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Bibliometric Study on Analysing Impact of newly launched products over existing ones through AI

Dipak Sharma
Symbiosis International University, dipak.sharma.btech2018@sitpune.edu.in

Vageesh Devrath
Symbiosis International University, vageesh.devrath.btech2018@sitpune.edu.in

Abhinav Rajput
Symbiosis International University, abhinav.rajput.btech2018@sitpune.edu.in

Gouranga Jyoti Kataky
Symbiosis International University, gouranga.jyoti.btech2018@sitpune.edu.in

Priyanka Tupe-Waghmare
Symbiosis International University, priyanka.tupe@sitpune.edu.in

See next page for additional authors

Authors

Dipak Sharma, Vageesh Devrath, Abhinav Rajput, Gouranga Jyoti Kataky, Priyanka Tupe-Waghmare, and Ismail Akbani

Bibliometric Study on Analysing Impact of newly launched products over existing ones through Artificial Intelligence

Dipak Sharma, Vageesh S Devrath, Abhinav Rajput, Gouranga Jyoti Kataky,
Priyanka Tupe-Waghmare, Ismail Akbani
Symbiosis Institute of Technology, Symbiosis International (Deemed University), Pune,
Maharashtra, India

Abstract:

Different analysis models like Conditional Mean Analysis, Trend Analysis, Correlation Analysis helps us to analyse the delicate equilibrium between businesses that gets impacted when a new product is launched in a cluster. This paper shows a statistical report of research done on the businesses in a cluster based on ongoing trends and current customer needs . There is surplus data present on various platforms related to every product following the ongoing trends in the form of customer reviews.The research mainly speculates mainly how the businesses get impacted with change in consumer needs, wants and demands. With the help of datasets that are available from online sources incorporating various machine learning techniques which would help us analyze the correlation of two businesses and by checking on various algorithms for analyzing the results obtained regarding the study made covering various aspects of businesses. On top of that, the precision largely depends on the evaluating parameters that are taken into consideration along with finding helpful patterns in those evaluating parameters to characterise the main problem. In this report, to perform bibliometric analysis Scopus Database is employed. This bibliometric analysis considers essential keywords, datasets, and significance of the selected research papers. Moreover it offers details regarding types, sources of publications, yearly publication trends, affiliations and so on from Scopus. Furthermore, it captures details concerning co-appearing keywords, authors, titles of sources through networked diagrams. From this research paper it is perceived that there is a lot of research for the considered research area. This kind of research will also be helpful for speculating how the new businesses impact the awareness of the customers on the existing ones.

Keywords: Marketing, Business, Analytics, Machine Learning, Artificial Intelligence, Customer Reviews.

1. Introduction:

Over the last few years new businesses entering the market in clusters have been observed . Consumers are now habituating themselves to keep up with the trend as much as possible, which in turn resulting in the sales revenue of newly launched products leading to a sudden growth [1-3]. As the world is leading to an autonomous way of living, widespread use of devices which provides comfort and saves time are taken into practice, in turn creating significant change in people's lifestyles making investing in them [4-7]. Hitherto ongoing trends, newly launched gadgets save time and manpower were mostly overlooked by the consumers [8-9] .

As the awareness of modernisation was acknowledged by the people, businesses that kept pace with the current scenarios got a sudden boom, making consumer oriented companies focusing and looking on autonomous product launches more than ever before as it made a significant growth in sales figures which started the evolution in the people's lifestyles [10-13] .

On the other hand, the growth seen has resulted in many new companies with new innovations entering the market in a cluster as a competitor for the existing ones making people move on from incorporating them from orthodox to modernised products resulting, disturbing the fragile balance between the businesses and creating impact on the sales figures as well [14-17]. Here mostly evaluating will be on the basis of customer ratings and the sales figure to analyze the impact of the businesses in a cluster [18-20].

Mainly the analysis takes charge of different analysing techniques like Conditional Mean Analysis, Trend Analysis, Correlation Analysis for analysing the impact on the businesses in the cluster . The aim is to bring an optimised and efficient model to acknowledge the various impacts from new businesses stepping into the market by undergoing through various big datasets [21-25].

There are many different online sources available having tons of unstructured data, mostly web data available freely. There are many ways to collect data for analysis. One option is to copy the data manually and store it on your screen. However, this is a very time consuming job. Web scraping plays a very significant role and comes handy in such cases.

Web scraping is a technique that benefits us to extract large amounts of data from websites and store it in your computer [26-27] .

Data preprocessing is a process of preparing the raw data and making it suitable for a machine learning model, where it depicts the quality of choices depending on the behaviour of the data extracted. It is the first and crucial step while creating a machine learning model . Most of the time data is extracted for use in machine learning techniques , it is not invariably a case that we come across clean and formatted data. Moreover while doing any operation with data, it is mandatory to clean the data and put it in a formatted way. So for this, we use data pre-processing tasks where basically the data extracted is stored in the structured form. Data preprocessing is required for cleaning the data followed by data reduction and transformation making it suitable for a machine learning model which also increases the accuracy and efficiency of a machine learning model.

The utmost purpose of different Analysing techniques is to help in collecting information, to notice a pattern of the data taken. Moreover, it helps to estimate the relationship between two quantitative variables making it easy to analyse the fragile balances between two businesses in a cluster. Data reduction benefits to get rid of excess data, also aims to surge the storage efficiency and reduce data storage. This technique results in better data mining execution and also increases the precision of the analysis [29-30] .

Once the preprocessing is done next step is to go through various machine algorithms.Once an appropriate algorithm to cluster the data based on price range and other similar features of products selected which would then be followed by undergoing various analysing techniques such as correlation analysis , trend analysis, sentiment analysis and various other techniques where different models are built for analysing purposes [31-35]. Then the dataset is split into training and testing dataset. Model is trained using training data [36-37]. The evaluation of the model would be done using testing data. Visualisation of testing and validation data is then incorporated . Finally the prediction skill of the model is studied [38-40].

The below mentioned fig.1 shows the block diagram of different steps involved in the different phases of analysis. The first phase involves the process of data collection taken via various platforms available in the form of consumer ratings and reviews [41-46].

After data collection the next phase is pre-processing the data involving data cleaning, data transformation and reduction as missing data and noisy data can be handled moreover it helps to get rid of excess data which helps increasing the accuracy and efficiency of a model making ease in performing the next phase i.e. feature comparison [47-50]. Lastly, incorporating different analyzing techniques of AI impact could be examined.
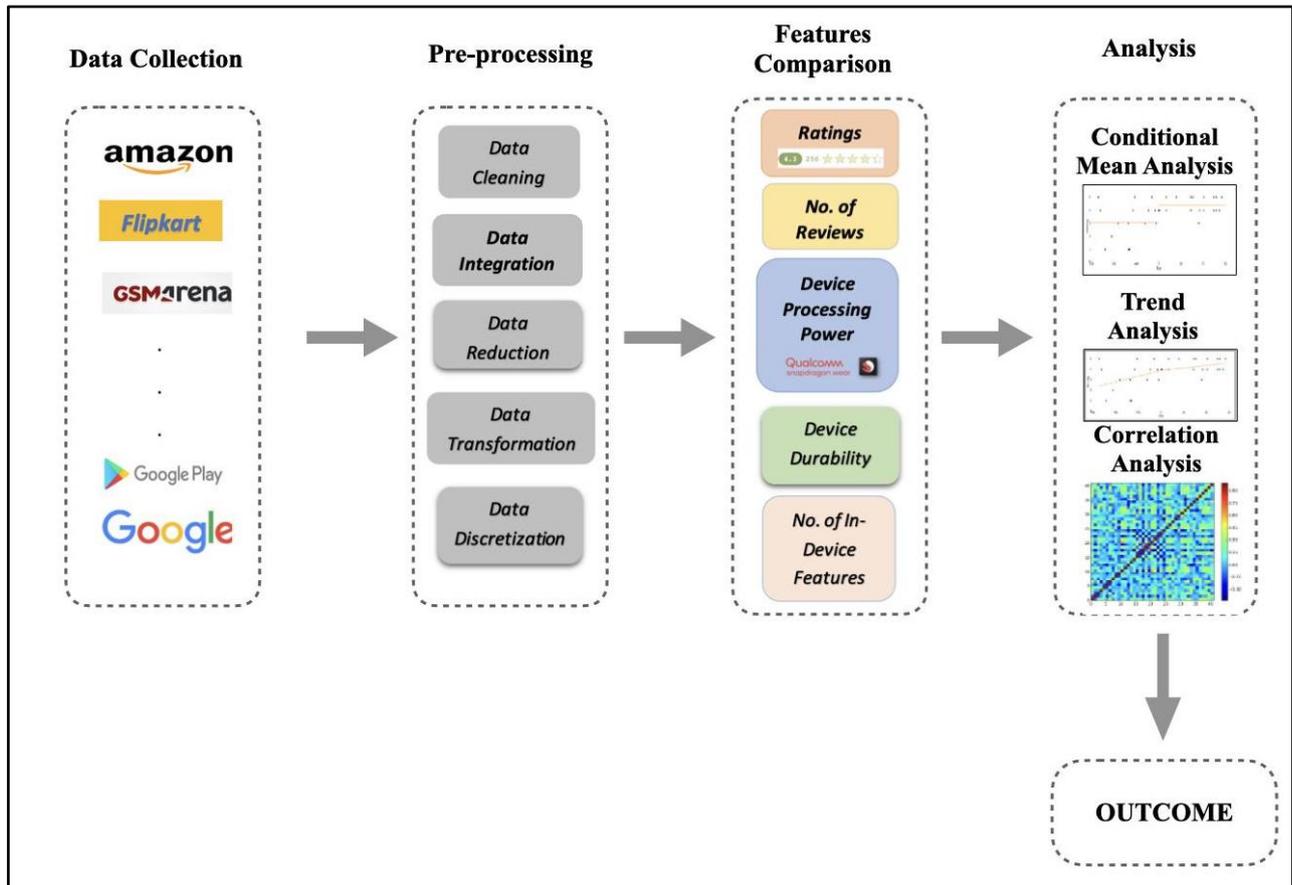
Fig. 1 Block diagram is showing steps involved in analysis

The layout of this paper presents in the following sections where section 1 presents introduction, section 2 demonstrates on preliminary data collection, section 3 network analysis, section 4 gives limitations of the carried out study followed by conclusion afterwards in section 5 and References referred to this paper are put together at the end.

2. Preliminary Data Collection

Since 2004, Scopus has been found to be the world's enormous citation and abstract database of peer-analysis literature, including books, scientific journals and conference

papers, comprising research topics across all scientific and technical directions, from medicine and community studies to arts and humanities.

In addition, Scopus comparatively has a larger dataset with respect to other citation databases available online like ResearchGate, Google Scholar. Moreover it also provides various tools to look at , trace and visualize research to deliver a broad overview of the world's research project results across all genres, moreover providing critical research for the same .

2.1 Database Search Query:

Table 1: Scopus Database search query

Scopus DB Query	"Marketing" AND "Business" AND "Analytics" AND "Machine Learning" OR "Artificial Intelligence" OR "Customer Reviews"

Source:Scopus_DB accessed on 10th May 2021

The above-mentioned query has been used for analysis in the Scopus database as it incorporates various aspects of business and AI oriented fields in which the research has been done providing refined results for better interpretation .

2.2 Initial search results:

By utilising the query mentioned in the above Table 1, a total 103 publications are extracted from the Scopus database. All of the 103 publications in the Scopus_DB are published in the English language which is included in the statistical analysis for the paper.

Comparatively English language has an upper hand compared to the other languages as it is widely taken into practice for writing as well as reading purposes.

Table 2: Language of Publication

Publication Language	Publications
English	103

The below mentioned Fig 2 shows 103 publications fall under numerous source types such as Journal, Book Series, and Conference proceedings. Out of four source types , 49% of the source type comprises the Journal source type, leading with a number of 50 sources. Book series is followed by a percentage of 17% with a number of 18 sources. 30 number of sources of the total results comprise 29% fall under the conference proceeding source type followed by book type source comprising 5 sources with 5% contribution which is the lowest of the four source types. All the source types were taken into consideration as the lowest, which was the book source type as it also made a considerable contribution with 5 sources.
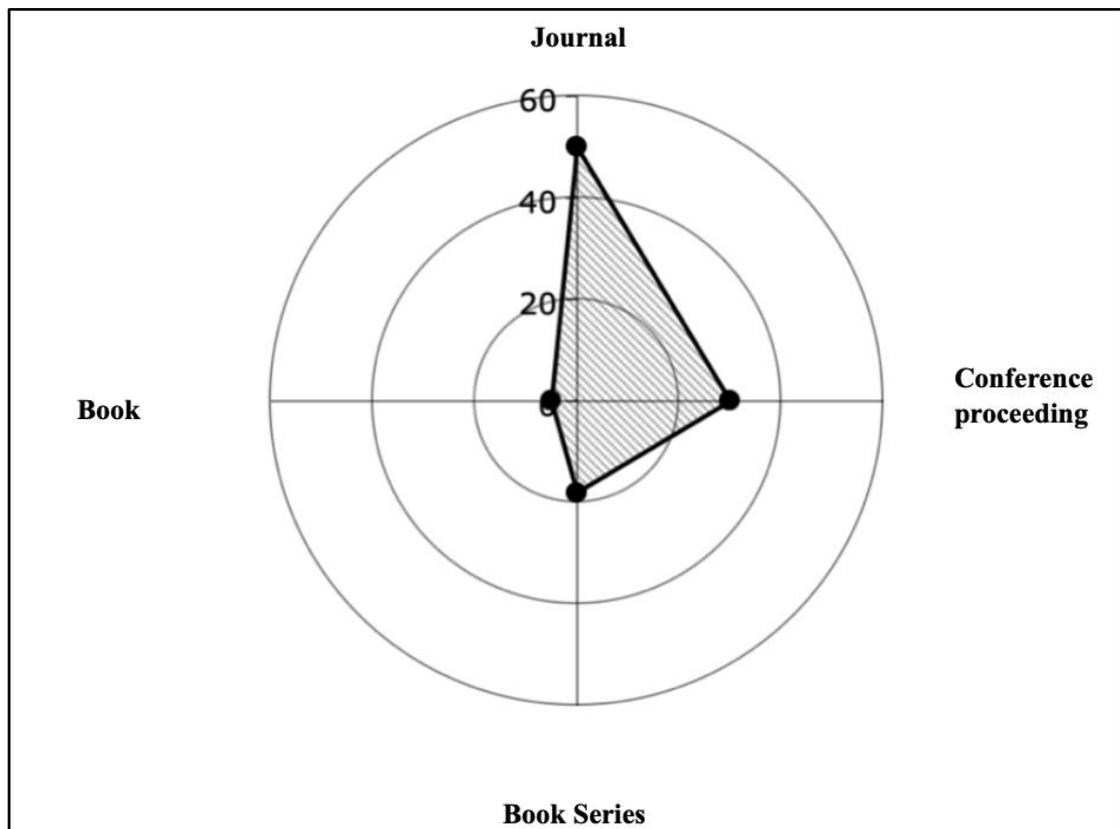
Fig.2 Sources of publication
Source: Scopus_DB accessed on 10th May 2021

2.3 Document Types
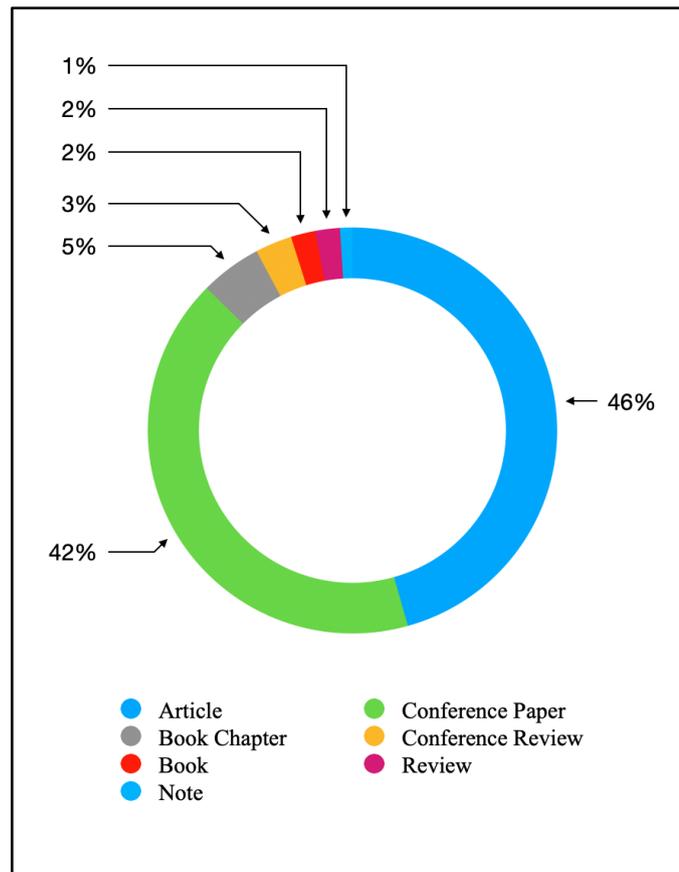
Fig.3 Types of documents for Publication
Source: Scopus_DB accessed on 10th May 2021

The above fig.3 shows the segregation of document types taken from the Scopus database. The majority of the publications considered were articles, conference papers, and book chapters (Fig. 3). The maximum number of publications have been found in the article publication type, leading with a number of 47 publications, which incorporates 46% of the total publication results. Followed by conference paper and book chapter with 43 and 5 number of publications respectively with 42% and 5% of the total publications. The analysis performed is based on different document types. The above fig.3 shows the segregation of document types taken from the Scopus database. From the fig.3 the pie chart clearly shows that the least number of records are of note type with 1%.

2.4 Preliminary Data Collection:

Documents related to Analysing impact on businesses through AI based on current scenarios, have been collected from 2003 to 2021 for 18 years. The Graph shows the Yearly Trend analysis of Scopus (Fig.4) publications. From the below graph we can also observe that study in this field traces back upto 2003 as a single publication was made back in 2003 followed by 2011 with the same number of publication.By looking at the following graph we can also figure out that the number of publications were significantly low before the year 2015 resulting in only 5 publications which accounted for only 4.8% of the total publications made so far but as the popularity of artificial intelligence increased in the coming years an increase was noticed in the period 2014 - 2016. And after that period we can see that the combined publications from the year 2018 to 2020 contribute to the highest number of publications even more than publications combined the remaining mentioned years. By analyzing this data, the number of publications peaked in the year 2018, 2019 and 2020.
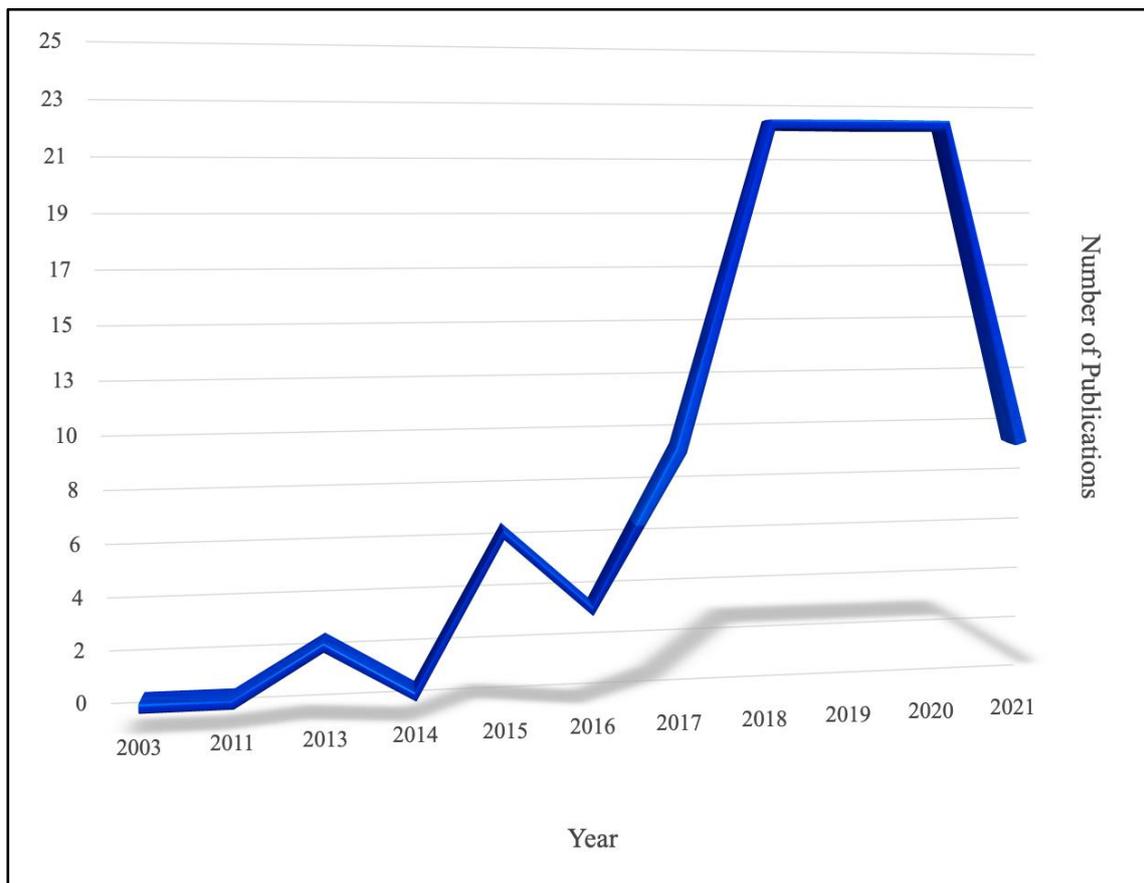
Fig. 4 The Yearly Trend of Publications
Source: Scopus_DB accessed on 10th May 2021

The charts mentioned below in fig. 5 shows the number of publications by top 15 contributors from different countries. In particular, India tops all other countries by publishing the maximum number of research documents in the Scopus's analysis with 29 publications so far. Looking at the below chart we can make a remark that India as a country has been significantly ahead of its other counterparts including the U.S.A which has been dominating and leading in this sector. We can also conclude from the below chart that apart from the top two countries i.e India and U.S.A other countries are way behind in terms of the amount of research going on in these sectors.
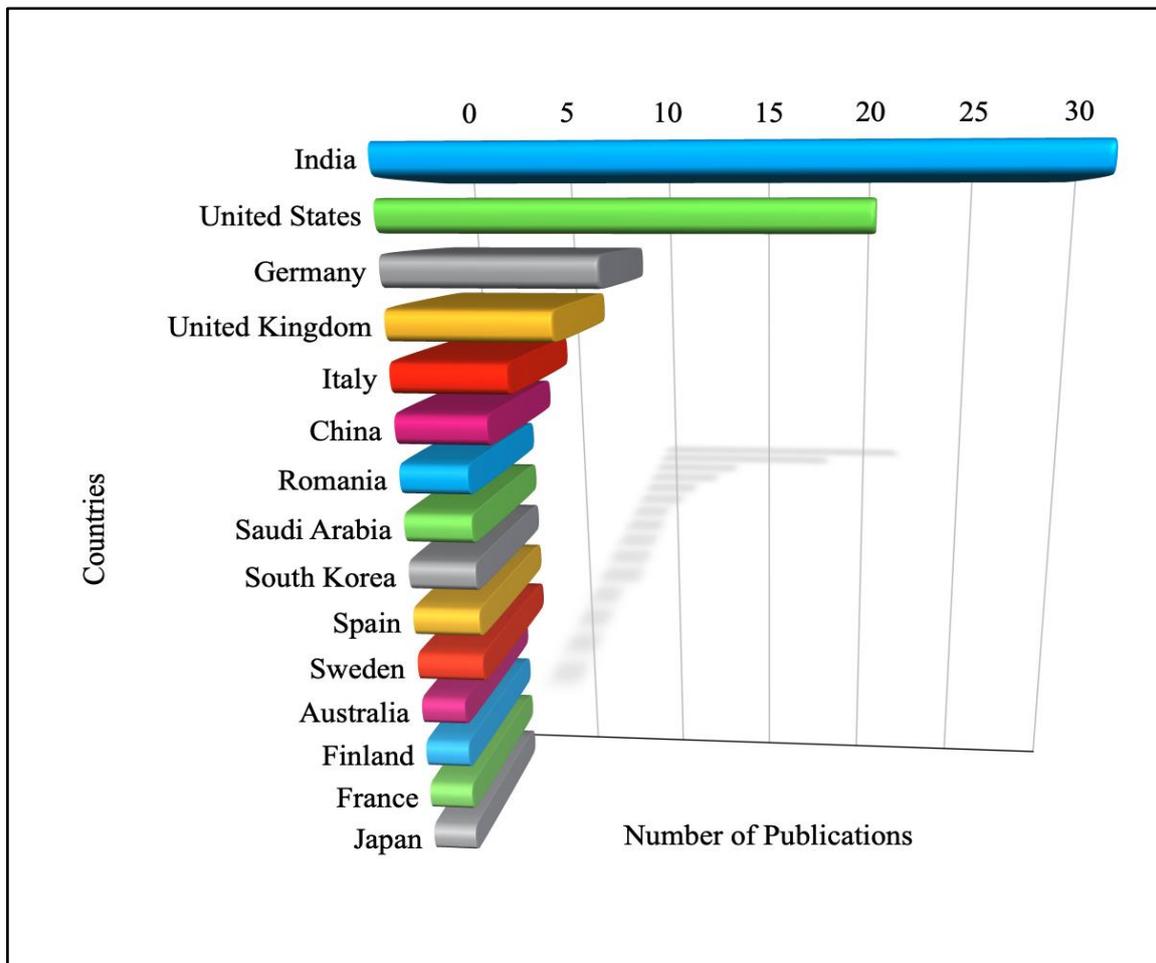
Fig.5 Top contributors from different countries for publication.
Source: Scopus_DB accessed on 10th May 2021

The below mentioned pie chart (Fig. 6) depicts the statistical analysis of Publication Source where 27 publications of the source are seen so far.

The Advances in Intelligent Systems and Computing is the leading source with a total of 6 publications in Scopus Database followed by Communication in Computer and Information Science and International Journal of Engineering and technology UAE with four publications contributing more than 50% of publication of source in the area of Business and AI oriented research, whereas Applied Sciences Switzerland and Big Data shows least contribution with 1 publication of source each.
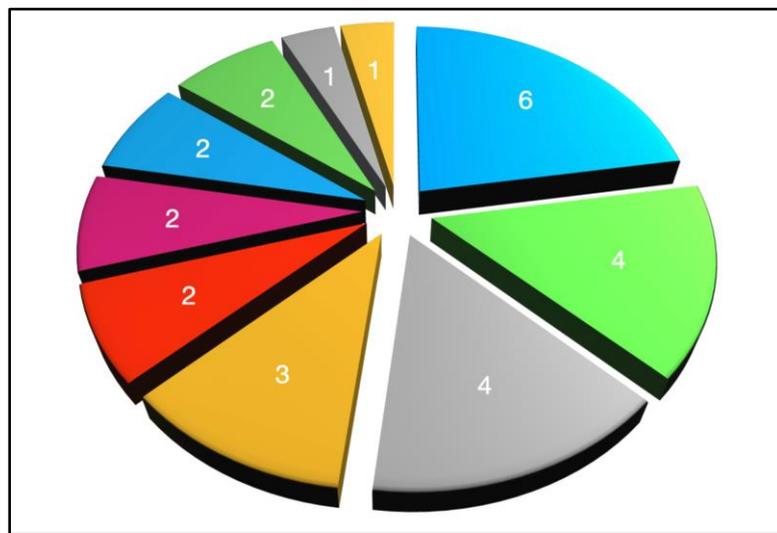
- Advances In Intelligent Systems And Computing
- Communications In Computer And Information Science
- International Journal Of Engineering And Technology Uae
- Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics
- Applied Marketing Analytics
- IEEE Access
- Journal Of Physics Conference Series
- Lecture Notes In Business Information Processing
- Applied Sciences Switzerland
- Big Data

Fig.6 The Publication statistics of source.
Source: Scopus_DB accessed on 10th May 2021

2.5 Keyword Statistics

Researchers scheme the usage of appropriate keywords to look within the database. The location of tangible keywords is required to urge the crucial research areas. The below table shows the leading top ten keywords list, which are considered from publications in analysing techniques of AI. It gives us an overview of the amount of publications supporting Important keywords. Apart from Machine Learning and Artificial Intelligence which are highly vigilant keywords as they were part of the query, keywords like Big Data, Data Mining ,Learning Systems ,Commerce and Sales also showed a significant

contribution for the research for the study of businesses and analysing its impact formed in a cluster which were not the part for Scopus_DB query.

Table 3:The below table shows the top 10 keywords for Analysing Techniques.

Keywords	Number of publication
Machine Learning	50
Artificial Intelligence	38
Big Data	29
Data Mining	29
Learning Systems	28
Marketing	28
Commerce	27
Sales	25
Data Analysis	17
Social Networking (online)	17

Source: Scopus_DB accessed on 10th May 2021

Network Analysis:

3.1 Network Diagrams

A network diagram stands in for the graphical and visual representation of the connection between the nodes, based on different parameters. The network diagrams give us a better understanding of our overall analysis of the research done so far. The network analysis of Figure shown in following pages are carried out using Gephi and Sciencescape . The analysis diagrams from both the tools are shown to better understand the connections and depict an analysis of the software.

Fig.7 Network of Author and Author Keywords, Co-appearing in the same paper

The above Fig.7 mentions the correlation between author and author keywords that are co-appearing in the same paper , nodes with degree less than 5 were filtered out resulting with 1618 edges which connect to 289 nodes after filtration, where text size varies according to the occurrence. Here the light pink nodes represent author keywords comprising 54.7% and the green nodes representing authors comprising 45.3% as seen in the network analysis.

The figure 8 below mentions the correlation between authors and their co-published papers is carried out using Gephi. The layout shows 294 nodes and 531 edges with degree range varying from 1 to 12 without any filtration.

Fig.8 Network of author linked by co - publications

The mentioned diagram fig. 9 depicts a network linkage between the author keywords that are co-appearing in the same papers in which they represent 332 to 213 nodes after filtration and the colours are partitioned according to modularity class connected with 964 edges. Nodes with degree less than 5 were filtered out, where "Machine learning" and "Artificial Intelligence" are the most significant keywords followed by "Marketing",

"Commerce", "Sales", "Business Analytics" are some of the notable business oriented keywords used in this area. Fig. 9 has been made using Gephi software and shows a collective representation of the author keywords co - appearing in the same paper.

Fig.9 Network of author keywords co-appearing in the same paper.

The below mentioned fig. 10 shows the diagram of a clustered network analysis of the authors and source titles that are appearing to be in the same publications, based on the publications in Scopus_DB. The fig. shows 393 nodes after filter and 328 edges. Here the degree of range varies from 1 to 22. Here the pink nodes represent authors comprising

78.37 % and the blue nodes representing source titles comprising 21.63% as seen in the network analysis. From the below diagram we can see that a variety of authors are working together to carry out research and publish various research works.

Fig.10 Network of Co-appearance of author and source title in the same paper .

The mentioned diagram from fig. 11 depicts a network linkage between Co-appearance of author keywords and source title in the same paper in which they represent 123 nodes after filtration and with 208 edges. Nodes with degree less than 2 were filtered out. The degree of range here varies from 2 to 34. Here the blue nodes represent authors keywords comprising 81.22 % and the green nodes representing source titles comprising 18.78% as seen in the network analysis. From the below diagram we can see that lots of author

keywords are common on various source titles which depicts the richness in variety of research done on similar or related keywords.
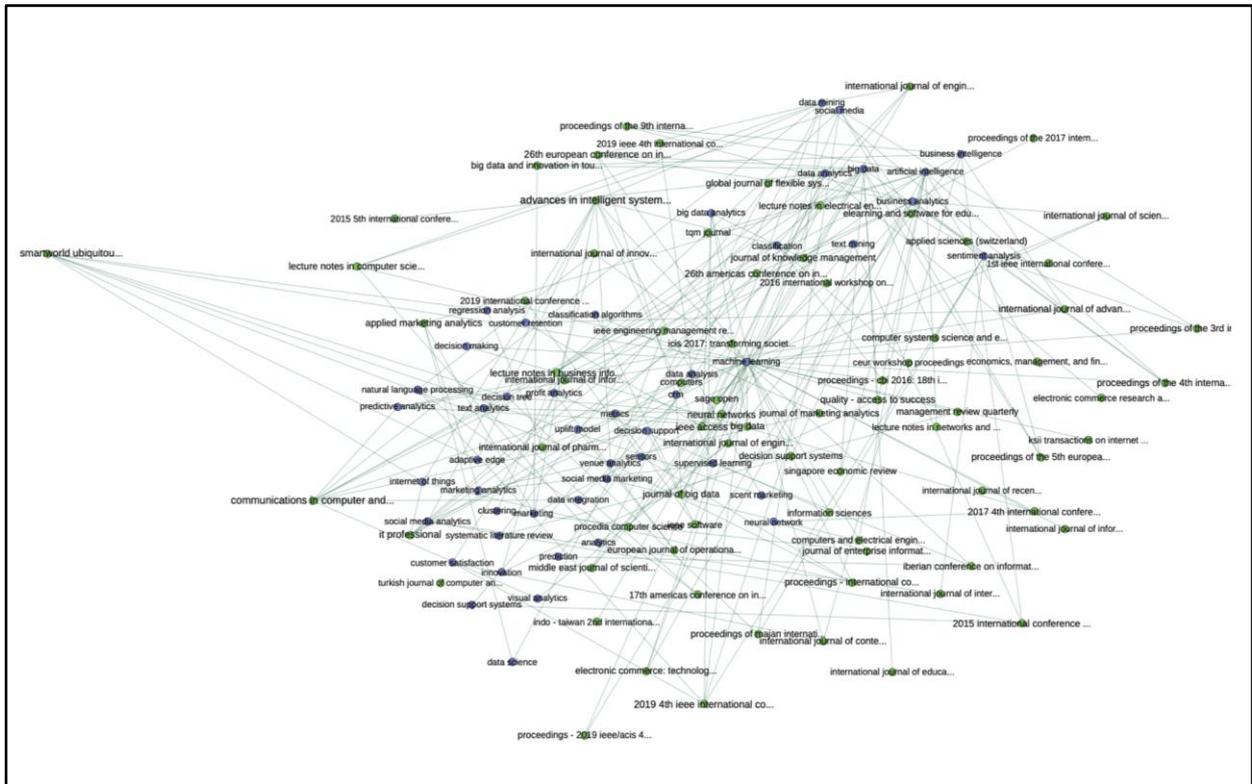

Fig.11 Network of Co-appearance of author keywords and source title in the same paper .
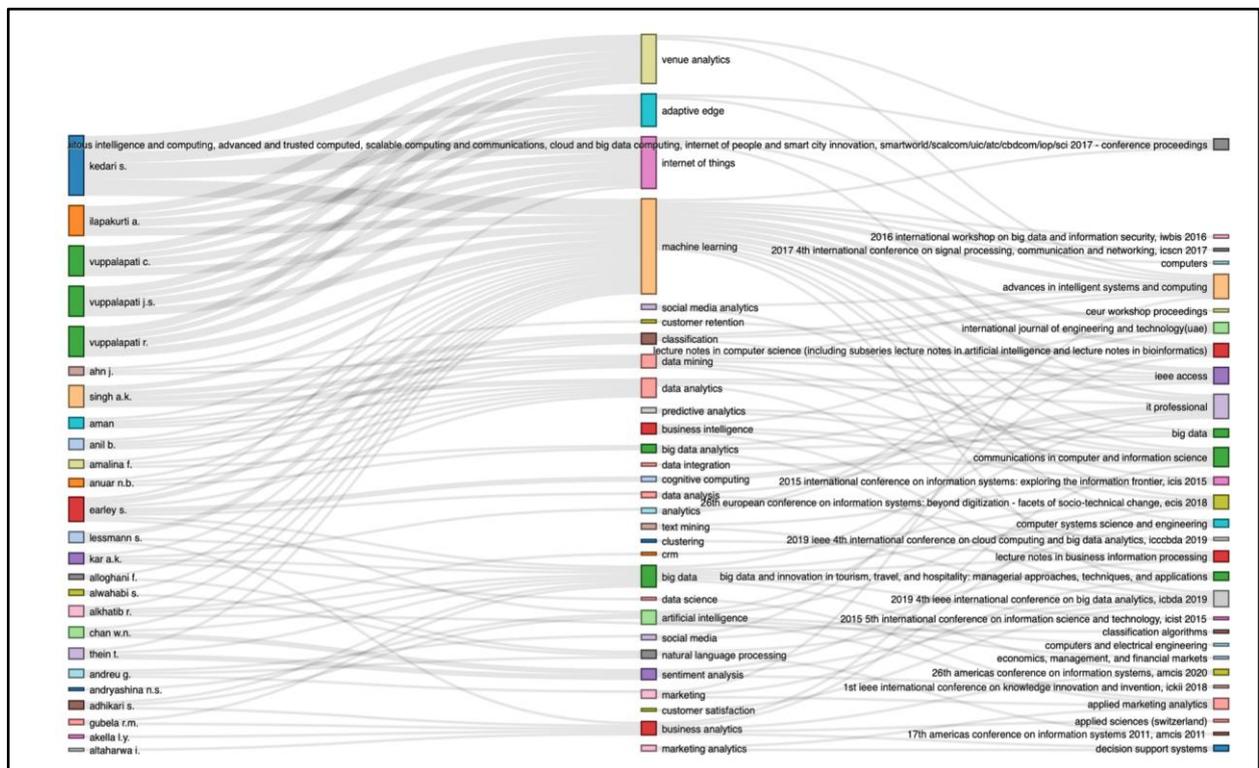

Fig.12 Connection between Network of Main-authors, Keywords, and Journals .

The above mentioned Fig. 12 gives the general overview of the main authors, primary keywords, and prominent journals showing the study on the analysis of businesses in a cluster. From the overview we can interpret that a lot of study is going on at the intersection of machine learning , analytics and businesses.

3.2 Affiliation Statistics:

The below graph fig. 13 shows us the University/ Organization affiliation statistics for the publications present in Scopus database, which indicates that two of them are situated in India among the top universities and have affiliated a total of 4 publications. The most number of affiliated documents published in Scopus_DB is from Humboldt-Universität zu Berlin in this topic of research and providing more relevance to the topic .
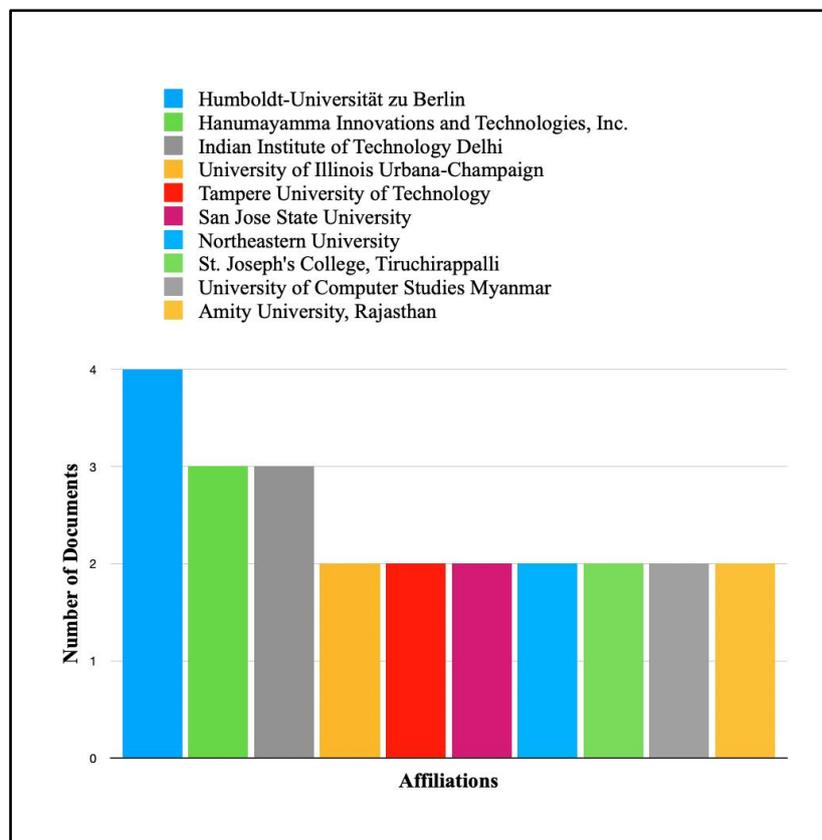

Fig.13 The Analysis done by Affiliation
Source: Scopus_DB accessed on 10th May 2021

3.3 Citation Analysis

Table 4 shows the yearly citations obtained from publications extracted in the area of Analysing techniques of AI and Marketing, the total number of citation count of 103

publications is 543 to date. Evidently, 2020 leads by having the highest number with 196 citations, followed y the year 2019.

Table 4: Yearly citations obtained from publications

Year	<2016	2016	2017	2018	2019	2020	>2020	total
No. of Citations	44	20	25	50	109	196	99	543

Source: Scopus_DB accessed on 10th May 2021
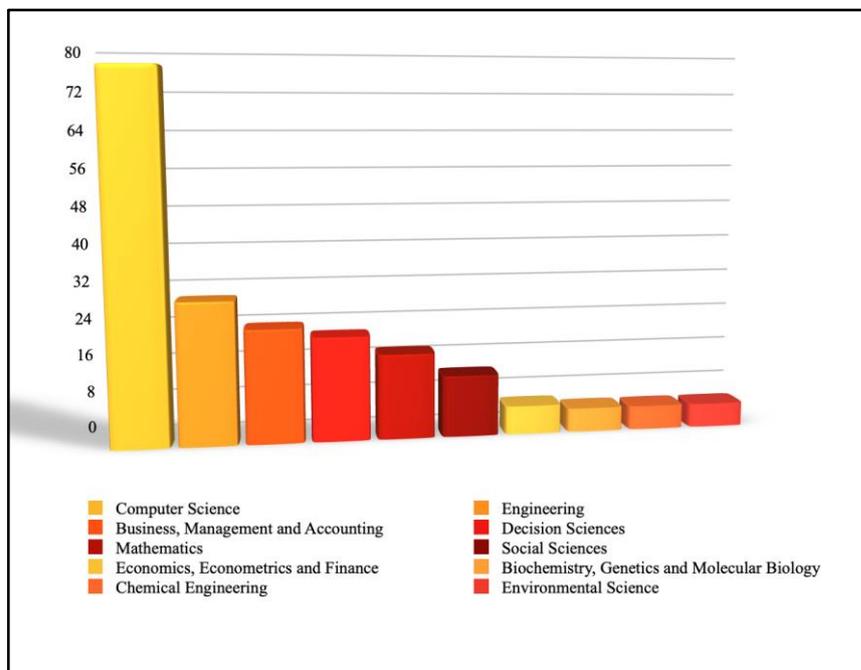
3.4 Subject Areas:

Fig.14 Number of researches done on the top 10 subject areas of publication.
Source: Scopus_DB accessed on 10th May 2021

The above chart fig. 14 shows us the diagnosis based on the top 10 subject areas from the data taken from Scopus Database. It is understandable from the graph mentioned that maximum research is carried out in the computer science area with a number of 77 researches done so far.

3.5 Analysis by Author:

The below mentioned fig. 15 shows the top 10 contributing Authors procured from the publications in Scopus DB, where the leading Author for the publication is Lessmann, S with four number of publications.
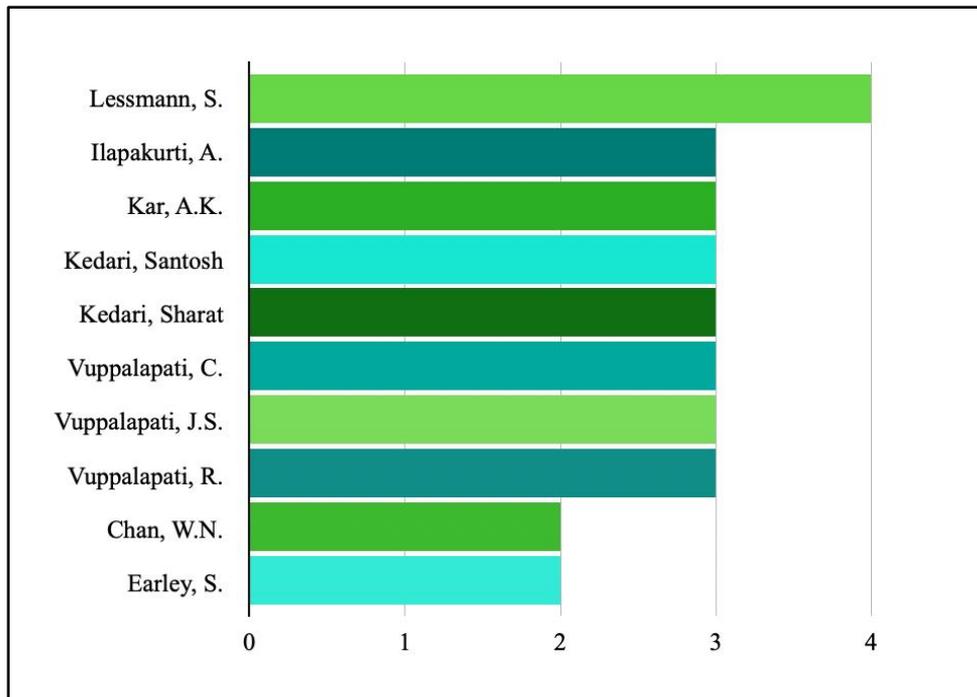

Fig.15 Top10 contributing Authors.
Source: Scopus_DB accessed on 10th May 2021

3.6 Document Title Citation Analysis

The Table 5 shows yearly document titles, which are obtained from the publications mined in the area of feature selection using optimization techniques in healthcare. The total citation count is more than 500 till date . The table enumerates the papers, along with the year and total citations for the documents mentioned.

Table 5: Citation Analysis for Document Titles for publications in Scopus DB

Document Titile	<2016	2016	2017	2018	2019	2020	>2020	total
Business intelligence in online customer textual reviews: Understanding consumer perceptions and influential factors	0	0	0	10	24	26	17	77
Big Data Analytics: A Review on Theoretical Contributions and Tools Used in Literature	0	0	3	12	17	24	8	64
Frontiers in massive data analysis	25	10	1	2	6	1	0	45
Internet of things and data analytics handbook	0	0	3	8	9	4	5	29
m-Health 2.0: New perspectives on mobile health, machine learning and big data analytics	0	0	0	3	6	15	4	28
Blending Big Data Analytics: Review on Challenges and a Recent Study	0	0	0	0	0	15	9	24
A classification of user-generated content into consumer decision journey stages	1	1	7	5	6	4	0	24
Machine-learning techniques for customer retention: A comparative study	0	0	0	1	4	9	7	21
Data-intensive analytics for predictive modeling	11	4	2	0	1	0	1	19
Predicting consumer variety-seeking through weather data analytics	0	0	0	0	5	7	6	18
Multisensory experience for enhancing hotel guest experience: Empirical evidence from big data analytics	0	0	0	0	2	11	4	17
Knowledge discovery out of text data: a systematic review via text mining	0	0	0	0	5	7	2	14
Roundtable: What's next in software analytics	6	1	2	1	1	0	1	12
Strengthening People Analytics through Wearable IOT Device for Real-Time Data Collection	0	0	0	0	0	4	7	11
Cognitively enhanced products, output growth, and labor market changes: Will artificial intelligence replace workers by automating their jobs?	0	0	0	0	0	9	1	10
Targeting customers for profit: An ensemble learning framework to support marketing decision-making	0	0	0	0	1	7	1	9

Comparing machine learning classifiers for movie WOM opinion mining	1	1	3	2	0	0	0	7
Accelerating business growth with big data and artificial intelligence	0	0	0	0	0	3	3	6
Response transformation and profit decomposition for revenue uplift modeling	0	0	0	0	0	5	1	6
Business analytics in telemarketing: Cost-sensitive analysis of bank campaigns using artificial neural networks	0	0	0	0	0	2	4	6
Conversion Uplift in E-Commerce: A Systematic Benchmark of Modeling Strategies	0	0	0	0	1	4	1	6
Time Series Data Prediction using IoT and Machine Learning Technique	0	0	0	0	0	2	3	5
Big data as a game changer: How does it shape business intelligence within a tourism and hospitality industry context?	0	0	0	0	2	2	1	5
An advertising analytics framework using social network big data	0	0	1	0	2	1	1	5
Executive Roundtable Series: Machine Learning and Cognitive Computing	0	2	0	2	0	1	0	5
Imbalanced customer classification for bank direct marketing	0	0	0	0	1	2	1	4
Using social media advertising to increase the awareness, promotion and diffusion of public and private entities	0	0	0	0	2	2	0	4
Predictive analytics using big data for increased customer loyalty: Syriatel Telecom Company case study	0	0	0	0	0	2	1	3
Adaptive edge analytics for creating memorable customer experience and venue brand engagement, a scented case for Smart Cities	0	0	0	0	1	2	0	3
Systematic literature review on customer emotions in social media	0	0	0	0	1	2	0	3
Retail price analytics using backpropogation neural network and sentimental analysis	0	0	0	0	1	2	0	3
A case study: Analyzing city vitality with four pillars of activity - Live, work, shop, and play	0	0	0	1	1	0	1	3
A novel design science approach for integrating Chinese user-generated content in non-Chinese market intelligence	0	0	1	1	1	0	0	3
Research in business service purchasing: current status and directions for the future	0	0	0	0	0	2	0	2
Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation	0	0	0	0	0	1	1	2
Novel artificial intelligence technologies for enhanced recruitment campaigns using social media	0	0	0	0	0	2	0	2

Analytics: Turning data into management gold	0	0	0	0	1	1	0	2
A Comparative Study of Machine Learning Techniques for Real-time Multi-tier Sentiment Analysis	0	0	0	0	2	0	0	2
Identification of suitable websites for digital marketing - An approach using bio-inspired computing	0	0	0	0	2	0	0	2
A data-driven framework for business analytics in the context of big data	0	0	0	0	0	2	0	2
Shaping interactive marketing communication (IMC) through social media analytics and modelling	0	0	0	0	0	1	1	2
A machine learning-based approach to enhancing social media marketing	0	0	0	0	0	0	1	1
Predicting employee attrition using machine learning techniques	0	0	0	0	0	0	1	1
Clustering of Social Media Data and Marketing Decisions	0	0	0	0	0	0	1	1
The Impact of Sentiment Analysis on Social Media to Assess Customer Satisfaction: Case of Rwanda	0	0	0	0	0	0	1	1
Building a culture of business analytics: a marketing analytics exercise	0	0	0	0	0	1	0	1
Prototype development and pre-commercialization strategies for mobile based property analytics	0	0	0	0	0	1	0	1
Fuzzy Logic Infused Intelligent Scent Dispenser for Creating Memorable Customer Experienceof Long-Tail Connected Venues	0	0	0	0	0	1	0	1
Sentiment analysis system in big data environment	0	0	0	0	0	1	0	1
A study of app user behaviours: Transitions from freemium to premium	0	0	0	0	1	0	0	1
Predictive Customer Data Analytics â€" The Value of Public Statistical Data and the Geographic Model Transferability	0	0	0	0	0	1	0	1
Behavioural analytics using process mining in on-line advertising	0	0	0	0	0	0	1	1
Towards Extracting Customer Needs from Incident Tickets in IT Services	0	0	0	0	0	1	0	1
Suggestion mining from customer reviews	0	1	0	0	0	0	0	1
Application of text classification and clustering of Twitter data for business analytics	0	0	0	0	2	4	2	8
Improving customer experience using sentiment analysis in e-commerce	0	0	2	2	1	2	0	7

3.7 Statistics of Funding Sponsor

The below figure 16 highlights the statistics of funding sponsors. Where the National Research Foundation of Korea is the key funding sponsor with 11% share compared to others for publication. Referring back to figure 5 we can also make an observation that despite the highest number of papers being published from India which amounts for 29 no. of publications, the key funding sponsor was not from the same country.
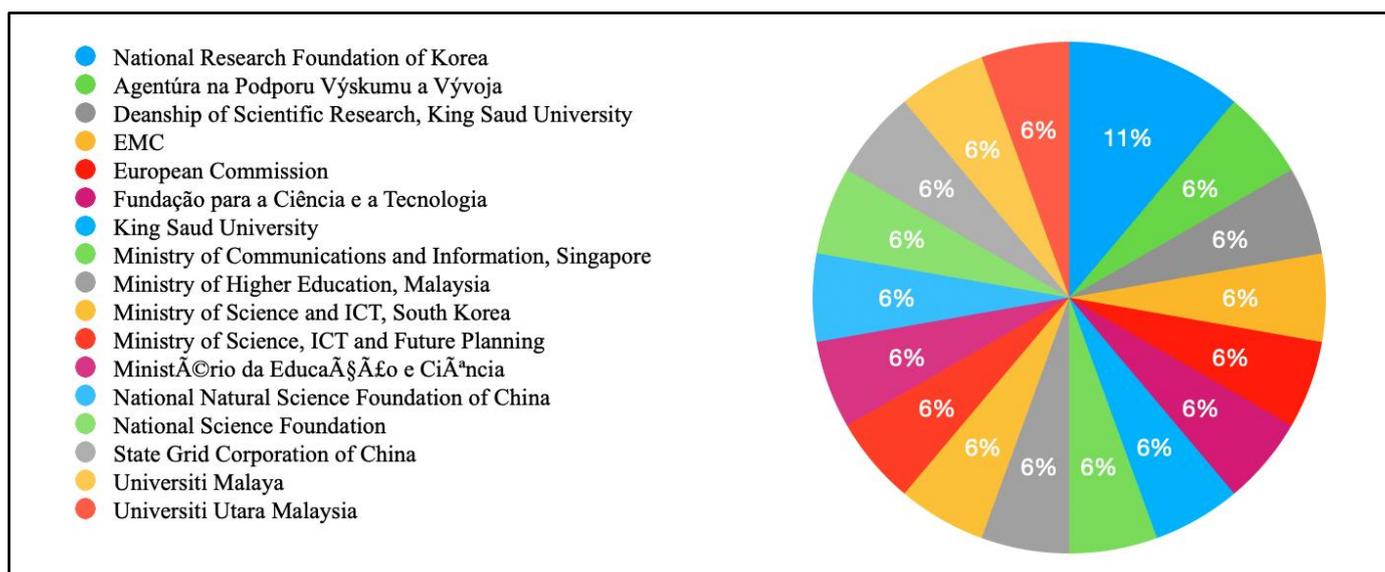

Fig. 16 Funding sponsor for the publication
Source: Scopus_DB accessed on 10th May 2021

4. Limitations of the study:

The bibliometric analysis presented in this research reckons with publications from the Scopus database. There may be a likelihood of a few other journals, articles and publications present in databases like Web of Science, Google Scholar and research gate , which have not been contemplated during the data analysis of this research. Thus, they have been ruled out from the diagnosis completely. In addition to this, the calculation of citations has been prolonged from the Scopus database only. Different research databases show numerous statistics of citations. Besides this, the research is limited to the English language only.

5. Conclusion:

The analysis done permits analysts to realise a more in-depth insight into the topic's potential and identify the loops. This in a way helps to recognise the different variables that could be considered during research in different analysing techniques. The keyword assessment for the majority part helps

in choosing the further exploration in the sector. This paper primarily pivoted on executing analysis made on how the businesses are making progress with time keeping pace based on the consumer demands, with help of AI. Furthermore readers can get an idea about different aspects like prominent source titles, authors, keywords, subject areas, publication types, and their languages used in the datasets to perceive current affairs of the topic much better.

The analysis summary discloses that research-oriented towards these subject areas can benefit and make AI in business revolutionising the products launched in the market for the consumers. Analysing techniques of AI are the most essential and stimulating field of study and therefore it was vital to take forward the detailed bibliometric study about this topic, that being the case this paper is prepared, based on the Scopus database, which involved the forthcoming authors, publication, citation, and co-aspects among them and so on.

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