International Journal of Applied Business and Economic Research

ISSN : 0972-7302

available at http: www.serialsjournals.com

Volume 15 • Number 21 (Part 2) • 2017

Education, Research and Practice in Remote Sensing and GIS: A Study of PhD Researches Conducted in Indian Universities and Institutions from 1980 to 2016

Brij Mohan[1], Harbinder Pratap Singh[2] and Shiv Singh[3]

[1]*Principal, Baba Banda Singh Bahadur Public School, Dhariwal, Gurdaspur, Punjab. Email: brijmohan76@yahoo.com*

[2]*Lecturer in Geography, GSSS, Bharth Kazi Chak, Gurdaspur, Punjab. Email: pannu_71@yahoo.in*

[3]*Deputy Librarian, Lovely Professional University, Punjab. Email: shivsingh2005@gmail.com*

ABSTRACT

The present paper deals with the Indian thesis published in remote sensing and GIS. The data was obtained from the IndCat and analyzed on the various parameters such as University, State, Subject heading etc. The data comprises of the 365 thesis out of which the majority was from Andhra Pradesh and university at the top was Andhra University. The top three departments are geology, geography and physics with 124 theses.

Keywords: Remote sensing, GIS, IndCat, Geography.

1. INTRODUCTION

The analysis of the pursued researches in the any field is very valuable for an education policy maker as this kind of analysis gives the overviews of the areas which are neglected and over pursued. The present paper deals with researches in the emerging field "Remote sensing and GIS".

Remote sensing is the technique used acquisition of information about an object or phenomenon without having physical contact with the object. A geographic information system (GIS) is a computer-based tool for mapping and analyzing feature events on earth. Thus, remote sensing is the art and science of making measurements of the earth using sensors on airplanes or satellites. These sensors collect data in the form of images and provide specialized capabilities for manipulating, analyzing, and visualizing those images. Remote sensed imagery is integrated within a GIS.

Presently, there are various fields in which this technique is emerging such as geography, land surveying and most Earth Science disciplines. It is also widely used in military, intelligence, commercial, economic, planning, and humanitarian applications.

Thus, in this paper, a significant effort has been made to browse the Indian thesis catalogue Indcat for collecting the entire thesis related to remote sensing and GIS.

2. METHODOLOGY

Keyword remote sensing and GIS was searched in the Indian thesis catalogue Indcat. After removing the duplicity, the relevant database was created which consist of 365 theses from 1980 to 2016 and MS excel was used for analyzing the data on the basis of University, State, Subject heading etc.

Objective

The prime objectives are as follows:

- To determine decade wise contribution.
- To identify state wise contribution.
- To identify the ranking of contributed universities.
- To determine department wise contribution.
- To find out rank list of Keywords (Subject Headings)
- To find out the major subject areas of research over the period.
- To determine the top rank supervisor

3. RESULTS AND DISCUSSION

Table 1 reflects the decade wise contribution of the thesis containing remote sensing and GIS. The first thesis awarded was in year 1980. There is continuous growth is being observed. For the first decade under consideration 1980 to 1989 there were 26 theses. For the decade 1990 to 1999, there were 92 theses and from 2000 to 2009 there were 135 theses. For the span of last six years i.e from 2010 to 2016 there were 88 theses and obviously by the 2019 this will shoot greater than 135. There were 24 theses for which the year was not mentioned.

Table 1
Decade wise contribution

Year		*Number of contribution*	*Percentage*
From	*To*		
1980	1989	26	0.27
1990	1999	92	1.34
2000	2009	135	4.29
2010	2016	88	6.17
Year not Mention		24	2.14
Total		365	100

Table 2 gives the state wise contribution. It's worth to note that the contributions are from 24 states. The majority of the contributions are from 'Andhra Pradesh' with 40 contributions (10.96%) followed by 'Uttar Pradesh' with 38 contributions (10.41%), 'New Delhi' with 36 contributions (9.86 %). Table 2 clearly depicts that contribution is from all the zones i.e, north, south, east, west, central of the country.

Table 2
State wise contribution

Rank	*Name of State*	*Number of contribution*	*Percentage*
1	Andhra Pradesh	40	10.96
2	Uttar Pradesh	38	10.41
3	New Delhi	36	9.86
4	Tamil Nadu	34	9.32
5	Maharashtra	33	9.04
6	Telangana	29	7.95
7	Gujarat	28	7.67
8	Karnataka	25	6.85
9	Rajasthan	16	4.38
10	Uttarakhand	14	3.84
11	Kerala	11	3.01
11	West Bengal	12	3.29
12	Madhya Pradesh	10	2.74
13	Chhattisgarh	7	1.92
14	Jharkhand	6	1.64
14	Punjab	6	1.64
15	Haryana	5	1.37
16	Goa	3	0.82
16	Kerala	3	0.82
17	Chandigarh	2	0.55
17	Jammu and Kashmir	2	0.55
17	Odisha	2	0.55
18	Assam	1	0.27
18	Manipur	1	0.27
18	Pondicherry	1	0.27
	Total	365	100

Table 3 gives the rank wise top 15 university name, state of the university, number and the percentage of the thesis. The top two universities are from south east and south i.e. 'Andhra University' and 'Anna University' 29 and 24 contributions respectively. The third rank is shared by the two universities i.e Aligarh Muslim University from 'Uttar Pradesh' and Osmania University from Telangana with 22 contributions each. It is worth to note that there are 77 universities in India contributing in remote sensing and GIS. Thus, remote sensing and GIS has attracted the researchers all over the India.

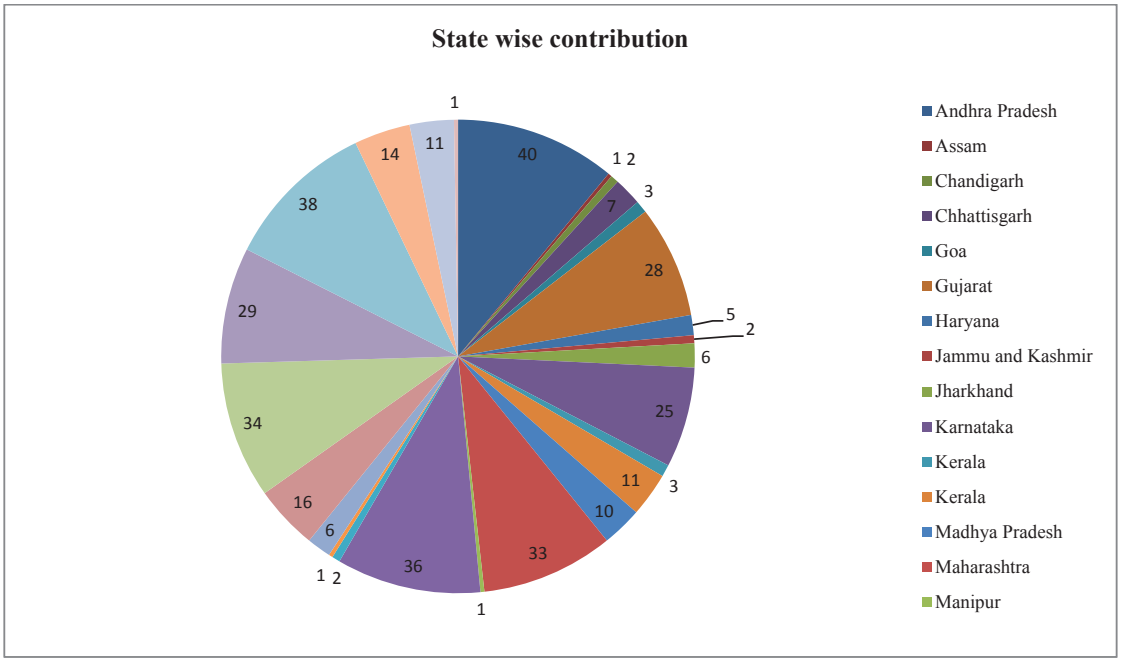

Figure 1: State wise contribution

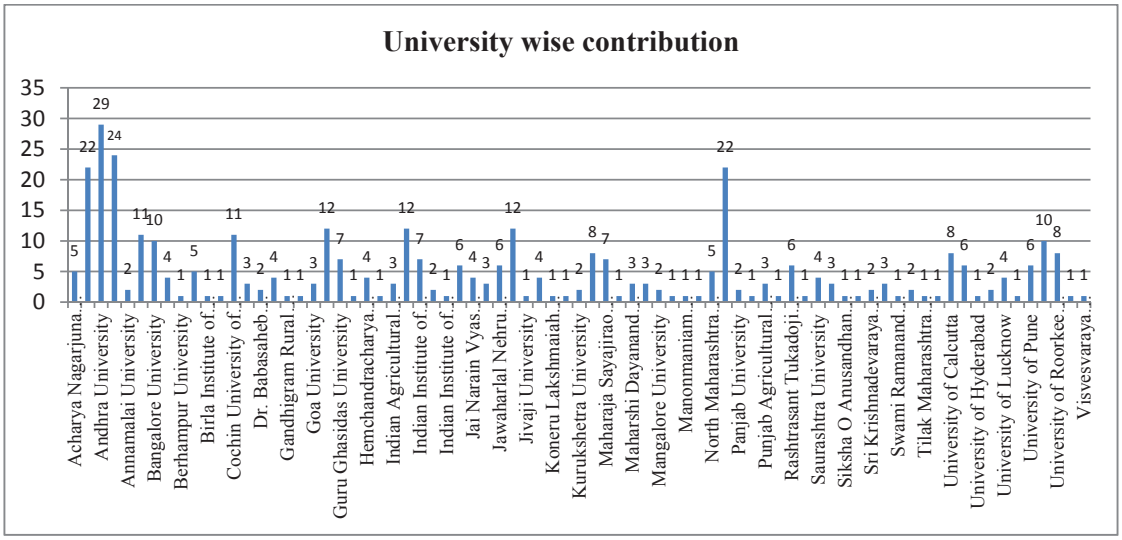

Figure 2: University wise contribution

Table 3
University wise contribution

Rank	*Name of University*	*State*	*Number of contribution*	*Percentage*
1	Andhra University	Andhra Pradesh	29	7.95
2	Anna University	Tamil Nadu	24	6.58
3	Aligarh Muslim University	Uttar Pradesh	22	6.03
3	Osmania University	Telangana	22	6.03

(*Contd...*)

Rank	*Name of University*	*State*	*Number of contribution*	*Percentage*
4	Gujarat University	Gujarat	12	3.29
4	Indian Institute of Technology, Delhi	New Delhi	12	3.29
4	Jawaharlal Nehru University	New Delhi	12	3.29
5	Banaras Hindu University	Uttar Pradesh	11	3.01
5	Cochin University of Science and Technology	Kerala	11	3.01
6	Bangalore University	Karnataka	10	2.74
7	University of Rajasthan	Rajasthan	10	2.74
8	Kuvempu University	Karnataka	8	2.19
8	University of Calcutta	West Bengal	8	2.19
8	University of Roorkee (Indian Institute of Technology Roorkee)	Uttarakhand	8	2.19
9	Guru Ghasidas University	Chhattisgarh	7	1.92
9	Indian Institute of Technology-bombay	Maharashtra	7	1.92
9	Maharaja Sayajirao University of Baroda	Gujarat	7	1.92
10	Indian School of Mines	Jharkhand	6	1.64
10	Jawaharlal Nehru Technological University Hyderabad	Telangana	6	1.64
10	Rashtrasant Tukadoji Maharaj Nagpur University	Maharashtra	6	1.64
10	University of Delhi	New Delhi	6	1.64
10	University of Pune	Maharashtra	6	1.64
11	Acharya Nagarjuna University	Andhra Pradesh	5	1.37
11	Bharathidasan University	Tamil Nadu	5	1.37
11	North Maharashtra University	Maharashtra	5	1.37
12	Barkatullah Vishwavidyalaya	Madhya Pradesh	4	1.10
12	Forest Research Institute	Uttarakhand	4	1.10
12	Hemchandracharya North Gujarat University	Gujarat	4	1.10
12	Jai Narain Vyas University	Rajasthan	4	1.10
12	Karnatak University	Karnataka	4	1.10
12	Saurashtra University	Gujarat	4	1.10
12	University of Lucknow	Uttar Pradesh	4	1.10
13	Dr Harisingh Gour Vishwavidyalaya	Madhya Pradesh	3	0.82
13	Goa University	Goa	3	0.82
13	Indian Agricultural Research Institute	New Delhi	3	0.82
13	Jamia Milia Islamia	New Delhi	3	0.82
13	Maharshi Dayanand University	Haryana	3	0.82
13	Mahatma Gandhi University	Kerala	3	0.82
13	Punjab Agricultural University	Punjab	3	0.82
13	Shivaji University	Maharashtra	3	0.82
13	Sri Venkateswara University	Andhra Pradesh	3	0.82
14	Annamalai University	Tamil Nadu	2	0.55
14	Dr. Babasaheb Ambedkar Marathwada University	Maharashtra	2	0.55

(*Contd...*)

Rank	*Name of University*	*State*	*Number of contribution*	*Percentage*
14	Indian Institute of Technology, Kharagpur	West Bengal	2	0.55
14	Kurukshetra University	Haryana	2	0.55
14	Mangalore University	Karnataka	2	0.55
14	Panjab University	Chandigarh	2	0.55
14	Sri Krishnadevaraya University	Andhra Pradesh	2	0.55
14	Thapar University	Punjab	2	0.55
14	University of Jammu	Jammu and Kashmir	2	0.55
15	Berhampur University	Odisha	1	0.27
15	Birla Institute of Technology and Science	Rajasthan	1	0.27
15	Bundelkhand University	Uttar Pradesh	1	0.27
15	Gandhigram Rural Institute	Tamil Nadu	1	0.27
15	Gauhati University	Assam	1	0.27
15	Guru Nanak Dev University	Punjab	1	0.27
15	Hemwati Nandan Bahuguna Garhwal University	Uttarakhand	1	0.27
15	Indian Institute of Technology-Madras	Tamil Nadu	1	0.27
15	Jivaji University	Madhya Pradesh	1	0.27
15	Koneru Lakshmaiah Education Foundation (K.L. University)	Andhra Pradesh	1	0.27
15	Kumaun University	Uttarakhand	1	0.27
15	Maharana Pratap University of Agriculture and Technology	Rajasthan	1	0.27
15	Manipur University	Manipur	1	0.27
15	Manonmaniam Sundaranar University	Tamil Nadu	1	0.27
15	North Gujarat University	Gujarat	1	0.27
15	Pondicherry University	Pondicherry	1	0.27
15	Rani Durgavati Vishwavidyalaya	Madhya Pradesh	1	0.27
15	Sant Gadge Baba Amravati University	Maharashtra	1	0.27
15	Siksha O Anusandhan University	Odisha	1	0.27
15	Solapur University	Maharashtra	1	0.27
15	Swami Ramanand Teerth Marathwada University	Maharashtra	1	0.27
15	Tilak Maharashtra Vidyapeeth	Maharashtra	1	0.27
15	University of Burdwan	West Bengal	1	0.27
15	University of Hyderabad	Telangana	1	0.27
15	University of North Bengal	West Bengal	1	0.27
15	Vikram University	Madhya Pradesh	1	0.27
15	Visvesvaraya Technological University	Karnataka	1	0.27
	Total		365	100.00

Table 4 gives the top 10 departments dealing in remote sensing and GIS. The top three domains are geology, geography and physics with 57, 35 and 32 contributions respectively. It is important to note that 88 departments contributed in remote sensing and GIS. Hence, it can be said that remote sensing and GIS has its roots in almost all the departments.

Table 4
Department wise contribution

Rank	*Name of the Department*	*Number of contribution*	*Percentage*
1	Geology	57	15.62
2	Geography	35	9.59
3	Physics	32	8.77
4	Civil Engineering	27	7.40
5	Botany	19	5.21
5	Environment Sciences	19	5.21
6	Science	13	3.56
7	Earth Sciences	12	3.29
8	Remote Sensing Applications	10	2.74
9	Electronics Engineering	8	2.19
9	Geo-Engineering	8	2.19
10	Applied Geology	7	1.92
	Others (76)	118	32.33
	Total	365	100

Table 5 shows the trend of department's decade wise. The top six departments i.e. Geology, Geography, Physics, Civil Engineering, Botany, Environment Sciences and Science have shown the continuous growth when compared before and after 2000. The department 'Environment Sciences' has emerged after 2000. The department Geo-Engineering has shown the tremendous growth after 2000. The departments like Remote Sensing Applications, Electronics Engineering and Applied Geology have published fewer theses after 2000.

Table 5
Decade wise department growth

Rank	*Name of the Department*	*1980-1989*	*1990-1999*	*2000-2009*	*2010-2016*	*Year not Mention*
1	Geology	10	16	23	7	1
2	Geography	2	8	15	9	1
3	Physics	1	4	14	11	2
4	Civil Engineering	1	6	15	4	1
5	Botany	1	6	9	3	0
5	Environment Sciences	0	0	12	6	1
6	Science	0	2	7	4	0
7	Earth Sciences	3	6	2	0	1
8	Remote Sensing Applications	0	9	0	1	0
9	Electronics Engineering	1	4	3	0	0
9	Geo-Engineering	0	2	4	2	0
10	Applied Geology	1	3	2	1	0
	Total	20	66	106	48	7

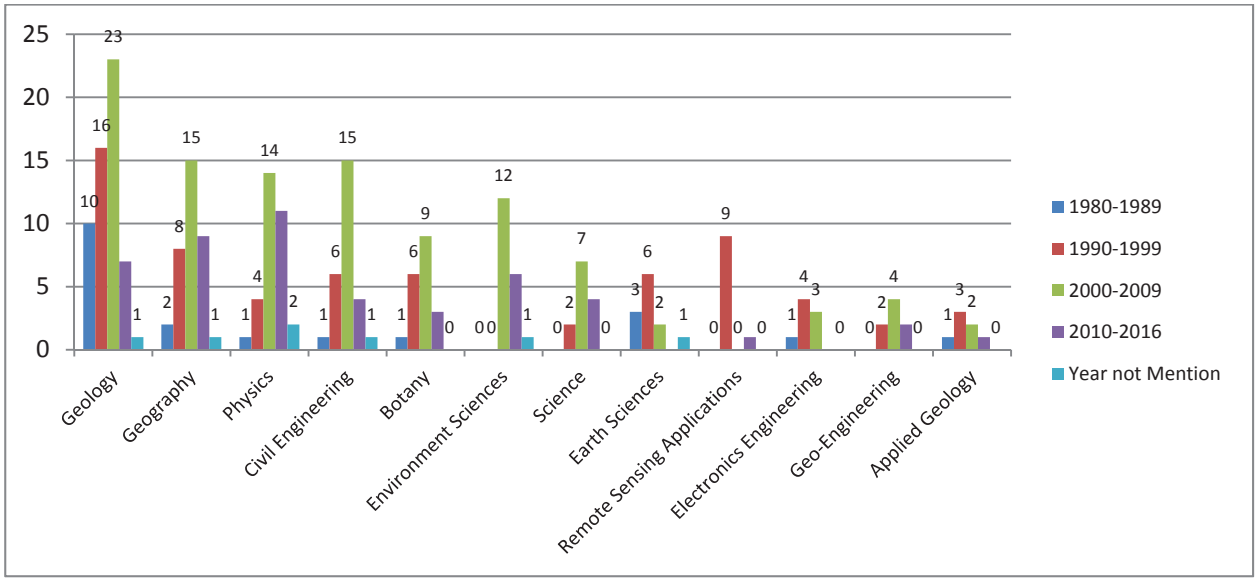

Figure 3: Decade wise department growth

Table 6 shows the subject headings/keywords in the field of remote sensing and GIS. In total there were 778 keywords but the table 6 demonstrates the keywords which occurred 10 times or more. These keywords signify the zone where remote sensing is revolving. The top keywords are Remote sensing, Geology, Earth System Sciences, Physics, Earth Sciences, Geography, Civil Engineering with the occurrence of 57, 52, 31, 31, 30, 30 and 28 respectively.

Table 6
Rank list of subject heading (Keywords)

Rank	*Subject heading/Keywords*	*Frequency*	*Percentage*
1	Remote sensing	57	7.33
2	Geology	52	6.68
3	Earth System Sciences	31	3.98
3	Physics	31	3.98
4	Earth Sciences	30	3.86
4	Geography	30	3.86
5	Civil Engineering	28	3.60
6	Environmental Science	23	2.96
7	Botany	22	2.83
7	Engineering Science	22	2.83
8	Physical Sciences	20	2.57
9	GIS	13	1.67
10	Engineering	11	1.41
10	Science	11	1.41
11	Science & Technology	10	1.29
	Others (274)	387	49.74
	Total	778	100.00

Table 7 shows the growth of top keywords which occurred 10 times or more decade wise. Overall it's seen that the keywords have started increasing after the year 2000. As from 1980-1989 total occurrence of keywords are 29, from 1990-1999 are 102, from 2000-2009 are 165, from 2010-2016 are 75.

The topmost keyword is remote sensing which occurred only once in 1980-1989, 24 times from 1990-1999, 5 times in 2000-2009 and 19 times in 2010-2016. So by the completion of decade till 2020 hopefully this will increase more. The exact situation before and after 2000 can't be clear as for the 8 keywords the year was not mentioned. The second and third rank keywords Geology, Earth System Sciences, Physics have shown the continuous growth. The keyword science and technology has been emerged in 2000-2009.

Table 7
Decade wise top rank keywords growth

Rank	*Subject heading/Keywords*	*1980-1989*	*1990-1999*	*2000-2009*	*2010-2016*	*Year not Mention*
1	Remote sensing	1	24	5	19	8
2	Geology	10	10	23	8	1
3	Earth System Sciences	0	5	22	4	0
3	Physics	1	3	15	10	2
4	Earth Sciences	12	15	2	0	1
4	Geography	1	5	15	7	2
5	Civil Engineering	0	7	15	5	1
6	Environmental Science	0	1	12	9	1
7	Botany	1	8	12	1	0
7	Engineering Science	0	4	18	0	0
8	Physical Sciences	0	8	10	2	0
9	GIS	0	2	1	9	1
10	Engineering	3	7	0	0	1
10	Science	0	3	5	1	2
11	Science & Technology	0	0	10	0	0
	Total	29	102	165	75	20

Table 8 demonstrates the rank of supervisors along with their affiliations. The top two supervisors are Iqbaluddin, Mukherjee S, affiliated from Aligarh Muslim University and Jawaharlal Nehru University have guided 13 and 8 theses respectively. The supervisor at the third rank is Vora A B, he has guided six theses, out of which three were affiliated from Hemchandracharya North Gujarat University, two from Gujarat University, one from Berhampur University. There are 18 supervisors who guided the 2 theses each and 243 supervisors who guided one thesis each. It is clear from the table 8 that top supervisors are from all the zones of the country.

Table 8
Rank list of Supervisor contributed

Rank	*Name of the Supervisor*	*No. of Thesis supervised*	*Percentage*	*Supervisor Affiliation*
1	Iqbaluddin	13	3.44	Aligarh Muslim University
2	Mukherjee S	8	2.12	Jawaharlal Nehru University

(*Contd...*)

Rank	*Name of the Supervisor*	*No. of Thesis supervised*	*Percentage*	*Supervisor Affiliation*
3	Vora A B	6	1.59	Hemchandracharya North Gujarat University-3, Gujarat University-2, Berhampur University-1
4	Gautam N C	5	1.32	Osmania University
5	Ramalingam M	4	1.06	Anna University
5	Peshwa V V	4	1.06	University of Pune
5	Gupta R P	4	1.06	University of Roorkee (Indian Institute of Technology Roorkee)-3, University of Rajasthan-1
5	Dharmendra Singh	4	1.06	Guru Ghasidas University
6	Reddy M Anji	3	0.79	Jawaharlal Nehru Technological University Hyderabad
6	Prakash Rao B S	3	0.79	Andhra University
6	Menon A R R	3	0.79	Forest Research Institute-2, Cochin University of Science and Technology
6	Hema Malini B	3	0.79	Andhra University
6	Garge Sandhya Kiran	3	0.79	Maharaja Sayajirao University of Baroda
6	Chatterjee Alokesh	3	0.79	University Of Calcutta
6	Bhattacharya A	3	0.79	University of Roorkee (Indian Institute of Technology Roorkee)-2, Osmania University-1
6	Ahmed Syed Ashfaq	3	0.79	Kuvempu University, Karnataka
Others (261) (18 with 2 and 243 with single contribution)		279	73.81	
27 Information not available		27	7.14	

4. SUMMARY

On exploring the remote sensing and GIS in an Indian thesis catalogue Indcat from 1980-2016, the following major conclusions are drawn.

- There were 365 theses available on Indian catalogue in the field of remote sensing and GIS.
- The first thesis awarded was in year 1980 and since then the continuous growth is being observed. (Department of Geology, Banaras Hindu University)
- It's worth to note that the contributions are from 24 states. The majority of the contributions are from 'Andhra Pradesh' followed by 'Uttar Pradesh' and 'New Delhi'.
- The top two universities are from south east and south i.e. 'Andhra University' and 'Anna University'. The third rank is shared by the two universities i.e Aligarh Muslim University from 'Uttar Pradesh' and Osmania University from Telangana.
- The top three domains are geology, geography and physics.
- The top keywords are Remote sensing, Geology, Earth System Sciences, Physics, Earth Sciences, Geography, Civil Engineering.
- The top three supervisors are Iqbaluddin, Mukherjee S, Vora A B.

Overall it can be said that the research in remote sensing and GIS is going in all zones of the country and looking to the importance of the subject it is an interdisciplinary subject as it has its roots in several of domains.

Refrences

Campbell, J.B. (2002). *Introduction to remote sensing* (3rd ed.). The Guilford Press. ISBN 978-1572306400.

Dalpe R. Bibliometric analysis of biotechnology. Scientometrics. 2002;55(2):189-213.

Dubey S. (2017). Education, Research and Practice in Yoga: a study of Ph.D Researchers conducted in Indian Universities and Institutions from 1920 to 2013, University News 55(25) Jun 19-25, 3-9.

Hsieh PN., Chuang TM., Wang ML. (2013). A Bibliometric Analysis of the Theses and Dissertations on Information Literacy Published in the United States and Taiwan. In: Chang RS., Jain L., Peng SL. (eds) Advances in Intelligent Systems and Applications - Volume 1. Smart Innovation, Systems and Technologies, vol 20. Springer, ISBN: 978-3-642-35451-9.

http://indcat.inflibnet.ac.in/ (Accessed on dated 23 Sept 2017).

Kumar, P.S.G. (1998). Doctoral studies in library and information science in India: a study. DESIDOC Bulletin of Information Technology, 18(1), 5-9.

Mishra, Devendra Kumar and others (2014). Bibliometric Study of Ph.D. Thesis in English. Global Journal of Academic Librarianship. 1(1), 19-36.

Patra Punyatoya. Remote Sensing and Geographical Information System (GIS).Retrieved from http://ags.geography.du.ac.in/ (Accessed on dated 23 Sept 2017).

Pritchard, A. (1969). Statistical bibliography or bibliometrics. Journal of Documentation, 25(4), 348-349.