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Modified Impact Factor (MIF) at Specialty Level: A Way Forward

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Abstract

Journal Impact Factor (JIF) is gold standard in the field of bibliometric whether published or perished. Its opposition is mainly because of inter- and intra-disciplinary discrepancies. By normalization compared to highest JIF, Modified Impact Factor (MIF) were calculated at disciplines, branches and specialties level & termed as Red, Yellow and Green MIF respectively. For this purpose 10 Top JIF during 2010 from some disciplines of medical & engineering were taken. Then JIF of their branches and specialties were accounted and converted to MIF. Comparative analysis of MIF was more meaningful to remove inter- and intra-disciplinary discrepancies. This new method will help universities as well as researchers to find their proper place values at the specialty level in the era of advancing bibliometric in general & journal reputation, in particular.

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Keywords: *bibliometric; impact factor; citation index; normalized impact factor*

1. Introduction

For selection of quality information sources, librarians and scientists are in need of reliable decision aids because of large number of scientific journals. The "impact factor" (IF) is the most commonly used assessment aid for deciding which journals should receive a scholarly submission or attention from research readership (Dong, Loh, & Mondry, 2005). Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. Such research publications are widely viewed by researchers for their reference as “Trusted Sources” (ACS, 2008; Deepika & Mahalakshmi, 2012). The traditional way to evaluate research is to rely on peer judgement but this evaluation technique is costly (Campanario, 1998a, b), the bibliometric literature has developed alternative tools, mainly based on various ways of counting citations (Garfield, 2006, 1979, 1972 1955). Bibliometrics is a set of methods used to study or measure texts and information (Bellis, 2009). Citation analysis and content analysis are commonly used bibliometric methods (Wikipedia, 2012). The impact factor, often abbreviated IF, is a measure reflecting the average number of citations to articles published in science and social science journals (Garfield, 2006, 1979, 1972 1955). It is frequently used as a proxy for the relative importance of a journal within its field, with journals with higher impact factors deemed to be more important than those with lower ones. The impact factor was devised by Eugene Garfield, the founder of the Institute for Scientific Information (ISI), now part of Thomson

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Reuters. Impact factors are calculated yearly for those journals that are indexed in Thomson Reuter's Journal Citation Report (JCR). Journal impact factors represent the average number of citations to a journal over a specific period of time, usually two years (Garfield, 2006, 1979, 1972 1955). Factors affecting the values of IF are given in Table 1. The Impact Factor (IF) from ISI® Journal Citation Report (JCR) has moved in recent years from an obscure bibliometric indicator to chief quantitative measure of a journal, its research papers, the researchers, and even the institution they work in (Amin & Mabe, 2000). In general, fundamental and pure subject areas have higher average impact factors than specialized or applied ones (Amin & Mabe, 2000). The variation is so significant that the top journal in one field may have an IF lower than the bottom journal in another area. Researchers in industry will write significantly less papers than their colleagues in fundamental sciences. Therefore, the more workers are active in a field, the more citations will accumulate & multiple authorships are another contributing factor. Quality of scientific articles and of a journal in general can only be judged by scientists in the respective field. Journal quality greatly depends on its refereeing system, editorial board of the publishing company (Ortner, 2010). When using IF values for evaluation purposes, administrators usually ignore the fact that they greatly differ among subject categories. To overcome the problem of comparing IF across different specialties, Sen, 1982 and Marshakova-Shaikevich, 1996 have suggested, Normalized IF). Some suggested a rank normalized IF which involves order statistics for the whole set of journals in a specialty (Pudovkin & & Garfield, 2004). Even Scopus's Source Normalized Impact per Paper (SNIP) has been devised at paper level too (Polit & Northam, 2011). Journal weighted impact factor by Farrokh Habibzadeh & Mahboobeh Yadollahi, 2008a, b and another by Bollen, Rodriguez, and Van de Sompel, 2006 & 2009 are also available. Thomson Reuters also markets several subsets of this database, termed "Specialty Citation Indices" such as the Neuroscience Citation Index and the Chemistry Citation Index (Web of Knowledge, 2012). The use of JIF for evaluation has been the object of some criticisms. For example, the peaks in the citation distribution curves vary from discipline to discipline in specific fields (Cartwright & McGhee, 2005; Jose Maria & Jesus, 2010). Due to, diversity of citing behaviour in different disciplines the comparison between the JIFs dedicated to different disciplines is inadequate (Nah, Kang, Lee, & Chung 2009; Makino, 1998). Hirst introduced the Disciplinary Impact Factor (DIF) that was based on the average number of times a journal was cited in a given sub-field (discipline) alone rather than across the complete set of science citation index (SCI) (Knezevic, 1987). A similar approach was suggested by Alexander Pudovkin & Garfield, 2005.They suggested a rank-normalized impact factor (rnIF) to be calculated within each subject category (Pudovkin & Garfield, 2005). Ramirez, Garcia, & Del-Rio, 2000 proposed a renormalized IF (Fr), which was calculated based on the maximum IF, and median IF of each category. The positive value shows important relevance in the area and a negative one shows secondary rules. Impact Factor Point Average (IFPA) was introduced by the Ramirez et al., 2000, Sombatsompop, Markpin, Yochai, & Saechiew, 2005 & Sombatsompop & Markpin, 2005. The IFPA index is based on the impact factor of the journal, the average impact factor of all journals having the same subject category (discipline), the ranking of the journal's impact factor in the same discipline, the numbers of journal titles in the same discipline, and the number of research articles published by an individual. Van-Leeuwen and Moed, 2005 developed an alternative journal impact measure Called Journal to Field Impact Score (JFIS). The JFIS is based on four types of documents, namely articles, letters, notes and reviews (Owlia, Vasei, Goliaei, & Nassiri, 2011).

Table 1 Factors affecting the values of IF

1.1 Sociological Factors
1. Type of journal
Publishing mainly letters, full papers or reviews
2. Average number of authors per paper
This is related to the subject area
3. Time (month) of publication
The publish or perish phenomenon

1.2 Statistical Factors
1. Subject area of the journal
2. Number of scientists working in this area
3. Size of the journal
4. Numbers & type of scientists working the field
5. Industry vs. University

1.3 ISI Indicators
1. Impact factor
2. Immediacy index
3. Cited half-life
4. Specialty Citation Indexes e.g., Neuroscience & Chemistry citation indices

1.4 Non-ISI Indicators
1. The five year impact factor
2. Ranking
3. The journal h-index
4. SCImago journal rank (SJR)
5. Eigenfactor and article influence
6. SNIP (Source Normalized Impact per Paper)
7. Rank Normalized Impact Factor (rnIF)
8. The g-index
9. Citation Trends
10. Scopus Journal Analyzer
11. Article and issue types
12. Content citations
13. Journal Performance Measures
14. Disciplinary Impact Factor (DIF) by Hirst

2. Methodology of Modified IF

As general, fundamental and pure subject areas have higher average impact factors than specialized or applied ones and the top journal in one field may have an impact factor lower than the bottom journal in another area. Therefore, this is not possible to consider all factors by single criteria except better classification of subject category may help to compare ISI IF in the same field. The interests in Journal Impact Factor (JIF) in scientific communities have grown over the last decades. The impact factor is used to evaluate journal's quality, and the papers published therein (Owlia et al., 2011). IF is a discipline-specific measure and the comparison between the IF dedicated to different disciplines is inadequate, unless a normalization process is performed. By some researchers Normalized Impact Factor (NIF) was introduced as a relatively simple method enabling the IFs to be used when evaluating the quality of journals and research works in different disciplines The NIF Index was established based on the multiplication of IF by a constant factor. In our view, constant factor calculation is overwhelming and troublesome for each category. Therefore, general formula for all is better option. The normalization procedure is similar to percentile ranking, provides more reliable and easily interpretable values and termed as rank-normalized impact factors i.e., rnIF (Pudovkin & Garfield, 2004). Scopus's Source Normalized Impact per Paper (SNIP), Journal weighted impact factor by Habibzadeh et al., 2008 & Bollen et al., 2006, "Specialty Citation Indices" such as the Neuroscience Citation Index and the Chemistry Citation Index by Thompson Reuters are specialty based citation tools but still not popular Thomson Reuters (2012). With the advancement in scientific knowledge, science is divided into different disciplines (fields) and further divided to sub-disciplines, branches, specialties, sub-specialties, super-specialties and topics. Although, Thompson Reuter has given the concept of Specialty Citation Index, but still it is not available for different fields or disciplines. At the level if sub-discipline, branches and specialty level probably it will take more time to market. Therefore, we have tried our best to devise a new formula without jeopardizing the original concept by Garfield. Our concept is based on three factors, i.e., Highest Impact Factor (HIF) at the different level (disciplines, branches & specialty level for time being) and by adding Colour Coding these are designated as Red, Yellow and Green HMIF respectively. Sub-disciplines can be designated by orange colours if desired. These highest IF at different levels are taken 100% (simply 100) as a reference for disciplines, branches and specialties, etc. Modification of IF (MIF) of other members of the group is done by comparing to this Highest Modified Impact Factor (HMIF) by normalization. Descriptions of these three factors are given below.

1. Highest Impact Factor

When people think of the outcomes of their publications, they think in terms of ranking specially by comparing their IF with the highest IF in their own discipline, sub-discipline or specialty. For the sake of simplicity, we selected two disciplines i.e., health and engineering. Both have been further divided into different branches, e.g. health into surgical, medicine and nursing and engineering into civil and electronic engineering, etc. Surgery is further divided into general surgery, orthopaedic, urology specialties. Even sub-specialties, e.g., arthroplasty, sport medicine and foot are sub-specialties of orthopaedic. Therefore, it is not feasible to compare impact factors of different disciplines with each other like comparison of orange to apples because of entirely different readers and researchers. Highest impact factors at discipline, branches and specialty level are designated as RHMIF, YHMIF and GHMIF respectively. Following classification is only for the descriptive purpose. Therefore, consensus is required to make this technique more acceptable.

1) **Disciplines (red)**

Health & allied sciences (including medical, nursing), engineering and biology are main disciplines

2) **Sub-disciplines (orange)**

Medical field consists of many sub-disciplines like Medicine (overall) and Nursing & Biomedical. Civil, electrical, chemical and biomedical engineering are sub-disciplines of engineering.

3) **Branches (yellow)**

These are General surgery & General medicine.

4) **Specialties (green)**

Surgery & allied specialties (General Surgery, orthopaedic, urology, neurosurgery, anaesthesia) medicine & allied specialties (general medicine, dermatology, pulmonology) nursing (forensic nursing, cardiac nursing) and electronics (robotics) civil (material) are different specialties. Civil engineering is broken into several sub-specialties, including environmental engineering, geotechnical engineering, structural engineering, transportation engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering, survey, and construction engineering. Division of scientific field is not topic, of discussion here. For the sake of simplicity and clarity of concept, different colours have been proposed in Table 2.

2. Colour Coding

The neuroscience discipline of biomedical field, in which a great number of scientists are engaged in research, shows higher articles, citations and subsequently higher impact factor range of values for the related journals in comparison to the nursing, which shows lower citation propensity even in the best journals of this discipline (Lillquist & Green, 2010; Vinkler, 1991). This fact is usually ignored when using JIF values for evaluations (Bordons& Gomez, 2002). These differences in fields or disciplines cause unfairness in the evaluation of researchers and research institutes when JIFs are used in their assessments. Therefore, it is not justified to compare JIF of both disciplines. That is the philosophy behind to devise of the newer techniques at different levels. At the level of disciplines or fields we labelled them as Red Modified Impact Factor (RMIF), branch level as Yellow Modified Impact Factor (YMIF) and at specialty level as Green Modified Impact Factor (GMIF). All of them are called as Modified Impact Factors (MIF). Therefore, IF written in black colour will designate the ISI JIF and red, yellow and green typing will indicate MIF. Alternatively we can designate MIF by writing numerical values along with R, Y and G. In Table 3 MIF for robotics are taken as specialty of electronics and electrical engineering. Table 4 New England Journal of Medicine, Annal of Surgery and Osteoarthritis are journals of HIF for medical disciplines, branch (surgery) and specialty(orthopaedic) level respectively and taken as reference point to calculate MIF. Similarly in Table 5 anaesthesia as a specialty of surgery is given. If this colour coding system is accepted in future we may select rainbow colours (VIBGYOR) as in Table 2. Each colour of rainbow is representing topic, super-specialty, sub-specialty, specialty, branch, sub-discipline and discipline level respectively. Acceptance of this colour coding is only possible when we have recognized system of disciplines classification properly. Confusion may arise because of inter and intra disciplines overlapping. In all tables ISIJ IF are taken for top 10 journals in that particular group but possibility of error is quite normal. Therefore, data taken here is given only for descriptive purpose. By looking at Table 2-4, it is self explanatory that MIF of different specialties of entirely different disciplines do not have wider discrepancies. If we compare Table 4 (orthopaedic) with Table 3 (robotics) and Table 5 (anaesthesia) at Position No. 2 in green zones the respective values of GMIF are 92.72, 97.61 and 99.63. Their respective ISI IF values are 3.605, 2.04 and 5.35. Similarly at position 10 in same tables MIF values are 63.84, 47.85 and 43.02 and their respective ISI IF are 2.482, 1.00 and 2.31. Normalization (here we termed as modification) is simple and easy way to justify among colleagues of different specialties. At different author level we might select journal relevant to their publications & then compared with each other to remove ambiguities. In Table 2 Color coding is given for description purpose that could be changed once consensus is there on proper division of disciplines into sub disciplines, branches, specialties and so on. In current situation we can finalize bit easily the disciplines into branches and further into specialties. Therefore, current article is mainly focused on Red, Yellow and Green zones in MIF. Tables 3-5 are divided into these three colors MIF's and ISI IF are given in black color.In Table 3-5 Highest ISI IF is considered as 100 at disciplines, branches and specialties level and other members have been modified by normalization compared to these Highest MIF which we termed here as MIF i.e., RMIF, YMIF and GMIF. By comparing different specialties, we can explain place value of each journal at intra-specialty or inter-specialty level without jeopardizing the concept JCR ISI IF for academic promotion as well as reputation of journal itself in marketing. 2.3

3. Modification/Normalization

For "Modification" the Highest ISI IF of Journal of that discipline, branch or specialty is weighted as 100 & other groups members are normalized accordingly by considering it as a reference point. Percentages are used to express how large/small one quantity is, relative to another quantity. Here Highest IF is taken as 100% and Modified IF is converted to its equivalent. That is the way to convert ISI IF to MIF. It can be exemplified by New Engl. J Med. having 47.05 IF in 2010 in the field of health sciences. Therefore, we will be to label it as HMIF as 100 or 100% in the field of medicine. Disciplines are designated by red colours. Therefore it is will be abbreviated as RHMIF & will be used as reference point. Surgery being branched of health field will come in yellow zones and Anal of Surgery being the highest impact factor journal (7.9) will be taken 100 (100%) at the level of branch. Therefore, its YHMIF is 100 but when compared to its main disciplines its value is equal to 16.79 as RMIF. Similarly, if we further go to specialty level then Osteoarthr ISI IF is 3.888. Its other values are given in brackets i.e., (3.888) & 100 (GHMIF), 49.22(YMIF) and 08.26(RMIF). Impact factors are both loved & despised and at the same time arguments are there to be published or perished. This is irrational to compare IF of journals of different disciplines like orange with apples e.g., New Engl. J. Med. has 47.05 whereas engineering journals even do not touch figure of 30. One way of getting around the apples to oranges problem is by seeking out cases of unethical multiple publications, identical (or nearly identical) articles published in multiple sources. Another way is to track the performance of articles meant to be published in several sources. Therefore, clever researchers will send their articles at multiple places once accepted for publication in different journals; they will register their article in journal with high IF.

Formulae to calculate MIF are given below. The given formulae represent the Modified IF, JCR Journal Impact Factor (JIF) & Highest Modified Impact Factor at disciplines (R), branch (Y) and specialty (G) level. In our opinion comparison of MIF is more justified at branch or specialty level even & in certain cases at sub and super-specialties level. In short, GMIF is more preferable over YMIF and RMIF.

$$RMIF=JIF\div RHMIF\times 100$$
$$YMIF=JIF\div YHMIF\times 100$$
$$GMIF=JIF\div GHMIF\times 100$$

Table 2 Colour Coding for MIF

Colour Coding	Level	MIF	Example	
Red	Discipline	RMIF	Medical & allied	Engineering
Orange	Sub-discipline	OMIF	Medicine (overall), Nursing & Biomedical	Electrical & Electronics Mechanical Civil
Yellow	Branch	YMIF	Surgery, Medicine	Electronics
Green	Specialty	GMIF	Ortho, ENT Nephrology & Dermatology	Biomedical Electronics/ Robotics
Blue	Sub-specialty	BMIF	Sport Medicine	Artificial Intelligence (AI)
Indigo	Super-specialty	IMIF	Arthroscopy	Sensors
Violet	Topic	VMIF	ACL Injuries	Range Finders

N.B In all Tables top 10 journals have been selected carefully but error and omission are expected. In medical field IF of year 2010 and engineering field IF of 2009 are taken. ISI IF by JCR is simply abbreviated as IF. Black, Red, Yellow and Green Colours are representing ISI IF and MIF at Discipline, Branch & Specialty level respectively

Table 3 MIF of Electrical Engineering & Robotics

Rank	Journal	JIF ISI	RMIF (All Eng.)	YMIF (Elect. Eng.)	GMIF (Robot)
RHMIF	Nature Nanotech.	26.309	100	---	
YHMIF	IEEE Signal Proc Mag	4.914	18.678	100	
GHMIF	IEEE Robotics & Automation Mag.	2.09	7.944	42.531	100
2	IEEE Transactions on Robotics	2.04	7.754	41.514	97.61
3	International Journal of Robotics Research	1.99	7.564	40.496	95.22
4	Journal of Field Robotics	1.99	7.564	40.496	95.22
5	Robotics & Computer-Integrated Manufacturing	1.69	6.424	34.391	80.86
6	Bioinspiration & Biomimetics	1.37	5.207	27.879	65.55
7	Robotics & Autonomous Systems	1.36	5.169	27.676	65.54
8	Autonomous Robots	1.24	4.713	25.234	59.33
9	International Journal of Humanoid Robotics	1.23	4.675	25.030	59.32
10	Industrial Robot – An International Journal	1.00	3.801	20.350	47.85

3. Discussion

In Table 2 preferable colours scheme was suggested from disciplines through topic and represented by rainbow colours i.e., red to violet color respectively. Table 3-8 summarized the data from different branches and specialties of 2 disciplines i.e., medicine and engineering. Highest journal impact factor of respective discipline, branch and specialties were considered as 100% and respective top 10 journals IF were converted to MIF. MIF derived in Tables 3-8 were grouped in Table 9 and journals name in Table 10. Data was retrieved from Journal Citation Report, 2010 by Thomson Reuter Web of Science Web & only top journals were considered to avoid lengthy calculations. By comparative tabulation in Table 9, inter-specialty and intra-specialty comparison is possible from orthopaedic to nursing to robotics although their Highest IF are different i.e., 3.888, 1.919 and 2.09 respectively. Similarly chemical engineering can be compared by electrical & electronics engineering although their Highest IF are also different i.e., 11.02 &4.914 respectively. It is self-explanatory by simple modification of impact factor issue of apples to oranges comparison can be resolved but other issues still there.

Table 4 MIF of Surgery & Orthopaedic

Rank	Journal	JIF ISI	RMIF All Med	YMIF Surg.	GMIF Ortho
RHMIF	New Eng J Med*	**47.050**	**100**	**---**	**---**
YHMIF	Ann Surg	**7.900**	**16.63**	**100**	**---**
GHMIF	*Osteoarthr*	***3.888***	**08.26**	**49.22**	***100***
2	Am J Sport Med	*3.605*	**07.66**	**45.47**	*92.72*
3	J Bone Joint Surg Am	*3.427*	**07.28**	**43.38**	*88.14*
4	J Orthop Res	*3,112*	**06.61**	**39.39**	*80.04*
5	Spine J	*2.902*	**06.17**	**36.73**	*74.64*
6	J Bone Joint Surg Br	*2.655*	**05.59**	**33.61**	*68.29*
7	Spine	*2.624*	**05.58**	**33.01**	*67.49*
8	Arthroscopy	*2.608*	**05.54**	**33.01**	*67.08*
9	Gait Posture	*2.576*	**05.48**	**32.61**	*66.26*
10	J Orthop Sport Phys	*2.482*	**05.28**	**31.42**	*63.84*

Table 5 MIF of Surgery & Anaesthesia

Rank	**Journal**	**JIF ISI**	**RMIF All Med**	**YMIF Surg.**	**GMIF Anaes.**
RHMIF	New Eng J Med*	47.05	100	---	---
YHMIF	Ann.Surg	7.90	16.791	100	---
GHMIF	Pain	5.37	11.413	67.975	100
2	Anaesthesiology	5.35	11.371	67.721	99.63
3	Regional Anaes & Pain Medicine	4.16	8.842	52.658	77.47
4	British J. of Anaes.	3.83	8.141	48.481	71.32
5	European J. of Pain	3.61	7.672	45.69	67.23
6	Anaes. &Analgesia	3.08	6.546	38.987	57.36
7	Clinical J. of Pain	3.01	6.397	38.101	56.05
8	Anaes.	2.86	6.079	36.202	53.26
9	J. of Neuro-surgical Anaes.	2.41	5.122	30.506	44.88
10	Canadian J. of Anaes.	2.31	4.909	29.240	43.02

Table 6 MIF of Nursing

Rank	Journal	JIF	RMIF All Med.	YMIF Nursing
RHMIF	New Eng J Med*	47.050	100	---
YHMIF	Worldviews on Evidence-Based Nursing	1.944	4.132	100
2	Birth: Issues in Prenatal Care	1.919	4.079	98.71
3	International Journal of Nursing Studies	1.910	4.059	98.25
4	Oncology Nursing Forum	1.907	4.053	98.10
5	Cancer Nursing	1.878	3.991	96.60
6	Nursing Research	1.798	3.821	92.94
7	American Journal of Critical Care	1.658	3.523	85.29
8	Nursing Outlook	1.541	3.275	79.27
9	Journal of Cardiovascular Nursing	1.533	3.258	78.86
10	Journal of Advanced Nursing	1.518	3.226	78.09

Table 7 MIF of Chemical Engineering

Rank	Journal	JIF ISI	RMIF (All Eng. Fields)	YMIF (Chem. Eng)
RHMIF	Nature Nanotechnology	26.31	100	---
YHMIF	Progress in Energy & Combustion Science	11.02	41.885	100
2	Energy & Environmental Science	8.50	32.307	77.13
3	Journal of Catalysis	5.29	20.106	48.00
4	Applied Catalysis B-Environmental	5.25	19.954	47.64
5	Catalysis Today	3.53	13.416	32.03
6	Proceedings of the Combustion Institute	3.26	12.391	29.58
7	Chemistry & Physics of Carbon	3.25	12.353	29.49
8	Journal of Membrane Science	3.20	12.163	29.04
9	Fuel	3.18	12.087	28.86
10	Combustion & Flame	2.92	11.098	26.50

Table 8 Overall selection criteria of journals (Left) and MIF (Right) of Electronics & Electrical Engineering

In Table 9, JIF from two different disciplines (medical & engineering) & YMIF of branches of electronics, chemical & nursing along with GMIF of specialties of orthopaedic, anesthesia and robotics are given.

Top 10 members have been selected. Except branch of chemical engineering YMIF at position No 9 of electronics and nursing are similar and specialties of orthopaedic, anesthesia and robotics showed nearer GMIF compared to their different JIR. This concept can be further developed after selection of proper colour coding system by census of expert from different disciplines.

In Table No. 10, Top 10 journals of different branches and specialties of medical and engineering are given. These are Electronics, Robotics, Chemical, Orthopaedic, Anaesthesia and Nursing. Following are the journals of highest JCR IF in respective fields.

1. IEEE Signal Proc Magi
2. IEEE Robotics & Automation Magazine
3. Progress in Energy and Combustion Science
4. Osteoarthr
5. Pain
6. Worldviews on Evidence-Based

Rank	Journal	JIF ISI	RMIF All Eng. Fields	YMIF (Elect. Eng)
RHMIF	Nature Nanotechnology	26.309	100	---
YHMIF	IEEE Signal Proc Mag.	4.914	18.678	100
2	P IEEE	4.878	18.541	99.23
3	IEEE T Ind Electron	4.678	17.781	95.20
4	IEEE T Pattern Anal	4.378	16.640	89.09
5	Prog. Quant Electron	4.091	15.549	83.25
6	Prog. Electromagn Res	3.763	14.303	76.58
7	IEEE J Sel Area Comm	3.758	14.284	76.48
8	IEEE T Software Eng	3.750	14.253	76.31
9	IEEE T Med Imaging	3.540	13.455	72.04
10	IEEE T Fuzzy System	3.343	12.707	68.03

Table 9 MIF of Different Branches & Specialties

Rank	Electronics		Chemical		Nursing		Ortho		Anesthesia		Robot	
	JIF	**YMIF**	**JIF**	**YMIF**	**JIF**	**YMIF**	**JIF**	**GMIF**	**JIF**	**GMIF**	**JIF**	**GMIF**
(HMIF) 1	4.914	100	11.02	100	1.944	100	*3.888*	*100*	5.37	100	2.09	100
2	4.878	99.23	8.50	77.13	1.919	98.71	*3.605*	*92.72*	5.35	99.63	2.04	97.61
3	4.678	95.20	5.29	48.00	1.910	98.25	*3.427*	*88.14*	4.16	77.47	1.99	95.22
4	4.378	89.09	5.25	47.64	1.907	98.10	*3,112*	*80.04*	3.83	71.32	1.99	95.22
5	4.091	83.25	3.53	32.03	1.878	96.60	*2.902*	*74.64*	3.61	67.23	1.69	80.86
6	3.763	76.58	3.26	29.58	1.798	92.94	*2.655*	*68.29*	3.08	57.36	1.37	65.55
7	3.758	76.48	3.25	29.49	1.658	85.29	*2.624*	*67.49*	3.01	56.05	1.36	65.54
8	3.750	76.31	3.20	29.04	1.541	79.27	*2.608*	*67.08*	2.86	53.26	1.24	59.33
9	3.540	72.04	3.18	28.86	1.533	78.86	*2.576*	*66.26*	2.41	44.88	1.23	59.32
10	3.343	68.03	2.92	26.50	1.518	78.09	*2.482*	*63.84*	2.31	43.02	1.00	47.85

Table 10 Top Ten Journals

Rank	Electronics	Robot	Chemical	Ortho	Anaesthesia	Nursing
1	IEEE Signal Proc Mag	IEEE Robotics & Automation Magazine	Progress in Energy and Combustion Science	Osteoarthr	Pain	Worldviews on Evidence-Based Nursing
2	P IEEE	IEEE Transactions on Robotics	Energy & Environmental Science	Am J Sport Med	Anaesthesiology	Birth: Issues in Perinatal Care
3	IEEE T Ind Electron	International Journal of Robotics Research	Journal of Catalysis	J Bone Joint Surg Am	Regional Anaesthesia & Pain Medicine	International J. of Nursing Studies
4	IEEE T Pattern Anal	Journal of Field Robotics	Applied Catalysis B-Environmental	J Orthop Res	British Journal of Anaesthesia	Oncology Nursing Forum
5	Prog Quant Electron	Robotics & Computer-Integrated Manufacturing	Catalysis Today	Spine J	European J. of Pain	Cancer Nursing
6	Prog Electromagn Res	Bioinspiration & Biomimetics	Proceedings of the Combustion Institute	J Bone Joint Surg Br	Anaesthesia & Analgesia	Nursing Research
7	IEEE J Sel Area Comm	Robotics & Autonomous Systems	Chemistry and Physics of Carbon	Spine	Clinical Journal of Pain	American Journal of Critical Care
8	IEEE T Software Eng	Autonomous Robots	Journal of Membrane Science	Arthroscopy	Anaesthesia	Nursing Outlook
9	IEEE T Med Imaging	International Journal of Humanoid Robotics	Fuel	Gait Posture	Journal of Neurosurgical Anaesthesia	Journal of Cardiovascular Nursing
10	IEEE T Fuzzy System	Industrial Robot – An International Journal	Combustion and Flame	J Orthop Sport Phys	Canadian Journal of Anaesthesia	Journal of Advanced Nursing

Impact Factor of ANN SURG (ISI J IF, 7.9) is the highest in surgery & allied (MIF, 100) therefore J BONE JOINT SURG AM being member of this group will have YMIF (Surgery) 43.38. But its GMIF (Ortho) is 88.14 % in its own specialty. Therefore, it is self evident that J Bone Joint Surg AM ISI IF looks very low 3.472 but when compared with all journals in surgical group (YMIF) it is 43.38 and in its own orthopaedic competitor journals (GMIF) is 88.14 but overall in all medical journals (RMIF) it is 07.28 The most important conclusion therefore is that comparisons of IFs can only be made for journals in the same subject area. What becomes obvious is the old fact that quality of scientific articles and of a journal in general can only be judged by scientists in the respective fields, after having used the journal for their own work. Journal quality greatly depends on its refereeing system and how authors are treated by the Editorial Board of the journal and especially by its editors and the staff of the publishing company of the journal. "Not everything that counts can be counted and not everything that can be counted counts" [16].

Therefore, we believe in proper field by relevant reader and peer reviewed should be counted to make it more meaningful. In Table 5, 6 & 7 ISI IF, RMIF and & YMIF are given from nursing and chemical & electronic engineering. Nature Nanotechnology was taken as HIF journal in engineering discipline and respective MIF were calculated at the level of chemical and electronics engineering (branch) as given in Table 6 & 7 and similarly nursing was taken as branch of medical field and MIF is calculated as given in Table 5. Nursing is considered as branch of medicine and numbers of journals in this field are limited. Therefore, HIF of nursing is 1.944 (YHIF 100%) and YMIF of other top 10 journals are calculated too in Table 5. CA has higher IF than New Eng. J. Med. but being very specific to cancer it was not taken as reference point for comparative purpose. In Table 6 & 7 Nature Nanotechnology was taken as Journal of HIF of engineering discipline and MIF of chemical & electrical branches are given in Table 6 & 7 accordingly. Although their ISI IF are11.020 and 4.914 but their MIF at branch level i.e., YHMIF is 100 for both. Similarly by using this modification method we are able to compare branches of different fields like medicine & engineering too as given in Tab 5 of Nursing with MIF of engineering in Table 6 & 7. Robotic specialty can be compared with orthopaedic as given in Table 1 & 2 and even if we consider Pain journal as

member of orthopaedic specialty than it is comparable too other specialties as per Table 2, 3 &4. By considering Pain in orthopaedic and robotics as a specialty of medical and engineering respectively, they are represented by GMIF. In Table8 we tried to summarize the Tables 2-7 and in Table 9 Top 10 journals are given accordingly. Data is available here for future researchers for graphical representation & further evaluation.

4. Conclusion

Modified Impact Factor is new concept based on existing ISI Journal IF (JIF) to remove intra and inter-discipline controversies to make it more acceptable to researchers, publishers, departments and universities. Further evaluation is required to validate the concept & selection of proper colour coding for different field of sciences.

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