

Artificial Intelligence and Machine Learning in Marketing: A Bibliometric Review

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Abstract

Determining optimal markets specifically for market segmentation is one of the key challenges in marketing. Consumer buying behaviour is influenced by varied factors executed at different periods. Development in Artificial Intelligence (AI) and Machine learning (ML) are set to transform various industries. The capabilities of AI have proved in mirroring human capabilities in performing marketing activities. The AI and ML have contributed immensely to marketing. The specific use cases are customization, segmentation, sales projections, recommender systems, interactive bots, virtual assistants, content development, paid marketing and predictive analytics. Researchers and practitioners are also becoming increasingly interested in AI and ML supported research in the marketing domain. There are minimal studies till date, to address this research gap; the authors have provided an outline of AI and ML research in marketing. The authors have utilized the Scopus citation database to identify relevant articles on the topic within AI and ML in marketing corpus to execute this research. A total of 790 research articles from 1960–to September 2020 have been considered for this analysis through the search strings retrieved data from 1984 onwards. The findings are presented using a variety of data such as content coverage, authorship, total yearly publications, country of publication, most influential and prolific authors in terms of citations and documents, keywords used in publication and future research themes for conducting research in marketing utilizing AI and AL technologies.

Keywords: Artificial Intelligence, Machine Learning, Bibliometric Analysis, Marketing

Introduction

As per salesforce, 76% of customers expect companies to understand their needs and expectations. AI provides the functionality to allow marketers to get a massive amount of marketing data from various customer interaction points like social media pages, emails, WhatsApp chatbots and other web sources, including companies' websites. The Big data collected would help the organizations to analyze the data and develop an understanding of customer needs, expectations and demand.

This proves the potential of AI in marketing for every business. The concept of AI imbibing human intellect to machines. The AI concept is not new and the idea of AI research was conceptualized back in the 1950s Turing (1950), and the term Artificial Intelligence was coined by John McCarthy in 1955. AI significantly transformed various fields, namely education, engineering, finance, healthcare, and marketing is also a prominent place in the list. Industries are more captivating to have more individualized and universal communication with the customers, which leads to generating customer's digital footprints. Technological advancements are transforming the current marketing landscape. Because of the widespread use of the internet, product or service marketing has moved to the online platform, highlighting a brand's global recognition (Davenport et al.2020). Artificial intelligence (AI) is one of the disruptive technological amalgamations with robotics and is changing every company's functionality (Choi & Ozkan, 2019). The unprecedented growth of technologies, the Artificial intelligence (AI) will undoubtedly revolutionize the past marketing methods, including marketing strategies, models of business, sales, and customer support (Davenport et al.2020).

In the near future, Artificial intelligence (AI) aids decision-making by giving marketing managers with data and insights that they could not otherwise obtain. The multifaceted features of Amazon's recommender systems which is aggressively used by customers during product purchases, convenience of same day delivery by Amazon and Google's ability to match search results with the advertisement. As social channels generate massive data that is highly unstructured, the role of AI and ML has become more significant for marketers to get insights in real-time. Machine learning (ML), the domain of AI, guides marketers to recommend customers personalized experiences at the right moment by applying big data models to identify patterns in data and predict outcomes (Mitić V, 2019). AI and ML have ushered in a new era in marketing, one in which firms' strategic processes are substantially streamlined, and strategic decision-making is greatly aided (Miklosik et al. 2019).

Unstructured big data gathered from numerous sources such as chatbots, blogs, and social channels with various formats can be used by machine learning methods to generate high prediction results. Prediction is becoming more relevant as merchandise, marketplaces, and decision frameworks are getting more complicated, resulting in an increase in the use of machine learning approaches (Ma L. & Sun B., 2020). According to Hakim, A et al. (2021), conventional marketing procedures have a number of shortcomings, requiring new measures to boost predictive ability to forecast customers' needs and promotional campaign success. Arefieva V et al. (2021) proposed a framework considering different machine learning models to club text-based information on visual content. Their output guide marketers to know the tourist preferences. Similarly, Sánchez-Núñez, Pet al. (2020) conducted a bibliometric analysis and found that K-means, Bayesian networks, clustering techniques, deep and convolutional neural networks, SVM, hidden Markov models, NLP and ontology are the most widely used computational intelligence techniques to analyze sentiment and opinion in marketing. Emerging markets are undergoing a paradigm transition. AI and ML are pervasive in the modern marketing ecosystem. These technologies lead to digital transformation and become prevalent in sales and marketing. AI and ML are still in their infancy and sparsely distributed in terms of scientometrics research in the field of marketing management. To address this research gap, the authors focus on a detailed bibliometric study based on publications published in the Scopus database from the year 1960 to September 2021. AI and ML are becoming ubiquitous in the present scenario, this scientometrics research explores their usage in the field of marketing. This study would aid in reporting the publication trend of AI and ML, sharing details about international research collaboration, finding highly cited journals, articles, authors and organizations and exploring the evolution of Artificial intelligence and machine learning in the area of Marketing. This bibliometric research would highlight the key areas of research that can be considered for future research in the field of AI and ML-enabled marketing.

Methodology

As per Fisch et al. (2018), a literature review is a vital component of almost any research project. It helps lay down the foundation for advancing knowledge, enables theory development, helps understand mature research areas, and enhances opportunities in novel research areas (Webster & Watson, 2002). Bibliometric research is a subset of the systematic literature review it is the statistical analysis of books, articles, or other publications to measure the output regarding an individual, research topic, institution, journal and country.

National and international networks and new fields of

research were identified. In the sciences, medicine, and nursing, Bibliometrics and scientometrics have received significant attention (Corbet et al.2019; Donthu et al.2021). Bibliometrics has gained approval in management research due to its ability to handle a large corpus (Donthu et al.2021). Bibliometric analysis has become a popular methodology for examining management sectors such as the creative industry Dharmani et al. (2021), capital structure of SMEs Kumar et al. (2020) and board diversity Baker et al.(2020). Systematic literature review has been done by Rana & Sharma, (2015) considering various parameters like time frame, domain focus, articles and authors.

Table 1. Search strategy and data retrieval process

September 30, 2021	Scopus Database	TITLE-ABS-KEY ("artificial intelligence" OR "ai" OR "expert systems" OR "robotics" OR "artificial intelligence" OR "knowledge management systems" OR "kms" OR "machine learning" OR "ml" OR "neural networks" OR "NLP" OR "natural language processing" AND "marketing") AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (SUBJAREA, "busi") OR LIMIT-TO (SUBJAREA, "soci")) AND (LIMIT-TO (LANGUAGE, "english")) AND (LIMIT-TO (SRCTYPE, "j"))
<i>First Stage Filter applied</i>		
Filter First Stage		Document = Article, conference paper, review Language= English
Result		5978 journal articles in English
Filter Second Stage Scopus Subject Business Management Accounting, Social Science Date: 1960 to September 2021		
Result		790 Research Papers

For the research, the author accepts the recommendations of Baker et al. (2020), utilizing the citation database (Scopus) and performing a keyword search between 1960 - September 2020. The authors designed a search string identified in Table 1. The search was implemented by using various keywords related to artificial intelligence and

machine learning in marketing. It included different search criteria drawn from Scopus, including year, topic coverage, language, article format.

Planning of the search string was done after reviewing the literature on artificial intelligence and machine learning developed by Goodell et al. (2021), including various

keywords related to artificial intelligence like robotics, neural network, machine learning, marketing as search string keywords. After including different search keywords related to artificial intelligence, machine learning and after implementing the search criteria from Scopus, the authors have shortlisted 780 research articles from 1960 - to September 2021 that have been considered for this analysis. However, the papers related to AI and ML in marketing are available from 1980 onwards. This study offers a comprehensive review of Artificial intelligence and Machine learning in the marketing domain. To authors understanding, this is the first study to use this strategy in marketing using artificial intelligence and machine learning. The author proposes the following research questions (RQs):

- RQ1: What is the publication trend of Artificial Intelligence and Machine Learning in the Marketing domain?
- RQ2: Which are the most active countries and their international research collaborations in Artificial intelligence and machine learning publications in the area of Marketing?
- RQ3: Which are the most cited journals and articles regarding Artificial Intelligence and Machine Learning publications in Marketing?
- RQ4: Which are the most cited authors and organizations publishing articles on Artificial Intelligence and Machine Learning contribution in the Marketing domain?
- RQ5: How has Artificial intelligence and machine learning evolved in the area of Marketing?

Bibliometric Analysis and Findings

For academic literature, the Scopus is one of the largest, most accepted and reputable abstract and citation databases; it covers around 40,000 publications from varied fields like science, technology, medicine, social sciences, and humanities. The publications are of two types, serial and non-serial. The serial publications are journals, annual reports, yearbooks, and book series. These are assigned an ISSN (International Standard Serial Number) and non-

serials embrace monographs, reports, etc. These are given an ISBN (International Standard Book Number). Scopus supports quality publication within various formats, including books, journals, conference papers, etc.

To answer various RQs we analyse the publication trend related to artificial intelligence and machine learning in marketing using total publications by year, total yearly citations, average citations per year, top authors their publications in terms of number of citations, and their institutional association and country of origin of the institution.

To answer RQ1 (What is the publication trend of Artificial Intelligence and Machine Learning in the Marketing domain), we analyse the publication trend related to artificial intelligence and machine learning in the Marketing domain using total publications by year mentioned in Figure 1. It can be observed that there is a steep increase in the publication trend in marketing using AI and ML techniques. We calculated the data for this analysis using bibliographic data collected from the Scopus database using the R package Bibliometrix which provides descriptive statistics (Aria & Cuccurullo, 2017).

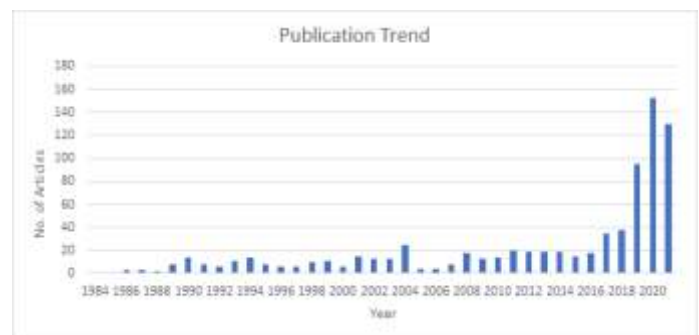


Figure 1. Total articles published Source: Scopus data based

To answer RQ2 (Which are the most active countries and what are their international research collaborations in Artificial intelligence and machine learning publications in the area of Marketing?), we analyse the information by using the most cited countries based on the number of citations and international collaboration by the help of collaboration network strength. We have diagnosed distance-based maps, and network maps with the use of VOSviewer visualize in Figure 2. This software tool

supported the construction and visualization of the bibliometric networks being explored. The VOSviewer analysis technique reduces the overlying of labels and is considered more robust than multidimensional scaling (Van Eck et al.2008). The threshold selected was a minimum of 10 documents with a minimum of 5 citations of 88 countries; 22 met the point. Top 5 countries, namely the United States, United Kingdom, China, India and Australia, contributed more than 60% of total publications in the Scopus dataset. As per Table 2, it seems there are good contributions from Asian countries like India and China and countries like the United States, the United Kingdom, and Australia. The United States have the highest number of citations with 6387 citations among the list of top 20 countries. The link strength of the United States is also the highest, which signifies the collaborative research culture in the country.

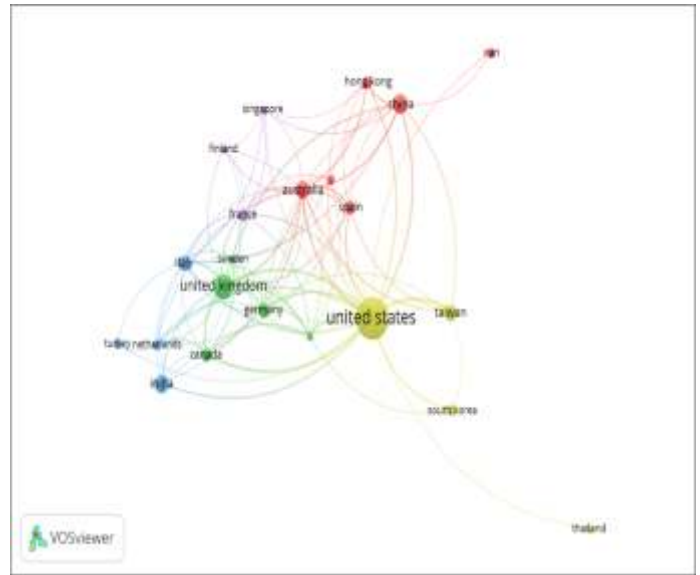


Figure 2: Network visualization map Source: VOSviewer

Table 2: Leading countries publications based on citations Source: VOSviewer

S.no	Country	Total link strength	Documents	Citations
1	United States	94	252	6387
2	United Kingdom	46	86	1611
3	China	30	55	921
4	India	13	53	488
5	Australia	45	44	1005
6	Taiwan	22	39	1478
7	Italy	25	35	561
8	Germany	17	32	666
9	Spain	18	29	766
10	Canada	29	27	320
11	France	25	24	682
12	Hong Kong	17	23	921
13	South Korea	6	19	304
14	Japan	9	17	251
15	Iran	2	17	148
16	Netherlands	16	15	347
17	Turkey	3	15	220
18	Singapore	11	12	476
19	Sweden	13	12	182
20	New Zealand	19	12	160

RQ3: Which are the most cited journals and articles regarding Artificial Intelligence and Machine Learning publications in Marketing?

Table 3 summarizes the research article published in most cited journals as per the total publications, citations per publication, source normalized impact per paper, Scimago journal ranking, and quartile and Table 4 contains most cited articles. The top contributor in terms of publications is

Decision Support Systems Journal of Business Research, Sustainability (Switzerland), Industrial Marketing Management, contributing to research on AI and ML in the realm of marketing.

Table 3: Summary of productive Source: VOSviewer

Journal Name	TP	TC	CPP	Cite Score	SNIP	SJR	Quartile	H index
Decision Support Systems	25	1672	66.88	10.5	2.582	1.564	Q1	151
Journal of Business Research	20	553	27.65	9.2	2.852	2.049	Q1	195
Sustainability (Switzerland)	19	164	8.631	3.9	1.242	0.612	Q1	85
Industrial Marketing Management	17	249	14.64	8.8	2.578	2.022	Q1	136
Applied Marketing Analytics	14	2604	186	0.3	0.141	0.211	Q3	2
International Journal of Research in Marketing	11	891	81	8.8	2.984	3.725	Q1	102

Journal Name	TP	TC	CPP	Cite Score	SNIP	SJR	Quartile	H index
Marketing Intelligence & Planning	11	183	16.63	4.4	1.088	0.745	Q2	70
Journal of Interactive Marketing	10	1350	135	6.2	1.419	0.909	Q1	106
Knowledge-Based Systems	10	537	53.7	11.3	2.890	1.587	Q1	121
Tourism Management	10	498	49.8	16.5	4.163	3.328	Q1	199

Notes: TP = Total Publications; TC=Total Citations; CPP = citations per publications, SNIP=source normalised impact per paper; SJR= Scimago journal ranking Source: Scopus Figures are provided for the year 2021.

Table 4: Summary of articles based on total citations and total citations per year Source: VOSviewer

Article	Authors	Total Citations	TC per Year
Modelling wine preferences by data mining from physicochemical properties	Cortez P. et al.	575	41.0714
Designing ranking systems for hotels on travel search engines by mining user-generated and crowdsourced content	Ghose A et al. 2012	315	28.6364
Data mining techniques for customer relationship management	Rygielski C et al. 2002,	297	14.1429
Sentic patterns: Dependency-based rules for concept-level sentiment analysis	Poria S. et al. 2014	228	25.3333
A neural network model to forecast Japanese demand for travel to Hong Kong	Law, R., & Au, N. (1999)	219	9.125
Estimating aggregate consumer preferences from online product reviews	Decker, R., & Trusov, M. (2010)	206	15.8462

Article	Authors	Total Citations	TC per Year
Knowledge management in pursuit of performance: Insights from nortel networks	Massey AP, 2002	206	9.8095
Advertising content and consumer engagement on social media: Evidence from Facebook	Lee D et al. 2018	204	40.8
Spreading Social Media Messages on Facebook: An Analysis of Restaurant Business-to-Consumer Communications	Kwok, L., & Yu, B. 2013	188	18.8
Investigating antecedents and consequences of brand identification	Kuenzel, S., & Halliday, S. V., 2008	187	12.4667

RQ4: Which are most cited authors and organizations publishing articles on Artificial Intelligence and Machine Learning contribution in Marketing domain?

Table 6 presents the ranking of most influential institutions in terms of citations are New York University, New York, United States, University of Nottingham Ningbo China,

Ningbo, China, Carnegie Mellon University, Pittsburgh, United States, Deakin University, Australia

Table 5: Top countries publications based on citations Source: VOSviewer

Organization	Citations
New York University, New York, United States	370
University Of Nottingham Ningbo China, Ningbo, China	278
Carnegie Mellon University, Pittsburgh, United States	259
Deakin University, Australia	151
Tel Aviv University, Israel	126
Jaypee Institute of Information Technology, Noida, India	103
Cheltenham Gloucester Coll. H., Cheltenham, United Kingdom	101
Harvard University, Cambridge, MA, United States	99
Griffith Business School, Griffith University, Brisbane, Australia	89
Griffith Business School, Griffith University, Gold Coast, Australia	89
University Of Michigan, Ann Arbor, United States	85
The Wharton School, University of Pennsylvania, Philadelphia, United States	85
North western University, Evanston, United States	78
Amirkabir University of Technology, Tehran, Iran	77
Kth Royal Institute of Technology, Stockholm, Sweden	60
Istanbul Technical University, Istanbul, Turkey	57
University of Nebraska, Lincoln, United States	56
National Cheng Kung University, Tainan, Taiwan	53
University Of Muenster, Münster, Germany	53
University of Milano-Bicocca, Italy	48
Schroeder Institute, Truth Initiative, Washington, DC, United States	45

Table 6: Top countries publications based on citations Source: VOSviewer

Name of Author	Country	Institutions	Documents	Citations
Rob Law	China	University of Macau	5	386
Yong Seog Kim	USA	Utah State University	4	277
Hauser J.R.	USA	MIT Sloan School of Management	4	242
Yiyi Li	USA	University of Texas at Arlington	4	184
Moutinho L.	UK	Cardiff Business School	11	176
Shuyang Li	England	University of Sheffield	5	151
Geng Cui.	Hongkong	Lingnan University	4	132
Xiao Liu	USA	Stern School of Business	4	113
Ajay Kumar.	Philippines	International Rice Research Institute	6	112
Fiona Davies.	UK	Cardiff Business School	5	98
Jan Kietzmann.	Canada	University of Victoria	5	70
Yan-Chen Liu	Tiwan	National Cheng Kung University	6	62
Bruce Curry.	UK	University of Wales	6	34
Chen Zhang.	China	Nanjing University	4	28
Jie Zhang.	China	Nanjing University	5	25

Of 1629 organizations, 48 meet the threshold with the minimum number of organizations is two and the minimum number of citations per organization being 45. The most cited organizations in this field are Griffith Business School, Griffith University, Brisbane, Australia, National Cheng Kung University, Tainan, Taiwan, Amirkabir University of Technology, Tehran, Iran, Istanbul Technical University, Istanbul, Turkey, Kth Royal Institute of Technology, Stockholm, Sweden, University of Nebraska, Lincoln, United States.

Table 6 shows the most prolific of the 15 out of 2027 authors from our search string of the Scopus database. The three authors who had the highest citations were Law R. Kim Y. Hauser J.R., with more than 200 citations each. From the University of Macau, UMDF Chair Professor, Macau, Professor Rob Law is a featured author with 386 citations. This author has written five papers in the domain of Artificial intelligence and Machine Learning in the area of marketing. The most cited paper from these five papers is "A neural network model to forecast Japanese demand for travel to Hong Kong" with 219 citations. The article explains how to estimate Japanese visitor arrivals in Hong Kong using a feed-forward neural network model. Professor Dr. Yong Seog Kim, an Assistant Professor in Utah State University's Business Information Systems

department, is the second most prolific author. The article published by Dr Kim with the highest citations is "An intelligent system for customer targeting: A data mining approach".

RQ5: How has Artificial intelligence and machine learning evolved in the area of Marketing?

A map based on the co-occurrence of the authors' keywords was developed for this research, out of 2457 total author keywords with a minimum of occurrences of 8 keywords, the 31 items were established in 7 thematic clusters as in Figure 3. This map helps identify patterns by showing connections between the most commonly used phrases. Each keyword is represented as a circle, with label. The circle's size and label indicate the keyword's connectedness strength. The distance between two circles reflects the degree to which the terms are connected. The co-occurrence relationships between terms are shown by lines; the more frequently two keywords occur together, the wider the line between them (Sahoo, 2021). As illustrated in the visual network mapping in Figure 3 AI, ML, and marketing have the highest degree of linkage, indicating their essential importance in the current study. Seven theme groups were identified. First Cluster (red) has 7 items for market segmentation and evaluating online customer reviews, this cluster highlights neural networks and classification

algorithms, which are dominated by logistic regression approaches. Cluster 2 (green) (7 items), this cluster focuses on AI's applications in the marketing domain, particularly in Knowledge Management, Expert Systems, CRM, and building customers personalisation strategies. Cluster 3 (blue) (6 items) highlights social media, social media analytics, sentiment analysis, natural language processing, user generated content. This cluster focuses on social media analysis using NLP to find influential customers or influencers on various social networks. Cluster 4 (yellow) (5 items) namely deep learning, consumer behaviour, retailing, text mining, twitter. This cluster illustrates deep learning, as an element of AI & ML, that is prominently being used by marketers to monitor patterns in consumer behaviour. Further, it depicts that text mining is a dominant technique performed on tweets from microblogging platforms like Twitter to know the retail preferences of consumers. Cluster 5 (purple) (2 items) it illustrates the application of ML in forecasting. Cluster 6 (turquoise blue) (2 items) emphasizes on big data generated from digital marketing. Cluster 7 (orange) (2 items): Links the usage of innovation and technology in marketing.

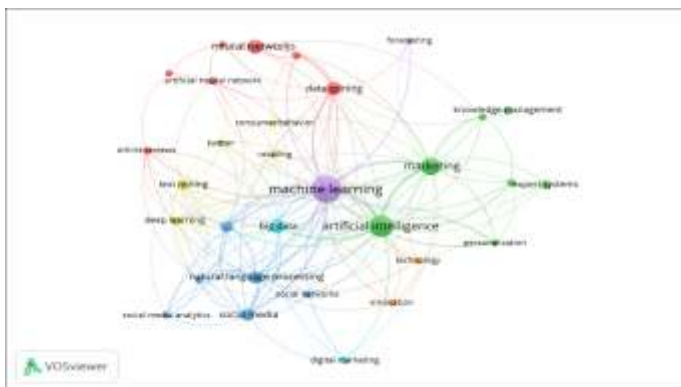


Figure 3: Network visualization map of author keywords
Source: VOSviewer

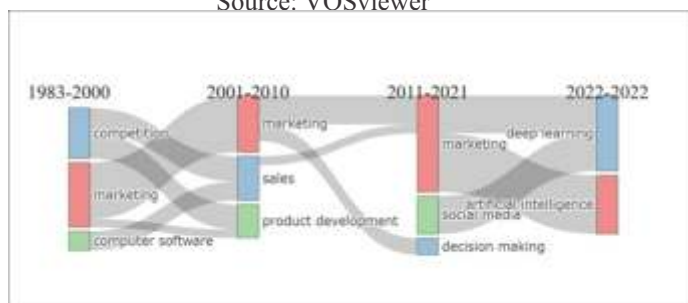


Figure 4: Conceptual evolution of AI and ML researches in marketing domain

The thematic evolution in Figure 4 is drawn using keyword class in Biblioshiny to explain the evolution of the conceptual structure of the researches using AI and ML in marketing from 1983-2022. The year 2000, 2010, 2021 were selected as three time cutting points based on time line of the published research paper. The period starts from the year 1983-2000 is focuses on computer softwares and research based on product or brand related competition, the 2001-2010 duration highlights the product development and sales focussed research publications and 2011 onwards researchers in the marketing domain are shown interest in research topics like deep learning, artificial neural networks and decisions making. The Thematic breakthrough Figure 5 also explains that the basic and transversal themes have high centrality and low density which can be targeted for future research also encompasses various technology enabled areas like artificial intelligence, big data, neural networks and data mining.

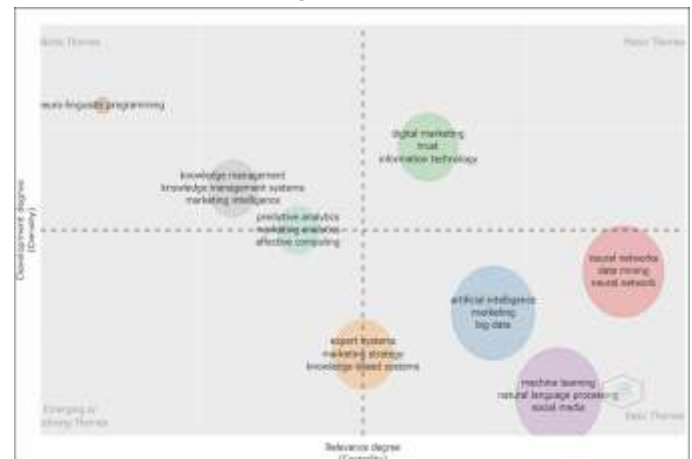


Figure 5: Thematic breakthroughs Source: Biblioshiny Library R
Several emergent topics are identified and grouped by themes. Based on relevancy and development degree, there are four topologies of topics to be described according to the quadrant in which they are located. The motor themes are found in the upper-right quadrant as in Figure 4. They are characterized by both high centrality and density. Digital marketing and information technology are the motor themes as per the authors keyword analysis. This indicates that they have been developed and are essential in the field of research. The quadrant in the upper-left has knowledge management, predictive analytics, neuro-linguistic programming themes. It denotes that they are highly developed, isolated, or niche issues that play a minor part in

research and development. Marketing analytics, expert systems, marketing strategies, and knowledge-based systems are emerging or declining themes with low centrality and density, indicating that they are underdeveloped and marginal. Basic and transversal themes have high centrality and low density and can be considered for future research as per study it includes artificial intelligence, big data, machine learning, natural language processing, neural networks, data mining and social media in the field of marketing.

Conclusion

This section presents a discussion with a response to all the research questions (RQ1-RQ5) under the Analysis and Finding section. To answer the first research question, this bibliometric review recognizes the publication trend related to artificial intelligence and machine learning in the Marketing domain using total publications by the year mentioned. Authors have observed that from 2018 onwards, there has been a steep increase in the publication trend in the area of marketing by utilizing the AI and ML techniques depicted in Figure 1. In response to the second research question, bibliometric review recognizes that United States is on the top with 252 publications and 6387 total citations, followed by the United Kingdom with 86 publications and 1611 citations. China and India have higher publications than Australia and Taiwan, but citations are low. The authors of China and India needs to work on collaborative research to improve citations which leads to higher link strength. As per research question three, the prominent research journals recognized as leading contributors in the subject area are Decision Support Systems, Journal of Business Research and Sustainability (Switzerland).

They are listed as per the Scimago journal ranking at Quartile 1 in the Scopus repository, as highlighted in Table 3. As per the details depicted in Table 5 the top articles based on citations are focussing the use of ML and AI technologies for explaining various avenues related to marketing like market segmentation, customer churn analysis, SEO, image recognition, customer experience, big data analytics using social media messages, tweets and chatbots and other digital assistants using techniques like the random forest, machine learning clustering and visual-based and analytics programming platforms like KNIME,

AI for marketing automation and real-time customer identification and optimization of digital campaigns. As per the research question 4 the top cited author is Rob Law (China) with 386 citations has published five research articles in collaboration using sentiment analysis, web pattern mining, neural networks and association rules focussing on forecasting demand and hotel preferences for Hongkong, China. Yong Seog Kim (USA) published four article sin collaboration with 277 citations he has contributed in the area of intelligent systems for customer targeting using neural networks approaches and data mining algorithms, Hauser J.R.(USA) contributes four publications with 242 citations he has worked on ML methods for recommendations based on preference learning and identifying the customer needs using deep learning and AI algorithms. Prof. Luiz Moutinho of Cardiff Business School contributed highest number of articles in the research domain, he has worked on neural networks and expert systems to understand the children marketing, market orientation and competitive position. Institutions who have immensely contributed in the research domain are New York University, New York, USA, University of Nottingham Ningbo China and Carnegie Mellon University, Pittsburgh, USA with 370, 278 and 259 citations respectively highlighted in the Table 6. It explains the research dominance of AI and ML in marketing in the institutions based at USA, China and it also reflects the popularity of technology innovation and analytics in these countries for marketing domain. The contribution of AI, ML in the field of marketing, opens the door to many potential research opportunities for future researchers explained extensively under the Research Question 5, based on thematic breakthroughs highlighted in Figure 5.

Research Limitations

This research study has attempted to incorporate all the possible tools of Bibliometric analysis to assess the domain of Artificial intelligence and Machine Learning in Marketing; however, like many studies, there are several limitations. First, the dataset covers research articles between 1986 to 2020. The citations of the current year publications may increase over a period of time, so the most prolific author or most cited document may vary over the period of the time. Second, publications selected for

inclusion were extracted from Scopus indexed Journals, while WOS, Dimensions, Google scholar and other categories were not incorporated for analysis.

Practical implications

Digital technologies have produced a considerable volume of data about customers and their usage, which has afforded new opportunities for marketing to collect, analyse and interpret customers' interactions. Therefore, the present study recommends focusing on the usage of AI and ML across domains of marketing. The result of the author's keyword analysis encompasses various domains of marketing that would be promising research areas like Twitter text mining using customer online reviews to provide them a personalized experience, natural language processing on big data retrieved from digital marketing, use of artificial intelligence and neural networks in consumer behaviour. The authors recommend developing various research proposals in the future that would help explain the role of AI and ML in the marketing domain. Other fundamental aspects of marketing like brand disposition and purchase expectations can also be explored in the future (Rana & Sharma, 2015). According to this study, the use of AI and ML in marketing is a promising and expanding research subject, as evidenced by the surge in the number of publications in recent

Originality

We hereby affirm that the contents of this manuscript are original. Furthermore, it has neither been published elsewhere in any language fully or partially, nor is it under review for publication elsewhere. We affirm that all the authors have agreed to the submitted version of the manuscript and their inclusion of names as co-authors. Authors are looking forward for the response on this submitted manuscript.

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