“Creation of Dynamic Ontologies for Graphical Representation in User Interface using NeOn in Shodhgang"n
Paper id:114

Manoj Kumar K
Dhruv Raval
Monali Vaghani

Presented By
Manoj Kumar K
Scientist-D(CS)
Shodhganga Division
INFLIBNET Centre/UGC
Infocity, Gandhinagar, Gujarat-INDIA
manoj@inflibnet.ac.in

- Paper based on **Shodhgang**a
- Developing a semantic web-based interface
- Facilitate subject-based browsing, navigation, search and retrieval of content
- Creation of dynamic ontology system for ETD
- Researcher can view all subject of PhD Theses and relation of different subject in one Graphical User Interface.
- Ontology based knowledge organisation
- RDF, OWL tools tested
- Used NeON Tool kit for creation of OWL
ETD Scenario in 2006

Poor Visibility of Theses
- Only 2 Universities Digitised Theses
  - Research Result not publically accessible

Plagiarism
- Duplication of Research
- Copying

Poor Access
- Sharing restricted due to non availability of softcopy
- Non Continuity of Research

First Digital copy of Thesis in 2010

manoj@inflibnet.ac.in
UGC has mandated electronic submission of Ph.D. theses. **UGC Regulation 2009** (Minimum standards and procedure for awards of M.Phil/Ph.D degree)


**National Committee on ETD formed by UGC in 2009**
Role of INFLIBNET

1. Development of portal
2. Developed Ingestion Interface
3. Guidelines/Responsibilities
4. Splitting/Uploading/Maintenance
5. Recommend Funds for Digitization, Setting up of ETD Lab
6. Provide access to Antiplagiarism tools
Responsibilities of INFLIBNET

- **Fund for Digitisation**
  - Rs. 1 Lakh to 22 Lakhs/Univ

- **ETD Lab**
  - Fund for Setting up of Lab
  - Rs. 5-10 Lacs/Univ

- **Access to Anti Plagiarism Software**
  - Rs. 1 Cr allocated

*Only 12 (B) Universities Provided to 130*

Rs. 12.84 Cr Allocated
SHODHGANGA Homepage at http://shodhganga.inflibnet.ac.in

1,54,000 Theses

From Zero to 1.53 Lakhs Theses
1,54,000 Theses On 31 July 2017

325 Universities MoU Signed

290 Universities Contributed

Theses Uploaded:
2010: 1171 (MoU: 10)
2011: 1522 (MoU: 38)
2012: 2299 (MoU: 51)
2013: 7057 (MoU: 54)
2014: 16782 (MoU: 32)

2010-2015
Theses uploaded:
2010: 1171 (MoU: 10)
2011: 1522 (MoU: 38)
2012: 2299 (MoU: 51)
2013: 7057 (MoU: 54)
2014: 16782 (MoU: 32)

2015
Theses Uploaded:
2015: 27701 (MoU: 188)

2016
Theses Uploaded:
2016: 31206 (MoU: 59)

2017
Theses Uploaded:
2017: 55963 (MoU: 53)

(Up to March 2017)
Total 143950 till 31 May 2017
Country Wise Visitors (Apr'15-15 Nov'15)

- India, 83.49%
- United States, 5.54%
- China, 0.68%
- United Kingdom, 0.38%
- South Korea, 0.36%
- Netherlands, 0.27%
- Canada, 0.23%
- Japan, 0.66%
- Germany, 0.48%
SHODHGANGA received Jury choice e-INDIA Award 2011
Key Features of SHODHGANGA Website

- **Adopted DSpace of MIT and Customised**
- **Developed Customized Ingestion Interface**
- **Advanced Search/Browse Option**
- **Access Control and Authorization based on User privileges**
- **Alphabetically ordered listing of Reports based key fields**
- **University Structure Maintained**
- **Multilingual Support (French, Russian, Arabic, Urdu, Spanish etc and Malayalam, Tamil, Gujarati, Sanskrit, Urdu, Hindi etc. Enabled)**
Key Features of SHODHGANGA Website

• Visual Browser
• RSS Feeds and Email notification
• University wise recent submission
• Department wise recent submission
• Links to International and National ETDs
• User’s Guide, E-book and Video Tutorials
• Guest Book & Feedback
• Integration with IndCat
Four Searches in Shodhganga

Welcome to Shodhganga

A reservoir of Indian theses

Research on Ontology based Semantic Search
Discovery Tools

Search

Browse

Four Searches

Universities & Departments
Date of Submission
Researcher/Guide
Keyword
Title

The Search available now
Ontology based

• Formal, explicit specification of shared conceptualization
• Description (like a formal specification of a program)
• Concepts and relationships which exist for an agent or a community of agents.
• This can be applied in Subjects/Keywords of ETD
Developing of ETD Ontology

• Easily understanding structure of the Shodhganga.
• Database or Information are represents as Graphical user Interface in Shodhganga. (Title, Subject, Guide, Keywords etc)
• Easy to search Information about uploaded Thesis’s subject of Shodhganga.
Architecture Tested

Client machine (View)

Application Server (Controller)

Database (Model)

HTML
CSS
Java Script

PHP
RDF
OWL
XML

Query Processing

MySQL
MariaDB

PostgreSQL

Shodhganga
DB
NeOn as a Tool to test OWL

- Open source, multi-platform ontology editor
- Supports the development of ontologies in OWL/RDF.
- Editor is based on the Eclipse platform and provides a set of plug-ins (Used KC-Viz Plugin)
- Covering a number of ontology engineering activities, including Annotation and Documentation, Modularization and Customization, Reuse, Ontology Evolution, translation and others.
- Built on Eclipse and the OWL API (v3) in Java
- Platform-independent (builds for Windows, MacOS, Linux)
- Complete ontology development functionality
- Extensible via plugins
• Web Ontology Language (OWL)
• Semantic Web language designed to represent rich and complex knowledge about things, groups of things, and relations between things.

• Example:
• <xml version="1.0"?>

   xml:base="http://www.semanticweb.org/inflibnet/ontologies/untitled-ontology-62"
   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
   xmlns:owl="http://www.w3.org/2002/07/owl#"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
   xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
   <owl:Class rdf:about="http://www.semanticweb.org/inflibnet/ontologies/untitled-ontology-62#Social_science">
       <rdfs:subClassOf rdf:resource="http://www.semanticweb.org/inflibnet/ontologies/untitled-ontology-62#GIPP"/>
   </owl:Class>
</rdf:RDF>
• **Resource Description Framework**
• Framework for describing resources on the web
• Designed to be read and understood by computers
• RDF is not designed for being displayed to people
• RDF is written in XML
Context-Level
Second-Level
Third-Level

Admin

Create Ontologies

3.1

Process Script

Get data from table

Update Ontologies

3.2

Process script to update ontology

Request for updated data

Send updated data

Update ontologies

Representation of Ontologies

3.3

Get representation of ontology

Give graphical view of ontology

Schema_tbl
Categories_tbl
Subject_tbl

Make new Ontology from database

Subject_Owl

Get representation of ontology

Researcher
# Data-Dictionary

## Table Name: Schema

<table>
<thead>
<tr>
<th>Attribute_Name</th>
<th>Contents</th>
<th>Data-Type</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Number of Subject</td>
<td>Numeric</td>
<td>Primary Key</td>
</tr>
<tr>
<td>schema_name</td>
<td>Name of Subject</td>
<td>Text</td>
<td>-</td>
</tr>
</tbody>
</table>

## Table Name: Subject Category

<table>
<thead>
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<th>Attribute_Name</th>
<th>Contents</th>
<th>Data-Type</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
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<td>ID of Subject Schema</td>
<td>Numeric</td>
<td>Foreign Key</td>
</tr>
<tr>
<td>category_id</td>
<td>Number of Subject Category</td>
<td>Numeric</td>
<td>Primary Key</td>
</tr>
<tr>
<td>category_name</td>
<td>Name of Subject Category</td>
<td>Text</td>
<td>-</td>
</tr>
</tbody>
</table>
DSpace Database in PostgreSQL (pgAdmin iii)
<table>
<thead>
<tr>
<th>sc_id</th>
<th>cat_id</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Arts &amp; Humanities</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Clinical, Pre-Clinical &amp; Health</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Engineering &amp; Technology</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Life Sciences</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Physical Sciences</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td><strong>Social Sciences</strong></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Arts and Recreation</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Computer Science, Knowledge and System</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>History and geography</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Language</td>
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<tr>
<td>11</td>
<td>2</td>
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<tr>
<td>12</td>
<td>2</td>
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<tr>
<td>13</td>
<td>2</td>
<td>Religion</td>
</tr>
<tr>
<td>14</td>
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<td>Science</td>
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<td>16</td>
<td>2</td>
<td>Technology</td>
</tr>
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<td>17</td>
<td>3</td>
<td>Auxiliary Sciences of History</td>
</tr>
<tr>
<td>18</td>
<td>3</td>
<td>Education</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>Fine Arts</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
<td>General Works</td>
</tr>
<tr>
<td>21</td>
<td>3</td>
<td>Geography Anthropology REcreation</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td>History of the americas</td>
</tr>
<tr>
<td>23</td>
<td>3</td>
<td>Language</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>Law</td>
</tr>
<tr>
<td>25</td>
<td>3</td>
<td>Music</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
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<tr>
<td>27</td>
<td>3</td>
<td>Political Science</td>
</tr>
<tr>
<td>28</td>
<td>3</td>
<td>Religion</td>
</tr>
<tr>
<td>29</td>
<td>3</td>
<td>Social Sciences</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>World History</td>
</tr>
<tr>
<td>cat_id</td>
<td>sub_id</td>
<td>name</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Arts and Recreation</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Religion</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Language</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>Literature</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
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</tr>
<tr>
<td>2</td>
<td>6</td>
<td>Psychiatry/Psychology</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>Pharmacology &amp; Toxicology</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Computer Science</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>Engineering</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>Material Science</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>Agricultural Sciences</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>Biology and Biochemistry</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>Ecology/Environment</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>Immunology</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>Microbiology</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>Molecular Biology and Genetics</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>Neuroscience and Behaviour</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>Plant and animal science</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>Chemistry</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>Geosciences</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>Mathematics</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>Multidisciplinary</td>
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<tr>
<td>5</td>
<td>23</td>
<td>Physics</td>
</tr>
<tr>
<td>5</td>
<td>24</td>
<td>Space Sciences</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>Social Sciences, general</td>
</tr>
<tr>
<td>6</td>
<td>26</td>
<td>Economics and Business</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
<td>Philosophy and Psychology</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
<td>History and geography</td>
</tr>
</tbody>
</table>
Ontology without Class

```xml
<?xml version="1.0"?>
<rdf:RDF xmlns:class=http://www.semanticweb.org/inflipnet/ontologies/ontologies/untitled-ontology-62#>
  <rdf:RDF>
  </rdf:RDF>
```
Process of Add Class to Ontology

GIPP class added
- Social_Science subclass added

DCC class added
- Arts_and_Recreation subclass added
- Computer_Science_Knowledge_and_System subclass added

Arts_and_Recreation class added

Computer_Science_Knowledge_and_System class added

Social_Science class added
- Social_Sciences_general subclass added
- Economics_and_Business subclass added
- Philosophy_and_Psychology subclass added
- History_and_geography subclass added
### Data of Table

#### Table 1: Category Details

<table>
<thead>
<tr>
<th>sc_id</th>
<th>cat_id</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Arts_and_Recreation</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Computer_Science_Knowledge_and_System</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Social_Sciences</td>
</tr>
</tbody>
</table>

#### Table 2: Subject Details

<table>
<thead>
<tr>
<th>cat_id</th>
<th>sub_id</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Social_Sciences_general</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Economics_and_Business</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Philosophy_and_Psychology</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>History_and_geography</td>
</tr>
</tbody>
</table>

#### Table 3: Other Details

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<tbody>
<tr>
<td>1</td>
<td>DOC</td>
</tr>
<tr>
<td>2</td>
<td>GIPP</td>
</tr>
</tbody>
</table>
Data Update
Updating of Ontology

- Arts_Humanities subclass added
- Clinical_Pre-Clinical_Health subclass added
- Engineering_Technology subclass added
- Life_Sciences subclass added
- Political_Sciences subclass added
- Social_Sciences subclass added
- Arts_and_Education subclass added
- Computer_Science sub-class added
- History_and_geography subclass added
- Language subclass added
- Literature subclass added
- Philosophy_and_Psychology subclass added
- Religion subclass added
- Science subclass added
- Technology subclass added

LCSH class added

- Architecture subclass added
- Education subclass added
- Fine_Arts subclass added
- General_World subclass added
- Geography_Anthropology subclass added
- History_of_the_Ancient_World subclass added
- Language subclass added
- Law subclass added
- Music subclass added
- Philosophy_and_Psychology subclass added
- Political_Sciences subclass added
- Religion subclass added
- Science subclass added
- World_History subclass added

Web_of_Sciences class added

- Arts_Humanities class added
- Clinical_Pre-Clinical_Health class added

Activate Windows
Go to Settings to activate Windows.
Science and Technology Theses in Shodhganga: Analytical Study

Manoj Kumar K
Scientist-D(CS)
Shodhganga Division
INFLIBNET Centre/UGC
Infocity, Gandhinagar, GUJARAT.
manoj@inflibnet.ac.in

Archita Muchhadia
Project Officer (LS)
Shodhganga Division
INFLIBNET Centre/UGC
Infocity, Gandhinagar, GUJARAT.
archita@inflibnet.ac.in

150,000+ Theses

- 124345 Theses from Shodhganga Studied (as on 31st January).
- 280 Universities contributed Theses in the study.
- 57349 Science & Technology Theses taken as sample.
Science and Technology Theses in Shodhganga: Analytical Study

Sunburst Chart

University S&T Departments which are top in contribution of PhD Theses in Science and Technology

Classification Scheme: ISIS Web of Science (WoS) & Field of Science (FOS) of OECD. FOS of OECD
Subject wise Distribution of Theses in Shodhganga
## Top Contributing Universities in Science and Technology

<table>
<thead>
<tr>
<th>S&amp;T Theses Rank</th>
<th>Position in Total Contribution</th>
<th>Name of University</th>
<th>Total Number of Theses Contributed</th>
<th>Number of S&amp;T Theses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Aligarh Muslim University</td>
<td>6426</td>
<td>2870</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>Anna University</td>
<td>3983</td>
<td>2671</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Panjab University</td>
<td>6453</td>
<td>2512</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>Maharaja Sayajirao University of Baroda</td>
<td>3496</td>
<td>1787</td>
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<tr>
<td>5</td>
<td>3</td>
<td>Jawaharlal Nehru University</td>
<td>4664</td>
<td>1775</td>
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<tr>
<td>6</td>
<td>6</td>
<td>Gauhati University</td>
<td>3992</td>
<td>1714</td>
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<tr>
<td>7</td>
<td>22</td>
<td>Cochin University of Science &amp; Technology</td>
<td>1898</td>
<td>1696</td>
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<tr>
<td>8</td>
<td>11</td>
<td>Bharathiar University</td>
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<td>1633</td>
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<td>9</td>
<td>14</td>
<td>Bharathidasan University</td>
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<td>1523</td>
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<tr>
<td>10</td>
<td>10</td>
<td>Sri Krishnadevaraya University</td>
<td>3337</td>
<td>1497</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>Gujrat University</td>
<td>3124</td>
<td>1475</td>
</tr>
<tr>
<td>12</td>
<td>21</td>
<td>Savitribai Phule Pune University</td>
<td>1914</td>
<td>1260</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>Dr. Babasaheb Ambedkar Marathwada University</td>
<td>4120</td>
<td>1233</td>
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<tr>
<td>14</td>
<td>13</td>
<td>Sri Venkateswara University</td>
<td>2871</td>
<td>1230</td>
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<td>15</td>
<td>5</td>
<td>Karnatak University</td>
<td>4017</td>
<td>1220</td>
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<tr>
<td>16</td>
<td>27</td>
<td>Dr. Harisingh Gour Vishwavidhyalay</td>
<td>1657</td>
<td>1205</td>
</tr>
<tr>
<td>17</td>
<td>25</td>
<td>Utkal University</td>
<td>1694</td>
<td>1028</td>
</tr>
</tbody>
</table>
### Universities which are Prominent Science and Technology Research

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Name of University</th>
<th>Total number of Theses</th>
<th>Number of S &amp; T Theses</th>
<th>% of S&amp;T Theses</th>
</tr>
</thead>
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<td>1696</td>
<td>89.36</td>
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<tr>
<td>2</td>
<td>University of Kerala</td>
<td>1319</td>
<td>995</td>
<td>75.44</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Harisingh Gour Vishwavidhyalay</td>
<td>1657</td>
<td>1205</td>
<td>72.72</td>
</tr>
<tr>
<td>4</td>
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<td>3983</td>
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</tr>
<tr>
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<tr>
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<td>876</td>
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<tr>
<td>7</td>
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<td>1028</td>
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<td>Name of the University</td>
<td>Research Performance with respect to total number of Theses</td>
<td>SCI* Science and Technology Index Value</td>
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RPS and SCI Index value calculation

\[
SCI = \frac{(\text{Weightage for S&T Theses}) \times (\text{S&T Theses submitted by the University})}{\text{Total Number of Theses submitted by the University}}
\]
S&T Research Performance in India

1. CUSAT is ranked one with 7.15
2. Anna University (6.71)
3. Dr. Harisingh Gour Vishwavidhyalay (5.09)
4. Savitribai Phule Pune University (4.61)
5. Aligarh Muslim University (4.47)
6. Bharathidasan University (4.28)
7. Utkal University (4.25)
8. Maharaja Sayajirao University of Baroda (4.09)
9. Bharathiar University (4.07), Panjab University (3.89)
10. Gauhati University (3.44) and Gujarat University (3.31)
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Thank you

Manoj Kumar K
Scientist-D(CS)
Shodhganga Division
INFLIBNET Centre/UGC
Infocity, Gandhinagar, GUJARAT.
manoj@inflibnet.ac.in

Dr. Jagdish Arora
Director,
INFLIBNET Centre/UGC
Infocity, Gandhinagar, GUJARAT.
director@inflibnet.ac.in

Nominator: Dr. Ramesh Gaur, NDLTD