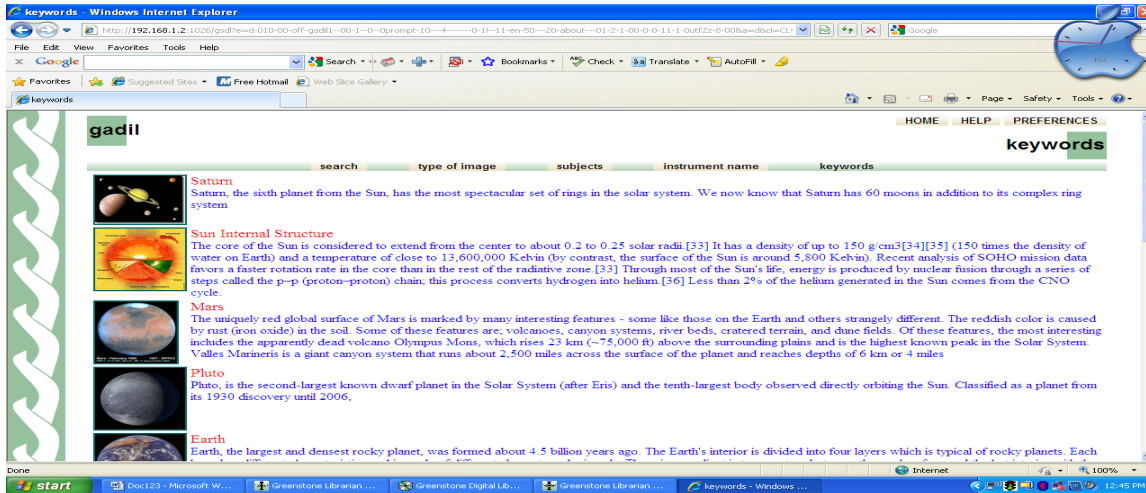
Fig: List of images with description

Q. How do we find images by the name of the instrument used?

Click on the "Instrument Used " option , further select the name of the instrument for e.g. The Hubble Space Telescope and the image results taken through this instrument would be displayed as shown:
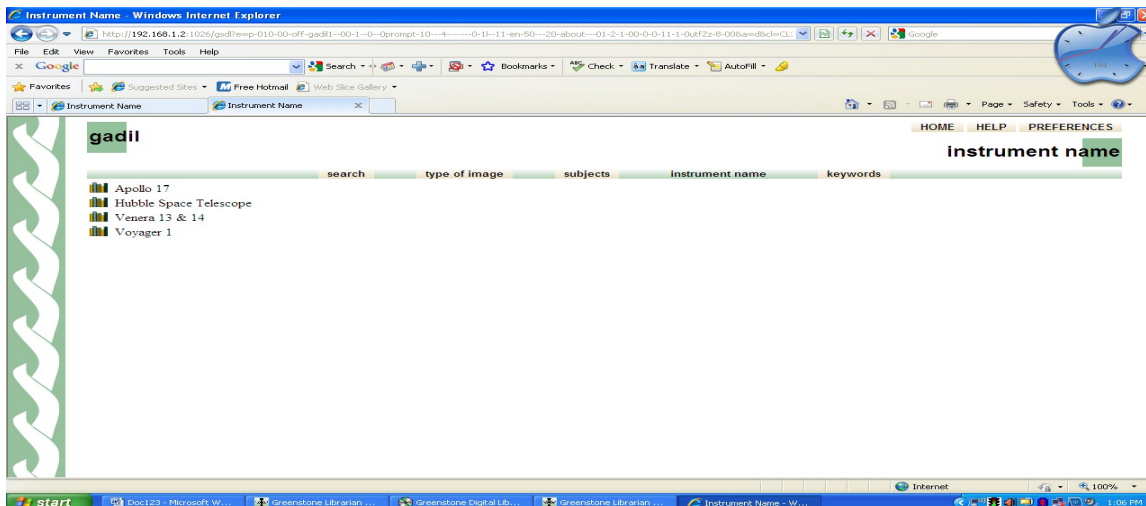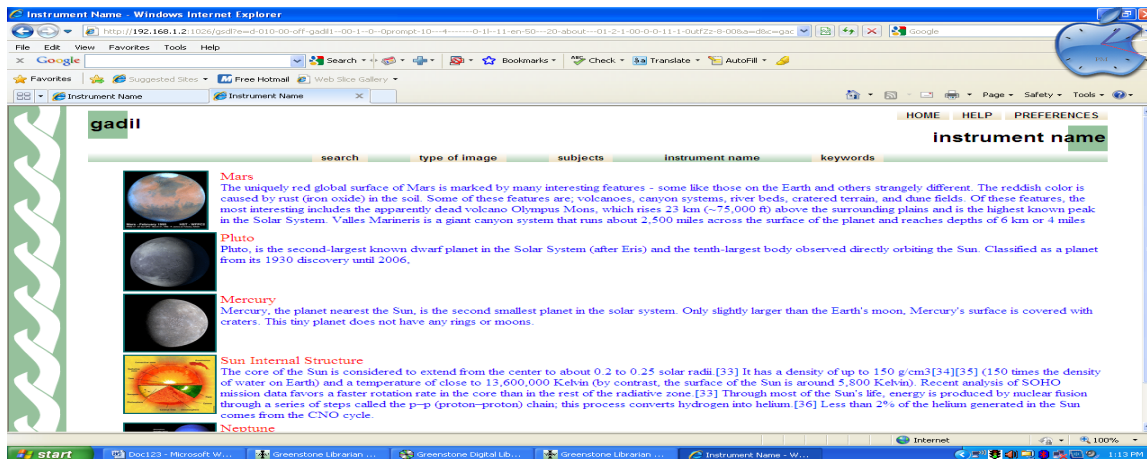
Fig: Instruments List

Fig: Image results of Hubble space telescope

Q. How do we find images by Subject and Keywords?

Click on the Subject or Keywords browsing option and the interface with all the subjects or keywords taken will be displayed , further clicking on anyone of these would give the desired image result , e.g. if Mars is selected from the list the images corresponding to that subject would appear.
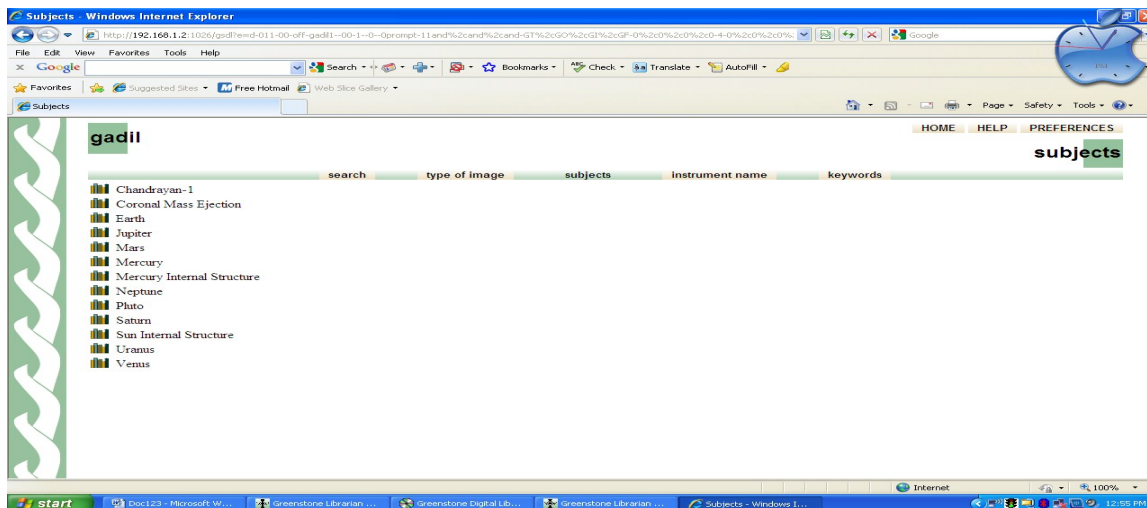

Fig Subjects List

Fig: Image result - Mars

Conclusion:

The preliminary results drawn , successfully fulfill the main objectives of the prototype . The online system such as GADIL can serve as an excellent tool in Astronomical research, education and general awareness It can be used as a futuristic and didactic system in preliminary astronomical studies. The system developed is a collection of few samples which on comprehension will serve as a one–stop–shop for the Astronomical Community.

References:

1. Alam, Md. Nurul.A Prototype Design and Development of Digital Library of Free Eelectronic Ddocuments on LIS. Department of Library and Information Science.Jadavpur University. July 2006. Dissertation.200 p. 74.
2. Mukhopadhyay,P.S.(2004).Organization and Ddissemination of Digital Objects through Web CDROM: A Framework for Indian Libraries.ICDL 2004.Paper published in conference proceeding at International Conference on Digital Libraries,24-27 February 2004,NewDelhi,The Energy and Resource Institute,NewDelhi,2004.pp. 470-78
3. Zhang,A and Gourley,D.(2003).A digital collection management system based on open source software. JCDL 2003.Paper published in conference proceeding at the Proceedings of the 3rd ACM/IEEE-CS joint conference on Digital libraries,27-31 May 2003,Texas,The IEEE Computer society,USA,2004.pp. 381 (http://www.wrlc.org/dcpc/dcmspaper/ on 05.10.2009)

4. Wan,Gang.An Open Source alternative for libraries.(http://www.white-clouds.com/iclc/cliej/cl23wan.htm on 05.10.2009)

5. Plante, Ramond L.The NCSA Astronomy Digital Image Library: The challenge of the scientific data library. D-Lib Magazine, 1997. 3
(http://www.dlib.org/dlib/october97/adil/10plante.html) on 05.10.2009

6. Sonker,S.K.,Makhija,V,K.,Ashok,K. and Singh,M.. Application of Greenstone digital library (GSDL) Software in Newspaper Clippings. DESIDOC Bulletin of information Technology, 2005,25(3). pp.9-17.

7. Huang,Chi Yu.Building Digital libraries with Greenstone Collection Maker. http://www.linux-magazine.com/ , 2006, (67) pp. 46-50.

8. Das,N.(2007).Open source software and building digital library using GSDL software. Planner 2007. Paper published in conference proceeding at 5th Convention Planner 2007,7-8 December 2007, Guwahati, Guwahati University , Guwahati, 2007 pp. 430-40.

9. Greenstone Digital Library Software. http://www.greenstone.org/ on 06.08.2009.

10. The New Zealand Digital Library (KIWI aircraft images)
http://nzdl.sadl.uleth.ca/cgi-bin/library?a=p&p=about&c=aircraft on 06.08.2009

11. GreenstoneWiki http://wiki.greenstone.org/index.php/GreenstoneWikion 06.08.2009

12. Bus and Coach Photo.com Image library
http://www.busandcoach.com/simpleSearch.aspx?mode=all&list=1   on 06.08.2009

13. Gandhi Serve.   http://www.gandhiserve.org/cgi-in/if2/imageFolio.cgi?direct=Art/Drawings on 06.08.2009

14. Headlines India.Com, http://www.headlinesindia.com/Archive/image_archive.jsp?j=1 on 10.10.2009

15. National Archive of India : Photo Gallery
http://nationalarchives.gov.in/photo_gallery.html on 10.10.2009