

A Detailed Review On Medical Image Compression

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Abstract: The current article is a scientometric analysis of the research articles on the topic “Medical Image Compression”. Scopus and WoS databases have been used for downloading the papers related to the above discussed topic. PRISMA guideline have been used for the selection of the articles. A total 884 articles have been downloaded and 397 have been selected and analyzed with VOS viewer.

Keywords: Review, Scientometric, Medical Image Compression

1. Introduction

At exponential rates, the amount of medical data is increasing and equals the decrease in digital data storage costs or exceeds them. Although methods for compressing image data are available reversibly, existing methods minimize storage requirements only modestly [1], [2]. Irreversible compression can achieve dramatically higher compression ratios without any image loss. These are regularly used in teleradiology and also in the archiving and correspondence processes of images. To optimize the treatment procedures, the doctor must consider how these compression methods operate and the extent of the deterioration that happens. The technology and artefacts used widely in irreversible medical image compression. There is growing regular volume of image data produced in healthcare, especially in combination with the enhanced scan resolutions and the importance of volumetric image sets [3], [4]. The handling of these images makes the encoding, archival and transmitting techniques more effective. The current article is a bibliometric review which attempts to analyze the work done in the field of Medical Image Compression [5], [6] by analyzing the work done in the field of MIC (Medical Image Compression).

2. METHODOLOGY

PRISMA guidelines have been used for the selection of the papers. 884 papers have been downloaded from Scopus and Web of Science databases using the Boolean “Medical” AND “Image” AND “Compression”. After applying the Prisma guidelines only 397 papers have been selected for the analysis purpose.

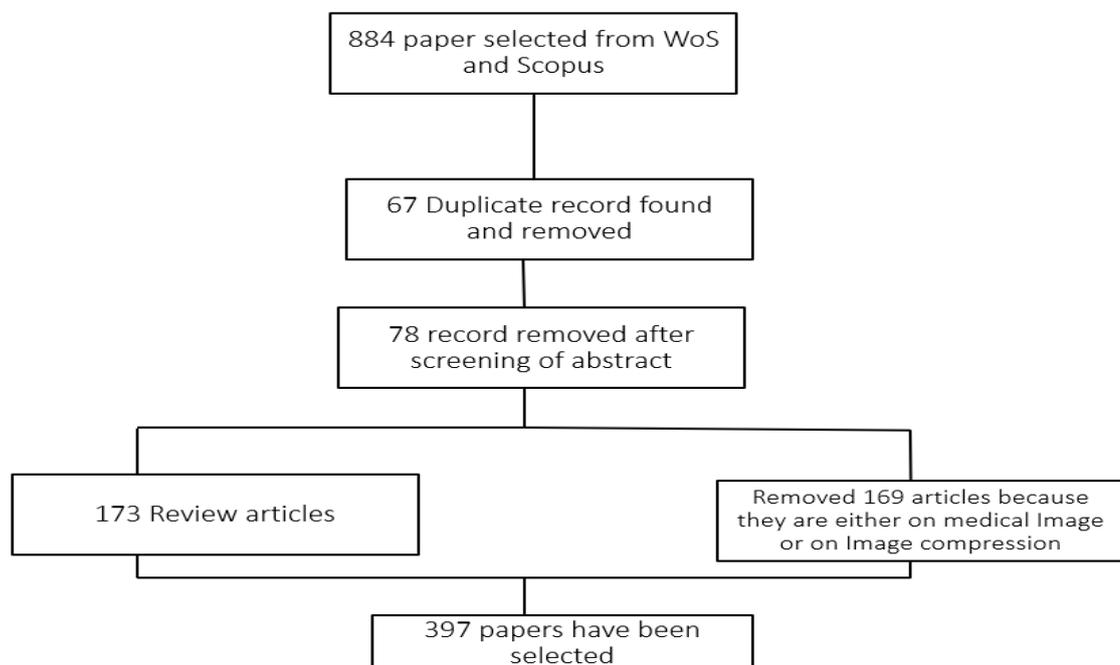
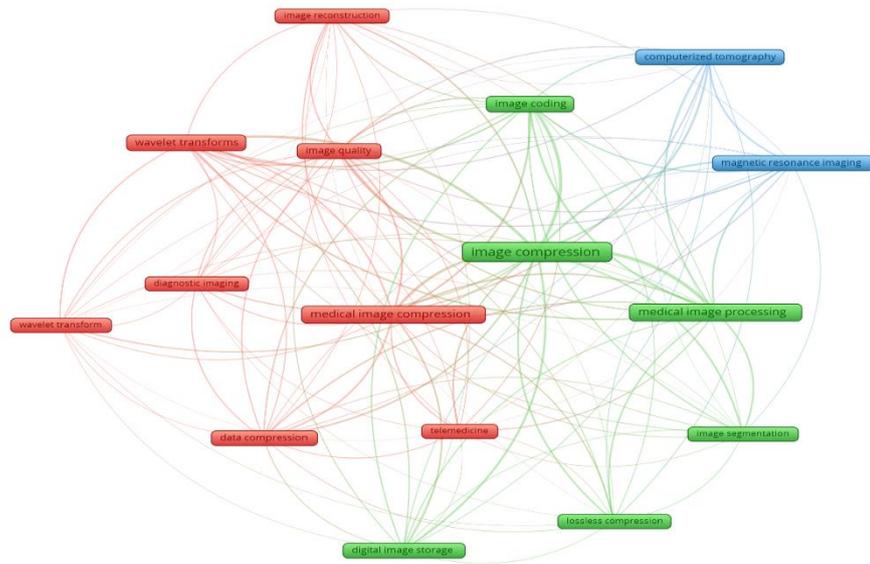


Fig.1. PRISMA Framework

3. ANALYSIS

Figure 2 shows the keywords used by the researchers in their manuscripts. Image compression, medical image compression, medical image processing are the keywords used prominently in the research articles. Table 1 reveals the different keywords and the number of occurrences for those.



VOSviewer

Fig.2. Medical Image Compression Keywords Analysis

Sl.N	keyword	occurrences
1	computerized tomography	43
2	data compression	50
3	diagnostic imaging	29
4	digital image storage	42
5	image coding	99
6	image compression	267
7	image quality	69
8	image reconstruction	33
9	image segmentation	33
10	lossless compression	37
11	magnetic resonance imaging	56
12	medical image compression	113
13	medical image processing	146
14	telemedicine	28
15	wavelet transform	23
16	wavelet transforms	87

Table.1. Medical Image Compression Keywords Data

Figure 3 shows the source wise citation for the articles. Proceedings of spie - the international society for optical engineering and iee transactions on medical imaging got the maximum citations but annual international conference of the iee engineering in medicine and biology – proceedings published the second maximum number of manuscripts.

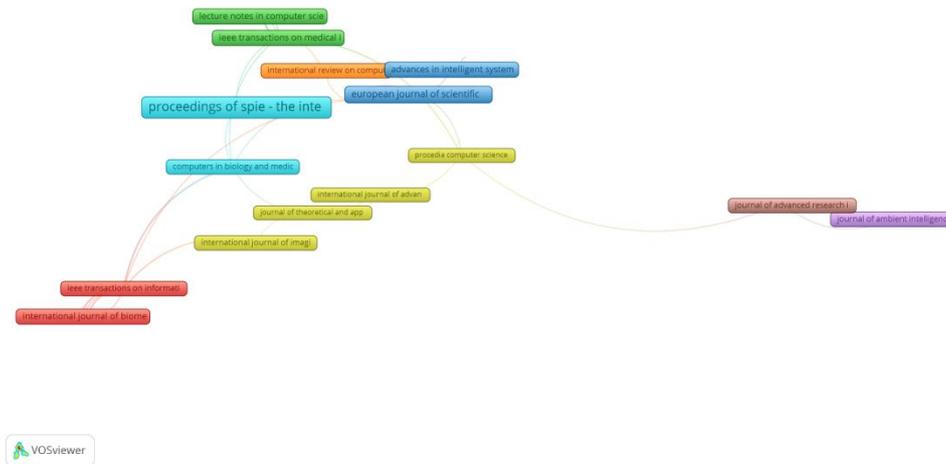


Fig.3. Medical Image Citation Source wise Analysis

Sl. No	source	documents	citations
1	proceedings of spie - the international society for optical engineering and electronics	28	142
2	annual international conference of the ieee engineering in medicine and biology - proceedings	10	54
3	european journal of scientific research	7	37
4	advances in intelligent systems and computing	6	9
5	ieee transactions on medical imaging	6	264
6	international journal of biomedical engineering and technology	6	9
7	lecture notes in computer science (including subseries lecture notes in artificial intelligence and lecture notes in bioinformatics)	6	7
8	progress in biomedical optics and imaging - proceedings of spie	6	30
9	international journal of applied engineering research	5	0
10	international journal of electrical and computer engineering	4	24
11	international review on computers and software	4	11
12	journal of advanced research in dynamical and control systems	4	6
13	journal of medical imaging and health informatics	4	10
14	2012 ieee-embs conference on biomedical engineering and sciences, iecbes 2012	3	10
15	2019 international conference on wireless communications, signal processing and networking, wispnets 2019	3	0
16	computers in biology and medicine	3	76
17	current medical imaging reviews	3	21
18	electronics letters	3	7
19	ieee international conference on image processing	3	24
20	ieee transactions on information technology in biomedicine	3	142
21	ifmbe proceedings	3	1
22	international journal of imaging systems and technology	3	6
23	journal of ambient intelligence and humanized computing	3	4
24	journal of computer science	3	11
25	journal of digital imaging	3	22
26	proceedings - international conference on image processing, icip	3	13
27	arpn journal of engineering and applied sciences	2	2
28	bioengineering, proceedings of the northeast conference	2	2
29	cluster computing	2	8
30	communications in computer and information science	2	4
31	data compression conference proceedings	2	4

32	ieee international symposium on information theory - proceedings	2	0
33	indonesian journal of electrical engineering and computer science	2	0
34	international conference on signal processing proceedings, icsp	2	3
35	international journal of advanced trends in computer science and engineering	2	9
36	international journal of control theory and applications	2	0
37	international journal of innovative technology and exploring engineering	2	0
38	international journal of signal and imaging systems engineering	2	6
39	international journal of wavelets, multiresolution and information processing	2	3
40	journal of electrical engineering and technology	2	12
41	journal of medical engineering and technology	2	30
42	journal of theoretical and applied information technology	2	2
43	lecture notes in computational vision and biomechanics	2	0
44	lecture notes in electrical engineering	2	18
45	medical physics	2	43
46	optical engineering	2	13
47	procedia computer science	2	27
48	proceedings - ieee symposium on computer-based medical systems	2	1
49	proceedings - international conference on computational intelligence and multimedia applications, iccima 2007	2	16
50	proceedings - international conference on pattern recognition	2	5
51	proceedings of 2005 international symposium on intelligent signal processing and communication systems, ispacs 2005	2	11
52	proceedings of the 2nd international conference on smart systems and inventive technology, icssit 2019	2	0
53	proceedings of the sice annual conference	2	13
54	shanghai jiaotongdaxuexuebao/journal of shanghai jiaotong university	2	3
55	studies in health technology and informatics	2	4

Table.2. Medical Image Citation Source wise Data

The next figure portray the country wise citation. It can be observed from the figure and Table below that India got the maximum number of citations along with USA, China and Taiwan.

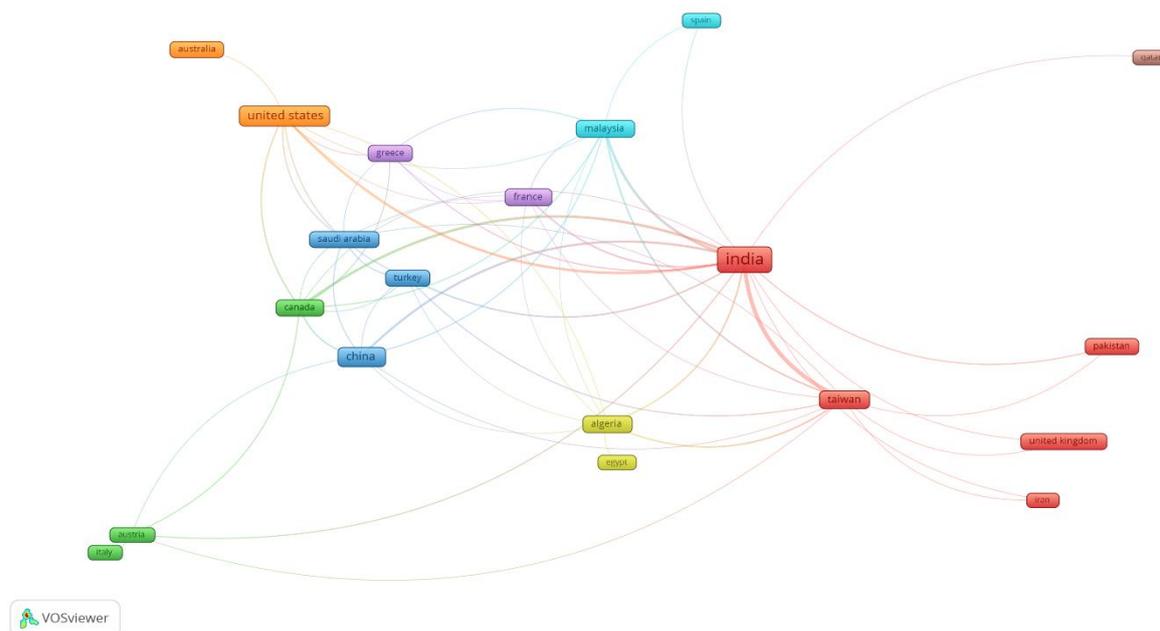


Fig.4. Medical Image Citation Country wise Analysis

Sl.No	country	documents
1	India	160
2	United States	44
3	China	39
4	Taiwan	19
5	Malaysia	18
6	France	15
7	Algeria	14
8	Canada	9
9	Greece	7
10	United kingdom	7
11	Saudi Arabia	6
12	Australia	5
13	Pakistan	5
14	South korea	5
15	Thailand	5
16	Turkey	5
17	Indonesia	4
18	Italy	4
19	Qatar	4
20	Spain	4
21	Austria	3
22	Egypt	3
23	Iran	3
24	Ireland	3

Table.3. Medical Image Citation Country wise Data

The data of co-authorship also reveals that the India have the most number of co authorship on the research papers on the Medical Image Compression.

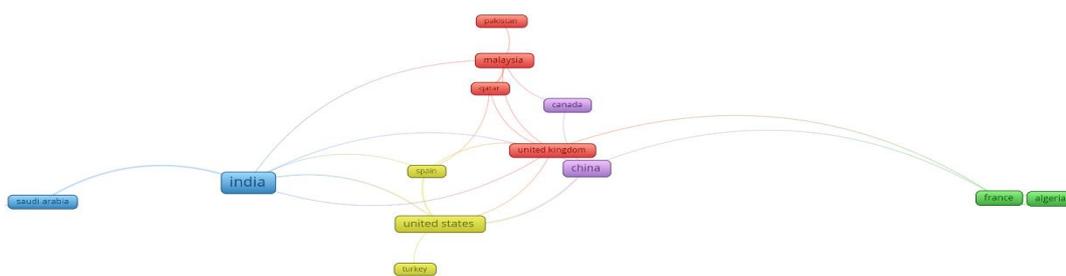


Fig.5. Medical Image Co-Authorship Analysis

4. Discussion

The data reveals that there are good number of researchers working on the medical image compression. India, USA and China are the country’s leading in the research on this topic. IEEE and International Society of Optical Engineering are the sources with major number of citations and documents. Researchers worked majorly

on the topics computerized tomography data compression, diagnostic imaging, digital image storage, image coding, image compression[7], image quality, image reconstruction[8]–[10], image segmentation[11], lossless compression, magnetic resonance imaging, medical image compression and medical image processing[4], [10], [12], [13].

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