

Bibliometric Analysis of “Statistics: A Journal of Theoretical and Applied Statistics” on 1985-2021 Period

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Abstract

This study is a quantitative research using bibliometric analysis. This study aimed to find out more detail about the “Statistics: A Journal of Theoretical and Applied Statistics” or SJTAS which was published during 1985-2021. This was seen from the topic of study, country productivity, author contributions, and analysis of their citation. The data in this study were taken from the Scopus database using keywords: (*ISSN(0233-1888) OR ISSN(1029-4910)*). The results obtained from the Scopus database are 1.798 documents. The average article citation fluctuates annually and the highest article citation is in 2018. Keywords from articles published in the SJTAS are dominated by topics: order statistics (55 articles), asymptotic normality (43 articles), bootstrap (33 articles), exponential distribution (32 articles), and consistency (31 articles).

Keywords: citations analysis; author contributions; statistics; scientific journal; bibliometrics.

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1. Introduction

Knowledge will continue to grow along with technological developments. This development will produce methods or ideas that will support technological developments. The development that is often seen is the development of scientific publications because scientific publications are one form of the author's contribution in providing information or knowledge based on research results (both field research and literature review).

Along with the development of these technologies, the world of work and the world of industry require human resources who are able to follow and adapt to the times. The presence of the Industrial Revolution 4.0 brought big changes to the world of work and the world of industry by bringing a digital transformation platform. Of course, with this development, future human resources will need skills that are in line with digital transformation. There are at least four fields of science that need to be compatible and in line with the industrial revolution 4.0, namely digital business, robotics and artificial intelligence, cyber security, and mathematics/statistics.

Of these four fields of science, mathematics/statistics is a field of science that will be needed by many companies because this field of science or department will produce competent human resources in the field of data science.

The development of scientific data will certainly be supported by innovations in the fields of mathematics and statistics. The development of this innovation is usually presented in a scientific publication in the form of journal articles or in the form of newspaper articles or other scientific articles. To see the development of innovation and what innovation studies are booming or developing, it is necessary to conduct a study and topic mapping using library analysis or known as bibliometric analysis. (Garrigos-Simon et al., 2018; Liu et al., 2018).

Royani & Idhani (2018) explained that bibliometric studies are studies in library science that apply statistics and mathematics. Bibliometric studies are used to see trends in a field of study, the productivity of journals/writers (Ferdias & Ahmar, 2021; Haryani et al., 2020; Iskandar et al., 2021).

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2. Methods

This research is a quantitative research that aims to see the trend of research developments in the field of statistics. In this study, research trends will be examined in the “Statistics: A Journal of Theoretical and Applied Statistics” or SJTAS with Print ISSN: 0233-1888 and Online ISSN: 1029-4910. Based on the website, the SJTAS is a journal that discusses the development and analysis of new methods in the field of statistics and its relation to real-life problems. Articles accepted in this journal must have interesting contributions and have novel value in both statistical theory and application, accompanied by rigorous mathematical results and proofs. The SJTAS is a reputable and prestigious journal for statistics because it has been indexed by Clarivate Analytics (SCI/SCIE), Scopus, and zbMath.

To see trends in the development of publications in the SJTAS, a bibliometric analysis method is used using metadata that has been obtained from the Scopus database using the keywords: (*ISSN(0233-1888) OR ISSN (1029-4910)*).

3. Results and Discussion

The results obtained from the Scopus database are 1,798 documents and the details each year are presented in table 1.

Based on data obtained through metadata from Scopus, table 1 shows that the highest number of documents issued in 2014 was 91 documents and the lowest was in 1994, which was 21 documents.

From figure 2, it can be seen that the average article citation has increased from year to year even though it often fluctuates. The highest article citation was in 2018.

From table 2 it can be seen that the top 5 countries that have the highest publications in this journal are the USA, China, Germany, France, and India.

Table 1. Number of Documents per Year

| Year | Documents | Year | Documents | Year | Documents | Year | Documents |
|------|-----------|------|-----------|------|-----------|------|-----------|
| 2021 | 57 | 2010 | 45 | 2000 | 23 | 1990 | 43 |
| 2020 | 65 | 2009 | 42 | 1999 | 24 | 1989 | 54 |
| 2019 | 67 | 2008 | 37 | 1998 | 36 | 1988 | 48 |
| 2018 | 74 | 2007 | 42 | 1997 | 34 | 1987 | 47 |
| 2017 | 79 | 2006 | 36 | 1996 | 36 | 1986 | 51 |
| 2016 | 79 | 2005 | 39 | 1995 | 54 | 1985 | 56 |
| 2015 | 80 | 2004 | 36 | 1994 | 21 | | |
| 2014 | 91 | 2003 | 38 | 1993 | 40 | | |
| 2013 | 76 | 2002 | 27 | 1992 | 31 | | |
| 2012 | 63 | 2001 | 30 | 1991 | 50 | | |
| 2011 | 47 | | | | | | |

In Figure 3 and Figure 4 it can be seen that the keywords of articles published in the SJTAS are dominated by topics: order statistics (55 articles), asymptotic normality (43 articles), bootstrap (33 articles), exponential distribution (32 articles), and consistency (31 articles).

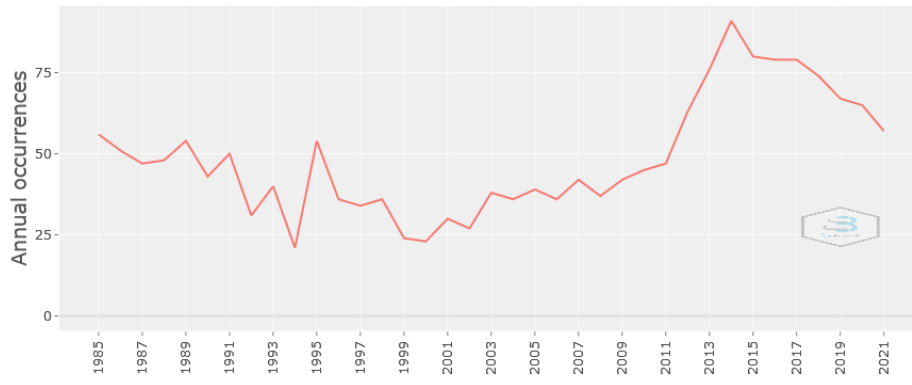


Figure 1. Number of Documents each Year

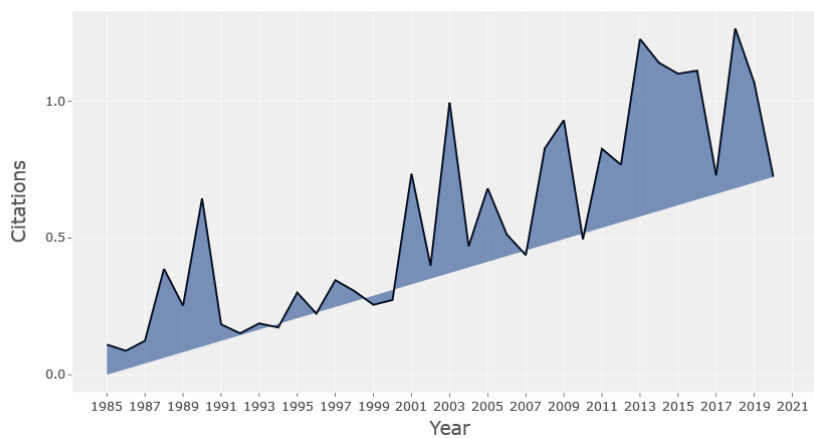


Figure 2. Average article citations per year

Table 2. Top 15 Countries with the Most Documents

| Region | No. of Documents |
|-------------|------------------|
| USA | 481 |
| CHINA | 411 |
| GERMANY | 404 |
| FRANCE | 291 |
| INDIA | 278 |
| SPAIN | 186 |
| CANADA | 158 |
| IRAN | 140 |
| POLAND | 138 |
| BRAZIL | 110 |
| SOUTH KOREA | 83 |
| UK | 66 |
| JAPAN | 54 |
| EGYPT | 48 |

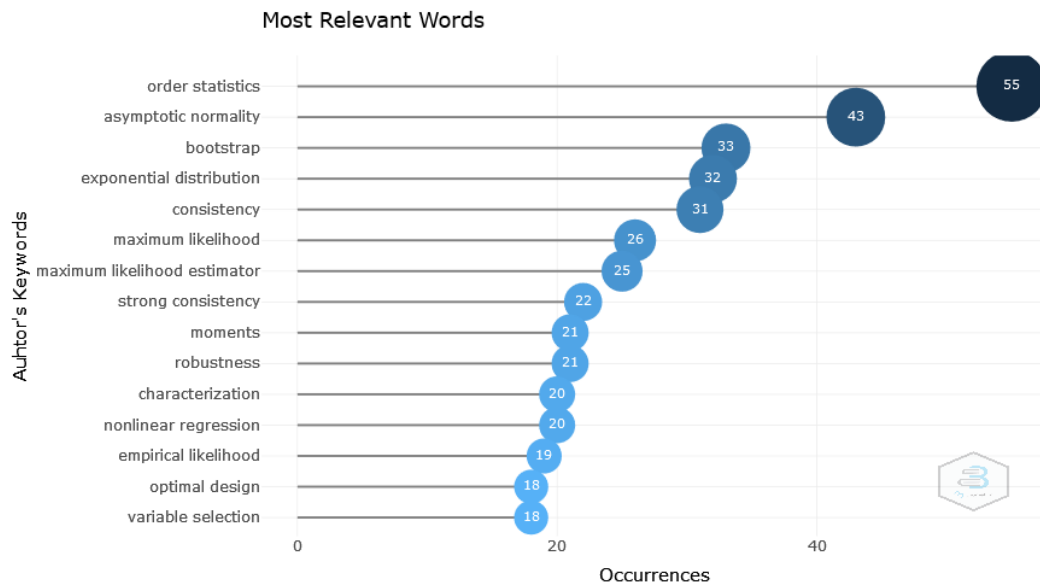


Figure 3. Most relevant words based on author's keywords

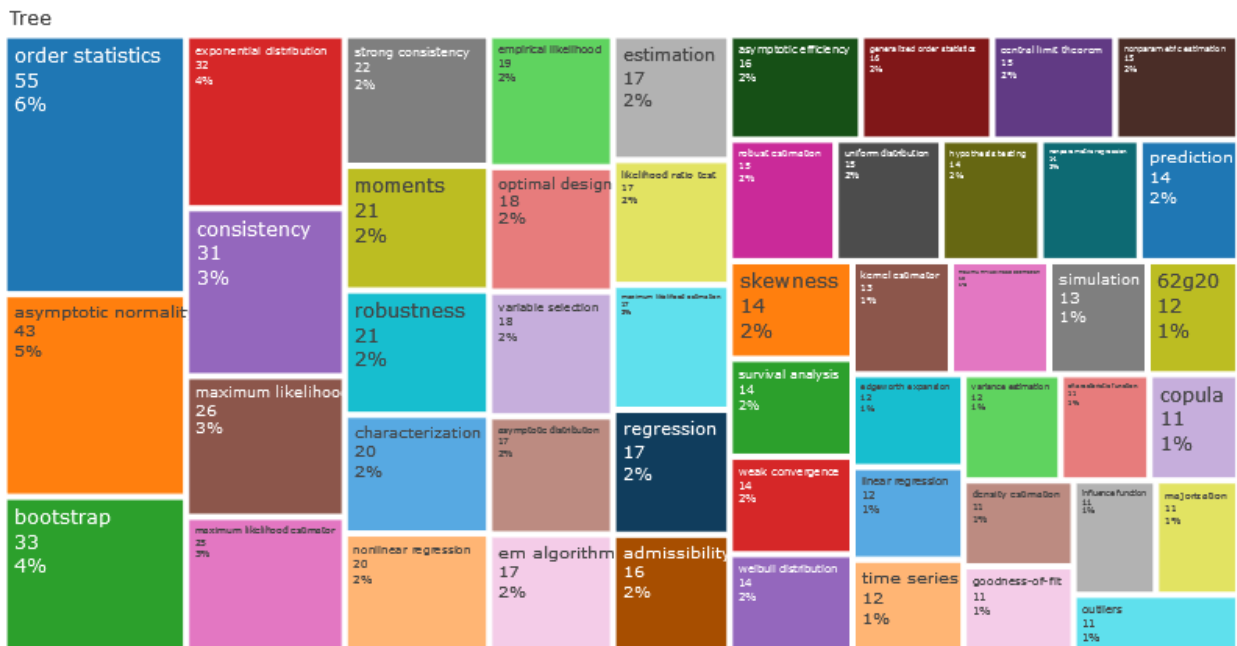


Figure 4. Treemap based on author's keywords

Unlike the case with most relevant words based on article titles (figure 5), keywords are dominated by topics: estimation, models, regression, distribution.

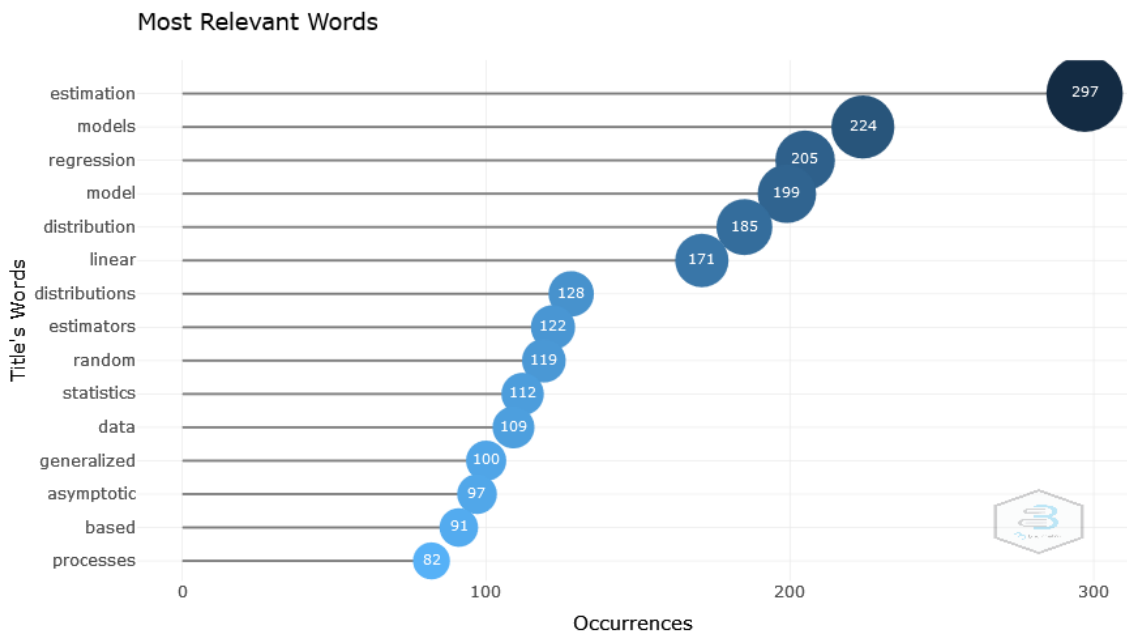


Figure 5. Most relevant words based on article titles

In Figure 6 it can be seen that the most studied keywords from researchers in China is "asymptotic normality" while USA, France, Germany, India, Spain, Canada, Iran, Poland, and Brazil are equally divided into all keywords. The most accurate keyword is "order statistics". The keyword "order statistics" is most often researched by Balakrishnan N.

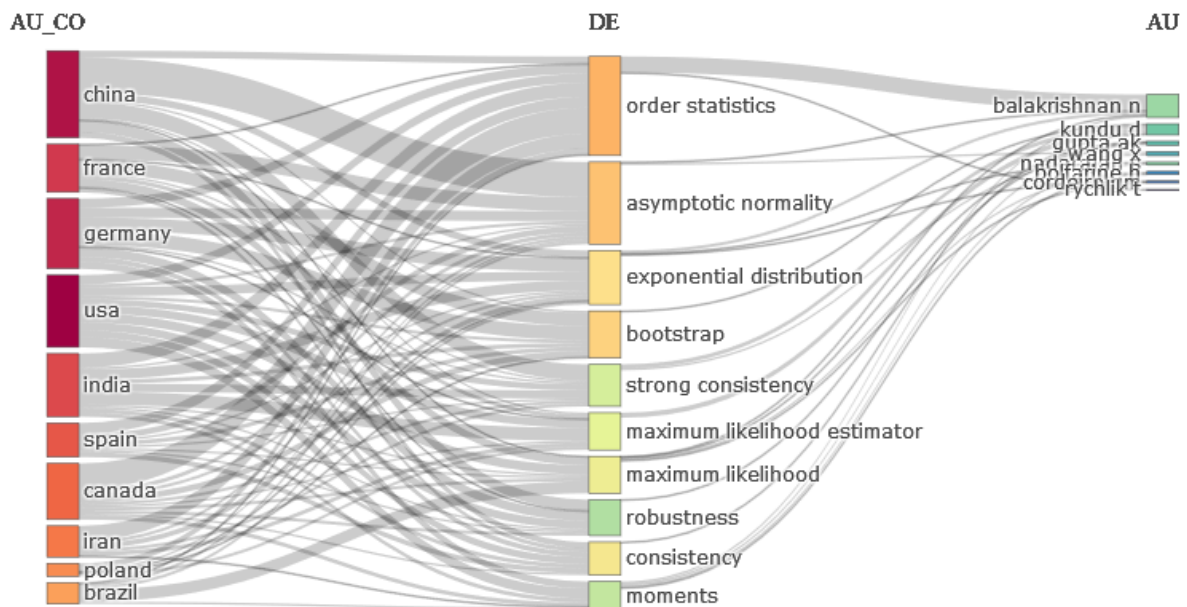


Figure 6. Three-field Plot of Countries, Keywords, and Authors for the ten most researched topics

Based on table 3, it can be seen that the author who has the highest citation rate for local citations is Lee C who published his article in 1995, while for global citations it is the author of Kamps U who published an article in 2001.

Table 3. Most Local Citation Documents

| Document | Year | Local Citations | Global Citations | LC/GC Ratio (%) | Normalized Local Citations | Normalized Global Citations |
|----------------------|------|-----------------|------------------|-----------------|----------------------------|-----------------------------|
| LEE C, 1995 | 1995 | 27 | 1 | 2700.00 | 38.37 | 0.13 |
| KAMPS U, 2001 | 2001 | 12 | 170 | 7.06 | 18.95 | 11.56 |
| ZHAO P, 2011 | 2011 | 6 | 49 | 12.24 | 20.14 | 5.94 |
| KIM H-J, 2005 | 2005 | 6 | 43 | 13.95 | 12.32 | 3.95 |
| VON ROSEN D, 1988 | 1988 | 6 | 22 | 27.27 | 11.08 | 1.72 |
| CRAMER E, 2006 | 2006 | 5 | 23 | 21.74 | 8.57 | 2.99 |
| DANIELAK K, 2003 | 2003 | 5 | 26 | 19.23 | 10.00 | 1.45 |
| TROUTT MD, 1991 | 1991 | 5 | 16 | 31.25 | 10.87 | 2.90 |
| BALAKRISHNAN N, 2016 | 2016 | 4 | 17 | 23.53 | 14.36 | 3.06 |
| LAND M, 2012 | 2012 | 4 | 33 | 12.12 | 8.13 | 4.78 |
| BEDBUR S, 2012 | 2012 | 4 | 26 | 15.38 | 8.13 | 3.77 |
| ILIOPOULOS G, 2012 | 2012 | 4 | 11 | 36.36 | 8.13 | 1.59 |
| ARNOLD BC, 2009 | 2009 | 4 | 28 | 14.29 | 9.33 | 2.51 |
| GÓMEZ HW, 2006 | 2006 | 4 | 19 | 21.05 | 6.86 | 2.47 |
| TROUTI MD, 1993 | 1993 | 4 | 16 | 25.00 | 11.43 | 3.05 |
| GBETE D-S, 1991 | 1991 | 4 | 20 | 20.00 | 8.70 | 3.62 |
| FANG R, 2018 | 2018 | 3 | 13 | 23.08 | 20.18 | 3.42 |
| TORRADO N, 2017 | 2017 | 3 | 11 | 27.27 | 13.94 | 3.78 |
| ZHAO P, 2016 | 2016 | 3 | 13 | 23.08 | 10.77 | 2.34 |
| FANG R, 2016 | 2016 | 3 | 29 | 10.34 | 10.77 | 5.22 |

From Figure 7, we can see that Balakrishnan N. is a writer who has a high local impact based on an h-index of 11, followed by Kundu D., Nadarajah S. with an h-index: 9, and Cordeiro GM and Raqab MS with an h-index. : 8. Balakrishnan N, Kundu D, and Nadarajah S have high impact because they are prolific writers in the SJTAS (see table 5).

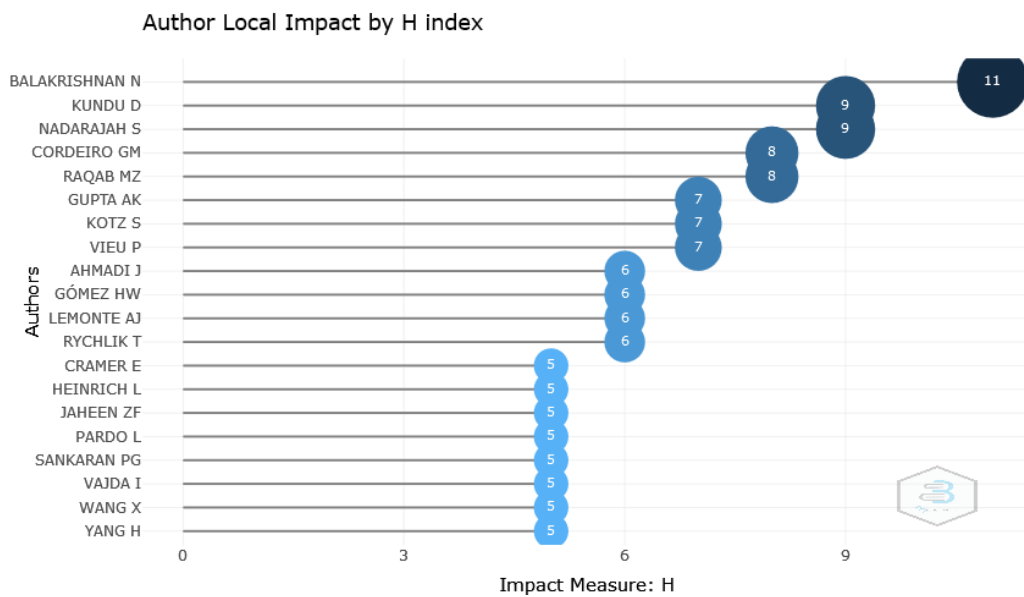


Figure 7. Productive Authors based on Local Impact by H-Index

To see the number of authors in each article, Lotka's Law is used (Nelisa, 2012). With Lotka's Law, we can find out how many documents an author has written. In this SJTAS, the results of Lotka's Law are presented in table 4.

Table 4. Lotka's Law

| Documents written | N. of Authors |
|-------------------|---------------|
| 1 | 1744 |
| 2 | 347 |
| 3 | 108 |
| 4 | 50 |
| 5 | 36 |
| 6 | 14 |
| 7 | 8 |
| 8 | 8 |
| 9 | 3 |
| 10 | 3 |
| 11 | 4 |
| 13 | 1 |
| 14 | 1 |
| 19 | 1 |
| 21 | 1 |
| 35 | 1 |
| 40 | 1 |

Based on table 4, it can be seen that the SJTAS, there is 1 author who wrote 40 articles each; 35; 21; 19; 14; 13 documents. There are 4 people who wrote 11 articles; and many authors who published only 1 article as many as 1744 authors. The authors who are dominant in writing articles in this journal are presented in table 5.

Table 5. Top Productive Authors in the SJTAS

| Authors | Number of Documents |
|----------------|---------------------|
| BALAKRISHNAN N | 40 |
| NADARAJAH S | 35 |
| KUNDU D | 21 |
| GUPTA AK | 19 |

4. Conclusion

Based on the results and discussions that have been carried out, it can be concluded that the USA, China, Germany, France, and India are the countries that have contributed the most articles to the SJTAS. And based on the keywords from the authors, information was obtained that the topics: order statistics, asymptotic normality, bootstrap, exponential distribution, consistency were the most frequently discussed topics. From the bibliometric results, it is also found that the authors who have high productivity are consecutively: BALAKRISHNAN N (40 documents), NADARAJAH S (35 documents), KUNDU D (21 documents), and GUPTA AK (19 documents).

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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