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# **Citations v/s Altmetric Attention Score: A Comparison of Top 10 Highly Cited Papers in Nature**

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## **ABSTRACT**

This study aims to analyze the correlation between citations and altmetric score of top 10 highly cited papers in Nature by extracting the data from Google metrics. It tries to investigate whether a highly cited paper has high altmetric score or not by using correlation method and the result show that there exists a high correlation. The study found that Mendeley is the main medium through which scientific papers are being disseminated more and contributing to the altmetric score intensely. The country wise tweeting data show that U.S and U.K holds the first and second position in tweeting with 1143 & 14 tweets respectively. As the altmetric values the online attention, it prompts the entire research community to opt for social media for publication for getting good attentions and there by promoting open access. Even though, altmetrics is not at all a replacement of traditional metrics but acts as supplement to it.

**Keywords –Altmetrics, Citation, Citation analyses, Tweets**

## **Introduction**

The paradigm shift from traditional metrics to altmetrics paved the way for the entire research community to be active in social web as a means to increase their output value by using social media as a publication medium. It has become a widely used tool for analyzing the research impact of scholarly publications in a wider perspective rather than the traditional citation counting. It goes beyond traditional citation-based indicators as well as raw usage factors (such

as downloads or click-through rates) in that they focus on readership, diffusion and reuse indicators that can be tracked via blogs, social media, peer production systems, collaborative annotation tools (including social bookmarking and reference management services(Taraborelli, n.d.). It uses social media sites to measure the “buzz” around research output: namely, the attention being paid by people—in real time(Academy, 2018)

### **Need for the study**

It has become a robust practice among the researchers community to use social media as a way to publish their output to reach to plenty rather making them as locked ones. Even though many of the scholars are unaware of the benefits that they avail once they use social media as a means for social research and publication. So, the current study becomes a needy one to make scholars aware about “Altmetrics” benefits thereby prompting them to publish their papers in social media and promoting the open access up to en extend.

### **Objectives of the Study**

The following are the major objectives of the study,

1. To know top 10 highly cited papers in Nature.
2. To check Correlation between altmetric score and citations.
3. To understand the main online attentions for the papers.
4. To know the major tweeters for the papers.

### **Scope of the Study**

The study is confined to top 10 articles from Nature which is selected by using the data provided by Google scholar metrics according to the highest citations that they possessed on 17<sup>th</sup> March 2019.

### **Methodology of the Study**

The study is based on the data extracted from Google scholar metrics on 17<sup>th</sup> March 2019. Top 10 highly cited articles from Nature which stands first in the top 100 publications in several language with 362 h5-index and 542 h5-median have been selected and their corresponding citations and altmetrics attention score have been calculated(Scholar, 2019). For collecting the altmetrics attention score, the investigation has used altmetrics.com which gives the number of online attention to a particular paper(Altmetrics, 2019). The

extracted data further analyzed with the help of SPSS 21 edition to know the co-relation between citation and altmetric attention score.

## Analysis & Interpretation

**Table-1: Top 10 Publications with Citation and Altemetric Attention Score**

<b>Paper No.</b>	<b>Title</b>	<b>Author</b>	<b>Year</b>	<b>WOS</b>	<b>CROSS REF</b>	<b>AAS</b>
1	Deep learning.	Y LeCun et.al.	2015	6065	6104	892
2	Sequential deposition as a route to high-performance perovskite-sensitized solar cells	Julian Burschka et.al.	2013	4998	5025	109
3	Efficient planar hetero junction perovskite solar cells by vapour deposition	Mingzhen Liu et.al.	2013	4115	4094	126
4	The global distribution and burden of dengue	Samir Bhatt et.al.	2013	2827	2672	1046
5	Van der Waals hetero structures	A. K. Geim et.al.	2013	3379	3413	136
6	Human-level control through deep reinforcement learning	Volodymyr Mnih et.al.	2015	1268	1210	1506
7	Mastering the game of Go with deep neural networks and tree search	David Silver et.al.	2016	1359	1332	3155
8	Signatures of mutational processes in human cancer	Ludmil B. Alexandrov et.al.	2013	2580	2305	513
9	Analysis of protein-coding genetic variation in 60,706 humans	Monkol Lek et.al.	2016	2567	2510	927
10	Diet rapidly and reproducibly alters the human gut micro biome	Lawrence A. David et.al.	2013	2071	2026	1115

The Top10 highly cited papers with their corresponding citations (both from Web of Science and Cross Ref) and altmetrics attention scores are tabled above. Deep learning: Sequential deposition as a route to high-performance authored by Y LeCun et.al. got the highest citations with 6065 from WOS and 6104 from Cross Ref. It could draw attention of 892 online users. The work published by David Silver et.al.in 2016 got the highest altmetric score (3155) in the list while its citation from both WOS and CROSS REF is summed 2691 only. It cannot be predicted that a highly cited paper may have a good altmetric score and vice versa.

**Table-2: Number of Online Attentions**

<b>Paper No</b>	<b>Tweet</b>	<b>Blog</b>	<b>FB</b>	<b>Google+</b>	<b>News Outlets</b>	<b>Wikipedia</b>	<b>Citeulike</b>	<b>Mendeley</b>
1	734	16	13	111	36	11	41	19863
2	18	3	8	1	9	2	3	-
3	36	4	1		8	3	3	1
4	246	18	17	5	111	1	7	3241
5	25	9	3	-	12	1	6	3201
6	991	35	16	66	73	11	28	1810
7	2069	61	27	41	261	15	28	7214
8	291	14	17	16	35	-	36	3983
9	1133	20	33	6	42	-	17	3188
10	664	36	147	21	91	1	15	3842
<b>Total</b>	<b>6207</b>	<b>216</b>	<b>282</b>	<b>267</b>	<b>678</b>	<b>45</b>	<b>184</b>	<b>46343</b>

Mendeley has become an important contributor to the altmetrics score which is evident from the above table. Paper1 has got highest Mendeley score i.e. 19863 followed by paper 7 with 7214. Considering the number of tweets, paper 7 tops in the table with 2069 tweets followed by paper 9 with 1133 tweets. Paper 7 got good number of comments in Facebook as well as in news outlets. Rest of the sources like Wikipedia, Citeulike, and Google+ etc. also stand as good platforms for making tweets, comments, shares, bookmarks, recommends, discuss and views etc. which would be calculated for determining the altmetric score.

**Table-3: Top 3 Tweeters**

Paper	Country	Tweets	Country	Tweets	Country	Tweets
1	U.S	154(20.98)	Japan	38(5.18)	U.K	37(5.04)
2	U.K	2(11.11)	U.S	2(11.11)	Canada	1(5.56)
3	U.K	8(22.22)	U.S	7(19.44)	Japan	2(5.56)
4	U.S	44(17.89)	U.K	19(7.72)	Canada	11(4.47)
5	U.K	4(16)	U.S	3(12.00)	Russia	2(8.00)
6	U.S	206(20.79)	Japan	81(8.17)	U.K	71(7.16)
7	U.S	331(16)	Japan	178(8.61)	U.K	110(5.32)
8	U.S	63(21.65)	Spain	24(8.25)	U.K	23(7.90)
9	U.S	221(19.51)	Japan	121(10.68)	U.K	69(6.09)
10	U.S	124(18.67)	U.K	48(7.26)	Australia	23(3.48)
Total		1157		521		349

Further we investigated the top 3 countries from where the papers got high tweets and we understood that majority of the tweeters are from Unites States of America as the latest Statista report shows that U.S has got the highest number of ‘Twitter’ users in the World with 47.05 million users(Statista, 2019). Even though some of the papers like 2, 3 & 5 got high number of tweets from U.K. Notwithstanding India has 7.65 million twitter users, the tweets are very less in number.

**Table-4: Correlation between Citation and Altmetric Attention Score**

		WOS	AAS		REF	AAS
	Correlation			CROSS		
WOS	Coefficient	1.000	-.818**	REF	1.000	-.794**
	Sig. (2-tailed)	.	.004		.	.006
<b>N</b>		<b>10</b>	<b>10</b>		<b>10</b>	<b>10</b>

\*\* . Correlation is significant at the 0.01 level (2-tailed).

To prove the assumption that whether a highly cited paper would have a high altmetrics score, Spearman correlation method was used. Both the citation from World of Science and Cross Ref are being separately compared with altmetric score and the result shows that there exist a positive correlation between these two as the 'p' values here stood as .004 and .006 which lay less than 0.05. It implies higher cited papers would have higher altmetric score.

### **Findings of the Study**

The study found that 'Deep learning: Sequential deposition as a route to high-performance' authored by Y LeCun et.al. got the highest number of citations from WOS and CROSS REF with 6065 and 6104 citations respectively among the top 10 journals in "Nature". While 'Mastering the game of Go with deep neural networks and tree search' authored by David Silver et.al. secured the highest altmetric score(3155).The study also found that Mendeley readership has a high impact on determining the altmetric score of a publication. The study gives the clear picture that countries with high number of 'Twitter' users will tweet more as the Table-3 shows that out of 10 papers, 7 papers got high number of tweets from U.S. who ranked first in the top twitter users around the world in 2019(Statista, 2019). It is also derived from the study that a highly cited paper may not have high altmetrics score even though the Pearson correlation shows the positive correlation between these two variables (see Table-1&4).

### **Suggestions for the Future Study**

1. Scholars can make use of social web for publication for better reach of their intellectual outputs.
2. Scholars can make their output free to use by the research community (Open Access) for enriching the research.
3. Scholars can sign in to various altmetric tools like Altmetric.com, Impact story, Plum analytics and Kudos etc. for self-analysing their paper impact.



## Conclusion

As a young discipline, altmetrics is quickly changing the dynamics and incentives of scholarly communication and scientific publishing (Academy, 2018). They are new measurements for the impact of scholarly content, based on how far and wide it travels through the social Web (like Twitter), social bookmarking (e.g. CiteULike) and collaboration tools (such as Mendeley) (Galligan, 2012). Majority of the scholars currently preferred to be in 'Open Access mode' which helps the altmetrics service providers to extract the data and show the corresponding altmetrics score. That's why, we can say that the emergence of Altmetrics prompted the research community to support open access there by creating an 'open-metrics' initiation. Even though, it never be a replacement of traditional metrics but only a supplement.

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