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HEALTH CARE AND BIG SOCIAL DATA: A SYSTEMATIC EXAMINATION OF CURRENT ISSUES AND PROSPECTS

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Abstract. Social Media interfaces individuals around the world, where they convey through sharing items and photographs. But social media is not now just a place for entertainment; it has evolved as a healthcare discussion platform where health freaks like sharing milestones achieved and treatment journeys and medical practitioners show their expertise by interacting with patients and the public. Analysis of Big data generated through the partnership of ever growing social media with the real time healthcare needs of the public can prove beneficial for all stakeholders of the health industry. Recent years have seen a high volume of research in our concerned field, so the healthcare industry and public need to be updated with new venues, challenges, and future scopes in big data analysis of social health data. Ongoing Systematic Literature Review (SLR) delivers these concerns by examining 18 studies published between 2020 and January 2023 on 5 quality parameters.

Keywords:*Social Media, Big Data, Healthcare, Health Management, Personalized Care, Government Policy.*

1 Introduction

The latest technological advancements have brought several opportunities for the healthcare industry. Social media has become important for several aspects of healthcare which includes psychological support [1–3], disease management [4–6], health professional education and communication [7–9], etc. Social media is a unique forum for the real time analysis of public opinions, surveys and research [10]. Social media includes both social forums and social networking sites. Each stage where we can share our innovative thoughts and examine benefits and impediments, admire something or criticize, and even if we are allowed to discuss anything then that platform is called a Social Forum. But here we are concerned about data from only Social Medical forums where questions and answers are related to the medical field. Social medical forums offer low cost expert opinions to patients at their convenience and prove a great platform for doctors to showcase their expertise [11]. Online discussion forums can also be used to understand problems faced by patients while availing medical services [12]. On the other hand, social networking sites are websites used by people to share treatment photographs, update health status and for posting health gigs [13–16]. Healthy people use social networking sites as a tool for gathering information, whereas people suffering from some diseases use them

as a tool for social awareness [17, 18]. Social media increases patient commitment opens doors for people to track down friendly help, and promotes wellbeing related social changes [19]. But interpreting social healthcare data is a computationally complex undertaking. So, to solve this problem Big Data Analytics comes to our rescue.

Big Data Analytics (BDA) can be conceptualized as the examination of point-by-point, dynamic, minimal expense, huge, and differed informational collections to convey complex arrangements [20, 21]. BDA in healthcare finds its applications in finding high-risk patients, providing better medication, and even reducing healthcare costs. BDA in healthcare can deliver real time disease detection and surveillance by taking social media generated health data into consideration [22].

Researchers face the challenge of developing research on our topic in terms of what plots to be considered, what values their work can deliver to society, what are the major limitations of previous researchers. Systematic Literature Reviews (SLRs) provide answers to all the above questions as they provide a detailed walkthrough of the topic leaving no queries to be answered. Few SLRs have been written in our area of investigation up to this point, but they lack information regarding the approach utilized. This SLR covers this gap by using 5 detailed quality specifications to examine studies. The following four research questions (RQs) are what this SLR is attempting to answer: RQ1. What is the ongoing status of research on the use of Big Social Data in Healthcare? RQ2. In which areas inside the health industry are the uses of Social Big Data being examined? RQ3. What are the important points from earlier examinations on BDA on Social Media Health data? Significant future examination plans, the question of RQ4, along with other RQs enlighten path of future researchers.

The rest of the paper is made as follows. The following section talks about past review studies done on our topic. The third section frames the methodology used in this SLR. This is trailed by a part of this review's discoveries. The fifth area is committed to recognizing the flaws of the current review, proposing future extents of examination, and introducing the closing comments of this SLR.

2 Related Literature

In this section, we have covered review papers concerned with big data, social media, and health. Earlier studies tried to provide review papers concerned with either a specific disease or the development of the overall healthcare system. Researchers like [23–25] focused on specific areas of healthcare. Kim et al. [23] reviewed studies concerned with the use of big data and social media to solve the drug abuse problem. Skaik & Inkpen [24] gave a review paper on mental health monitoring by applying big data techniques to social media data. Tušl et al. [25] developed a review paper on mental health issues due to COVID-19 taking the help of social big data. Whereas [26, 27] concentrated their reviews on overall healthcare services. Kass-Hout & Alhinnawi [26] developed a review study on the benefits that the healthcare system can gain through the analysis of social media data but did not use any paper selection method. A review paper focused on improving healthcare services through the analysis of big social health data was also created by [27]. Mgudlwa & Iyamu [27] adopted qualitative methodology to create the paper but lacked the required explanation of the qualitative methods used.

All these works have given valuable insights to the research community, but the present study focused on overall healthcare development delivers insights based on 5 selection parameters (different from previous studies) with profound details regarding the qualitative methods used as told in Table 1. The present study, besides being the most updated also guides the path of future researchers.

Table 1. Sample of papers under consideration

Author	Year	Citations	H-Index	QE1	QE2	QE3	QE4	QE5	Sum
Alahmari et al. [19]	2022	8	1	2	1.5	2	1	1	7.5
Dhand et al. [28]	2022	0	3	2	1.5	2	1	1	7.5
N.P. & Aruna [29]	2022	7	1	1.5	2	2	1	1	7.5
Alharbi et al. [30]	2021	4	12	2	1.5	2	1	1	7.5
Alomari et al. [22]	2021	34	8	2	1.5	2	1	1	7.5
Jones & Jones [31]	2021	1	1	1.5	0	1.5	0	1	4
Lee et al. [32]	2021	9	11	2	1.5	2	0	1	6.5
Mecili et al. [33]	2021	0	0	1.5	1.5	1.5	0	0	4.5
Mendhe et al. [34]	2021	10	3	1.5	1.5	2	1	1	7
Mwamnyange et al. [35]	2021	1	1	2	0	2	1	1	6
Saifuddin et al. [36]	2021	0	4	1.5	1.5	2	1	1	7
Sharma et al. [37]	2021	0	6	1.5	1.5	2	0	1	6
Singh et al. [38]	2021	1	1	1.5	2	2	0	1	6.5
Alotaibi et al. [39]	2020	54	4	2	1.5	2	1	1.5	8
Fiaidhi [40]	2020	14	14	1.5	0	2	1	1	5.5
Ghosh et al. [41]	2020	1	2	2	1.5	2	1	1	7.5
Kumar [42]	2020	14	21	2	2	1.5	1	1	7.5
Murthy et al. [43]	2020	4	1	1.5	0	1.5	0	1	4

Ristevski et al. [44]	2020	0	4	1.5	0	1.5	0	1	4
Saheb [45]	2020	13	8	2	1.5	2	0	1	6.5
Vidhya & Shanmugalakshmi [46]	2020	11	2	1.5	0	2	1	1	5.5

Quality Evaluation criteria are adopted from [47] and [48]. The studies that received a **sum<4.5** (threshold value) are highlighted in grey.

QE 1: Examination of gains and losses of the point being talked about - 'yes (+2)', 'somewhat (+1.5),' and 'negative (+0)'; the score for the fractional examination is appointed when the conversation needs profundity.

QE 2: Proof of information examined in the study- 'quantitative (+2),' 'subjective (+1.5),' and 'no proof (+0).'

QE 3: Defense of the study results as per the philosophy utilized in the study - 'yes (+2),' 'somewhat (+1.5),' and 'negative (+0)'; the score for fractional support is doled out when a handful of procedures are told or definite clarification of a method utilized is inaccessible.

QE 4: Are methods used powerful? – 'yes (+1)' and 'no (+0)'

QE 5: Unwavering quality of the source and conspicuousness of the article - (+2) when the H index and amount of references surpasses 100; (+1.5) when the H index and amount of references are somewhere in the range of 50 and 99; (+1.0) when the H index and amount of references are somewhere in the range of 1 and 49; (+0) when the H index and amount of references are 0.

3 Methodology

3.1 Planning the review

To begin with, proper catchphrases were distinguished to look for important papers in databases. This SLR zeroed in on databases like ScienceDirect and IEEE Xplore. These information bases are the main hotspots for papers in Computer Science. Full texts of the studies that seemed important were evaluated for qualification. Then, studies meeting the qualification standards (in particular, the consideration and prohibition rules) were surveyed for quality and their worth. These whole steps gave us sample of studies chosen for this SLR.

3.2 Performing the review

In January 2023, two primary electronic research databases: ScienceDirect and IEEE Xplore were utilized to look for the assortment of applicable articles connected with the proposed research. However, some decent and significant works published by Springer and MDPI publishers were also included in this study. We searched using string {social media} AND {big data} AND {healthcare} OR {health management}. Using this search syntax we got hands on 257 research studies that further went through our tough selection process. On passing the retrieved corpus through our inclusion criteria we got 104 records published in the years 2020 to 2023. Corpus further decreased to 67 studies whose abstracts were related to Big Data

Analytics, Social Media, and Healthcare altogether. Further 1 editorial and 1 Chinese language paper were removed citing inclusion parameters.

Full texts of 13 studies were not available leaving us with a sample of 52 papers whose full texts were available. These 52 papers were downloaded and went through close scrutiny. Out of these 52 studies, 31 studies were removed as they neither offered a framework nor a model. Next quality scores of remaining 21 studies were calculated in Table 1 and only those studies were taken into consideration whose Quality score (QS) was greater than 4.5 (QS>=4.5). 3 works fell short of crossing the threshold value providing us with a final sample of 18 papers.

3.3 Presenting the review

The oldest study considered is from 2020; hence the topic under discussion is fairly new to the literature. A significant number of papers and average citations per year are being received by these papers. For instance, studies considered in this SLR received 5 (2022), 6.55 (2021), and 17.83 (2020) average citations per year. So we can see amazing figures that our topic is pertaining to confirming the prevalence of our topic in academics.

Key Contributors. Among all the researchers (authors and co-authors) those who gave invaluable contributions to papers being considered in this SLR, Katib I., Albeshri A., Mehmood R. each of these 3 contributed maxima in our SLR by co-authoring our 3 considered studies which are [19], [22], and [39]. Our researchers are affiliated with institutions from 8 countries but in Fig. 1 we have only mentioned those countries from where we have got at least 2 contributions. As we can see in Fig. 1, we have received the maximum contribution from India (7) followed by Saudi Arabia (4) and Canada (2). Countries that were unable to secure a place in Fig. 1 are Algeria, Iran, South Korea, Tanzania, and USA.

Key Publishers. Studies in the sample were published in various journals and Conference Proceedings. Fig. 2 which shows the distribution of studies over the time period considered shows that IEEE and Springer were torchbearers in 2020 but Springer came to the driving seat in 2021 and in 2022 Elsevier published the maximum studies. Considering the overall scenario, we can comment that Springer has contributed the maximum to our sample but both IEEE and Elsevier are also not behind as they have contributed 4-4 papers each to our sample. Science and Information Organization and Tech Science Press have presented the least number of publications. Fig. 3 shows that the maximum publications were received in 2021. In 2022 we have got only 3 quality publications that were able to withstand our harsh inclusion and exclusion criteria. All these stats tell us that our topic of consideration is well in demand. Fig. 4 very well states that Springer has published 28% of studies considered in our sample whereas IEEE and Elsevier have given equal contributions of 22%. On the other hand, Science and Information Organization and Tech Science Press have given small but precious contributions of 5% and 6% each.

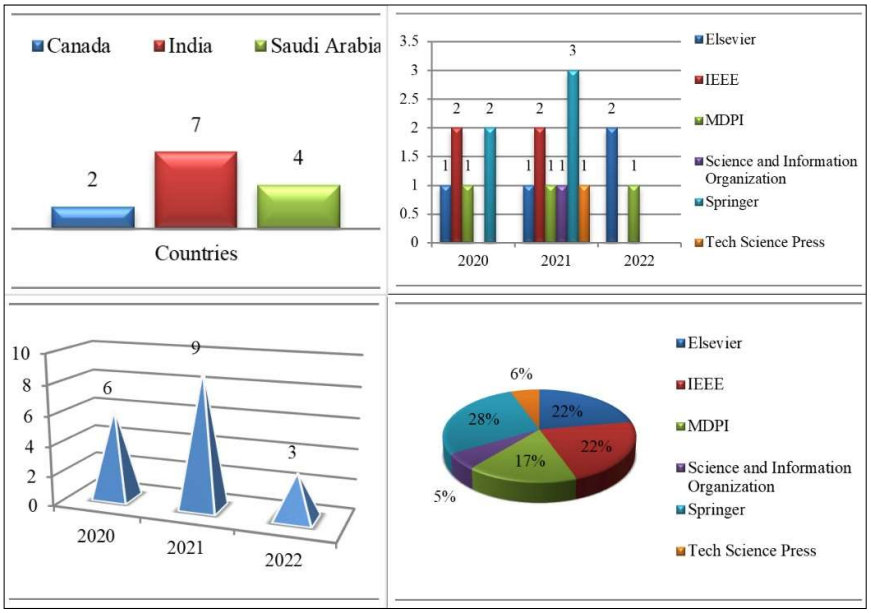

Fig.1-4(Top Left, Top Right, Bottom Left, Bottom Right respectively). Affiliation of our Researchers (Top Left), Publisher wise publications per year (Top Right), Publications per year (Bottom Left), Categorization of Publications (in terms of %) based on Publishers (Bottom Right)

4 Findings

4.1 Themes of studies on Big Social Data in Healthcare

The studies under review synthesize the following themes (see Table 2), as discussed below:

Contagious Diseases. This theme involves papers related to contagious diseases like studies discussing COVID-19. Alomari et al. [22] and [30] discussed COVID-19 surveillance using social data generated by people. These studies further discuss benefits that governments can achieve by analyzing disease in real time like identification of infected areas and determination of the rate at which disease is spreading.

Chronic Diseases. Under this theme, our researchers have thrown light on diseases that last longer which are also called Chronic diseases. Dhand et al. [28] have explored the path of developing a Chronic Diseases Monitoring System. Under chronic diseases, diabetes is one of the diseases that affect a large portion of patients. So, Mecili et al. [33] developed a strategy for self-management of diabetes.

Social Health Communities. Social health communities are groups, communities, or pages where people with similar interests come and help each other. Alahmari et al. [19] created a study on the development of communities based on the needs of people. Whereas [41] delivered insights on helping drug abuse addicts using social health communities.

Technology Perspectives. Our noteworthy researchers also tried to cover technological innovations which can further enhance healthcare services. Mendhe et al. [34] developed a method for better data accessibility so that health data can be accessed without any hassle. Singh et al. [38] also developed a paper keeping technology in mind and discussed various big data platforms that can be used in the healthcare industry.

Table 2. Contexts of reviewed studies.

Theme	Details
Contagious Diseases	COVID-19 surveillance [22, 30]; Analysis of multiple diseases [46]
Chronic Diseases	Diabetes care [29, 33]; System monitoring chronic diseases [28]; Multiple disease analysis [46]
Social Health Communities	Creation of services [19]; Health social data sentiment analysis [37]; Drug Addicts [36, 41]; Public health [39]
Technology Perspectives	Access to Data [34]; Big Data tools [38]; Thick Data analysis [40]

4.2 Value Delivered by Big Social Data in Healthcare

The studies under review synthesize the following values (see Table 3), as discussed below:

Self Health Management. Self health management means where people take care of themselves using their knowledge or knowledge of their known ones. Alahmari et al. [19] created a study that focused on creating services that help people with self care. Whereas the study of [41] proved helpful in the recovery of drug addicts. Self health management proves beneficial in reducing healthcare costs incurred by patients and also increases their knowledge and community.

Disease management. The management of diseases requires analysis of trends, better data collection, and better decisions based on evidence which can help the government control the spread of diseases [35]. Government can analyze birth rate, death rate, spreadable diseases, and most used drugs as told by [46]. Moreover, analysis of social media through big data analysis can help monitor and regulate drug patients [36].

Diabetes management. Diabetes, being a problem for the majority of patients, has been given special space in our SLR. N.P. & Aruna [29] gave a paper on determining and managing insulin levels, and [33] talked about diabetes prediction and self care through the diabetes community moderated by specialists and trained professionals.

Better User Services. Users can avail themselves of services like personalized healthcare as told by [40] and reduced health costs through analysis of social big data. Alahmari et al. [19] says reduced health costs can be achieved through health awareness and lifestyle changes by analyzing user generated social media data.

Business Strategy. Dhand et al. [28] concludes that hospitals and the health industry can improve their business strategies by doing better monitoring and analysis of data. In addition to this new business models can be created and by analyzing data, better technical investments will be possible [38].

Table 3. Values delivered by reviewed studies.

Value	Details
Self Health Management	Community build up [19]; Social support [41]; Diabetes Community [33]; Social Medical forums [42]

Disease management	Disease related services [19]; Monitoring spread of diseases [30, 35]; Government Policy [22, 32, 37, 39, 46]; Drug addicted patients [36, 41]
Diabetes management	Insulin levels [29]; prediction and self-administration [33]
Better User Services	Customized medical services [40]; less expenditure [19]; Mentor recommendation system [41]
Business Strategy	Data analysis [28]; Data Accessibility [34]; Business models [38] ; Technology adoption [45]

4.3 Future Research agendas

Here we will talk about the future scopes and limitations of studies considered which are also evident in our developed extensive framework. But before covering future scopes told in these papers under consideration let's review their limitations (the gist of limitations and future scopes are covered in Table 4 and Table 5 respectively).

Limitations as in our sample of papers:

Study Assumptions. Singh et al. [38] chose an unknown subjective value of the selection rules considered. Whereas [41] made an assumption regarding sample size taken into consideration.

Data Collection. Mendhe et al. [34] retrieved data from a single source whereas [19] considered data specific to a region. Ghosh et al. [41] faced the challenge of analyzing data small in size and on the other hand, [36] had to find a way out of noisy data.

Methodological Constraints. Sharma et al. [37] fell short while explaining the methodology adopted to categorize positive and negative words into low, medium, and high whereas research done by [39] faces the limitation of manual labeling. On the other hand, [45] has just taken single context and gender into consideration limiting the scope of research.

Table 4. Limitations as in reviewed studies.

Limitations	Details
Study Assumptions	About chosen criteria [38]; about sample size under judgment [41]
Data Collection	Data from singular source [34, 38, 45]; data sources [37]; limited data [19, 36, 45]; specific region data [19, 22]; quality of data [36]; small size [41, 45]; Noisy Data [36];
Methodological Constraints	Available methods [38]; simulation-based results [29]; About categorizing words [37]; Subset of factors considered [41]; Single context and gender considered [45]; Manual Labeling [39]

Future scopes of studies considered are discussed as following:

Conceptual advancement. This covers future paths like model optimization and model extension. N.P. & Aruna [29] and [19] have future endeavors of extending their proposed models whereas [38] want future researchers to work on optimizing their proposed models.

Methodological advancement. It covers studies that want future researchers to improve upon the methodology adopted by them like [29] want upcoming researchers to use real time data whereas [37] want diversification of data in upcoming research.

Study Extension. This relates to extending the scope and scale of studies or replicating the study in different countries. Under study extension, [19] wants to diversify the scope of the present study whereas [38] wants to increase the scale of the study in upcoming research.

Technological advancement. It includes using newer and innovative technologies to improve the results of studies considered. That's why [28] has asked fellow researchers to follow the path of deep learning and developing mobile models in upcoming times.

Research design. This covers scopes where future researchers have been asked to work on bringing changes in the method of research already followed. Singh et al. [38] want upcoming researchers to develop customized rules and [46] ask them to assign various emergency levels to patients.

Table 5. Future paths guided by studies considered.

Future Scope	Details
Conceptual advancement	Model efficiency [36]; model extension [19, 29, 39, 42]; model optimization [37, 38]; Model implementation [33]
Methodological advancement	Advanced statistical methods [38]; grasping unstandardized data [46]; real time data [22, 29]; Diversification of Data [36, 37, 41]
Study Extension	Depth and Breadth [22, 45]; scale [19, 38, 39, 42]; scopes [19]; replication in different countries [19, 22, 30, 34, 37]
Technological advancement	Application of newer technologies [38]; deep learning [22, 28]; Mobile model [28]; dynamic filter-creation, webhook API [34]
Research design	Customized rules [38]; Automatic tweet extraction and renewal [37]; Assigning emergency levels [46]; capsule networks [42]

5 Conclusion and Future scopes

The present study set the goal of resolving four exploration questions connected with the utilization of Big Social Data in healthcare. RQ1 enquired about the existing research profile of Big Social Data in healthcare. In response to this query, we showcased what a good number of average citations are received under this subject consistently. Besides this, we have appropriately recognized those unforgettable who are propelling the writings on our surveyed topic. RQ2 enquired about where in healthcare, big data analysis using social media data can

be applied. This question has been addressed by investigating the plots of the evaluated studies.RQ3 broke down the critical focal points from the audited studies. An outline of the discoveries of the examinations under the survey gives the responses to this inquiry. RQ4 recognized future plans to progress research on Big Social Data in healthcare. Despite the critical deliverables of this review, it experiences a few setbacks like non-English papers have not been thought about which may be stacked with valuable pieces of knowledge.

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References

1. Sala, E., Cerati, G., Gaia, A.: Are social media users more satisfied with their life than non-users? A study on older Italians. Ageing Soc. 43, 76–88 (2023). https://doi.org/10.1017/S0144686X21000416
2. Sun, P., Xing, L., Wu, J., Kou, Y.: Receiving feedback after posting status updates on social networking sites predicts lower loneliness: A mediated moderation model. Appl Psychol Health Well Being. (2023). https://doi.org/10.1111/aphw.12378
3. Buodo, G., Moretta, T., Santucci, V.G., Chen, S., Potenza, M.N.: Using Social Media for Social Motives Moderates the Relationship between Post-Traumatic Symptoms during a COVID-19-Related Lockdown and Improvement of Distress after Lockdown. Behavioral Sciences. 13, 53 (2023). https://doi.org/10.3390/bs13010053
4. Freiling, I., Krause, N.M., Scheufele, D.A., Brossard, D.: Believing and sharing misinformation, fact-checks, and accurate information on social media: The role of anxiety during COVID-19. New Media Soc. 25, 141–162 (2023). https://doi.org/10.1177/14614448211011451
5. Zhou, Y., Draghici, A., Abbas, J., Mubeen, R., Boatca, M.E., Salam, M.A.: Social Media Efficacy in Crisis Management: Effectiveness of Non-pharmaceutical Interventions to Manage COVID-19 Challenges. Front Psychiatry. 12, (2022). https://doi.org/10.3389/fpsyt.2021.626134
6. Rai, R.K., Khajanchi, S., Tiwari, P.K., Venturino, E., Misra, A.K.: Impact of social media advertisements on the transmission dynamics of COVID-19 pandemic in India. J Appl Math Comput. 68, 19–44 (2022). https://doi.org/10.1007/s12190-021-01507-y
7. Kwan, Y.H., Phang, J.K., Woon, T.H., Liew, J.W., Dubreuil, M., Proft, F., Ramiro, S., Molto, A., Navarro-Compán, V., de Hooge, M., Meghnathi, B., Ziade, N., Zhao, S.S., Llop, M., Baraliakos, X., Fong, W.: Social Media Use Among Members of the Assessment of Spondyloarthritis International Society: Results of a Web-Based Survey. J Med Internet Res. 25, e39155 (2023). https://doi.org/10.2196/39155
8. Jiménez-Hidalgo, P.J., Jiménez-Gómez, B., Ruiz-Núñez, C., Segado-Fernández, S., Diez-Villacañas, F., López-Espuela, F., Herrera-Peco, I.: Analysis of Healthcare Professionals' and Institutions' Roles in Twitter Colostomy Information. Healthcare. 11, 215 (2023). https://doi.org/10.3390/healthcare11020215

9. Cawcutt, K.A., Marcelin, J.R., Cortés-Penfield, N., Cutrell, J.B., Dong, S.W., Mahoney, M. V, McCarty, T.P., Mediwala Hornback, K., Titanji, B.K., Woc-Colburn, L.E., Schwartz, I.S.: #SoMe the Money! Value, Strategy, and Implementation of Social Media Engagement for Infectious Diseases Trainees, Clinicians, and Divisions. Clinical Infectious Diseases. 74, S229–S236 (2022). https://doi.org/10.1093/cid/ciac063
10. NUDI, R., CAMPAGNA, M., PARMA, A., NUDI, A., BIONDI ZOCCAI, G.: Breakthrough healthcare technologies in the COVID-19 era: a unique opportunity for cardiovascular practitioners and patients. Panminerva Med. 63, (2020). https://doi.org/10.23736/S0031-0808.20.04188-9
11. Khurana, S., Qiu, L., Kumar, S.: When a Doctor Knows, It Shows: An Empirical Analysis of Doctors' Responses in a Q&A Forum of an Online Healthcare Portal. Information Systems Research. 30, 872–891 (2019). https://doi.org/10.1287/isre.2019.0836
12. Alarifi, M., Patrick, T., Jabour, A., Wu, M., Luo, J.: Understanding patient needs and gaps in radiology reports through online discussion forum analysis. Insights Imaging. 12, 50 (2021). https://doi.org/10.1186/s13244-020-00930-2
13. Bazzaz Abkenar, S., Haghi Kashani, M., Mahdipour, E., Jameii, S.M.: Big data analytics meets social media: A systematic review of techniques, open issues, and future directions. Telematics and Informatics. 57, 101517 (2021). https://doi.org/10.1016/j.tele.2020.101517
14. Arora, A., Bansal, S., Kandpal, C., Aswani, R., Dwivedi, Y.: Measuring social media influencer index- insights from facebook, Twitter and Instagram. Journal of Retailing and Consumer Services. 49, 86–101 (2019). https://doi.org/10.1016/j.jretconser.2019.03.012
15. Lai, W.K., Chen, Y.U., Wu, T.-Y.: Analysis and evaluation of random-based message propagation models on the social networks. Computer Networks. 170, 107047 (2020). https://doi.org/10.1016/j.comnet.2019.107047
16. Alalwan, A.A., Rana, N.P., Dwivedi, Y.K., Algharabat, R.: Social media in marketing: A review and analysis of the existing literature. Telematics and Informatics. 34, 1177–1190 (2017). https://doi.org/10.1016/j.tele.2017.05.008
17. Vasha, Z.N., Sharma, B., Esha, I.J., Al Nahian, J., Polin, J.A.: Depression detection in social media comments data using machine learning algorithms. Bulletin of Electrical Engineering and Informatics. 12, 987–996 (2023). https://doi.org/10.11591/eei.v12i2.4182
18. S, S., S. Raj, J.: Analysis of Deep Learning Techniques for Early Detection of Depression on Social Media Network - A Comparative Study. Journal of Trends in Computer Science and Smart Technology. 3, 24–39 (2021). https://doi.org/10.36548/jtcsst.2021.1.003
19. Alahmari, N., Alswedani, S., Alzahrani, A., Katib, I., Albeshri, A., Mehmood, R.: Musawah: A Data-Driven AI Approach and Tool to Co-Create Healthcare Services with a Case Study on Cancer Disease in Saudi Arabia. Sustainability. 14, 3313 (2022). https://doi.org/10.3390/su14063313
20. Kamble, S.S., Gunasekaran, A., Goswami, M., Manda, J.: A systematic perspective on the applications of big data analytics in healthcare management. Int J Healthc Manag. 12, 226–240 (2018). https://doi.org/10.1080/20479700.2018.1531606
21. Kaur, P., Sharma, M., Mittal, M.: Big Data and Machine Learning Based Secure Healthcare Framework. Procedia Comput Sci. 132, 1049–1059 (2018). https://doi.org/10.1016/j.procs.2018.05.020

22. Alomari, E., Katib, I., Albeshri, A., Mehmood, R.: COVID-19: Detecting Government Pandemic Measures and Public Concerns from Twitter Arabic Data Using Distributed Machine Learning. Int J Environ Res Public Health. 18, 282 (2021). https://doi.org/10.3390/ijerph18010282
23. Kim, S.J., Marsch, L.A., Hancock, J.T., Das, A.K.: Scaling Up Research on Drug Abuse and Addiction Through Social Media Big Data. J Med Internet Res. 19, e353 (2017). https://doi.org/10.2196/jmir.6426
24. Skaik, R., Inkpen, D.: Using Social Media for Mental Health Surveillance. ACM Comput Surv. 53, 1–31 (2020). https://doi.org/10.1145/3422824
25. Tušl, M., Thelen, A., Marcus, K., Peters, A., Shalaeva, E., Scheckel, B., Sykora, M., Elayan, S., Naslund, J.A., Shankardass, K., Mooney, S.J., Fadda, M., Gruebner, O.: Opportunities and challenges of using social media big data to assess mental health consequences of the COVID-19 crisis and future major events. Discover Mental Health. 2, 14 (2022). https://doi.org/10.1007/s44192-022-00017-y
26. Kass-Hout, T.A., Alhinnawi, H.: Social media in public health. Br Med Bull. 108, 5–24 (2013). https://doi.org/10.1093/bmb/ldt028
27. Mgudlwa, S., Iyamu, T.: Integration of social media with healthcare big data for improved service delivery. SA Journal of Information Management. 20, (2018). https://doi.org/10.4102/sajim.v20i1.894
28. Dhand, G., Sheoran, K., Agarwal, P., Biswas, S.S.: Deep enriched salp swarm optimization based bidirectional -long short term memory model for healthcare monitoring system in big data. Inform Med Unlocked. 32, 101010 (2022). https://doi.org/10.1016/j.imu.2022.101010
29. N.P., J., Aruna, R.: Big data analytics in health care by data mining and classification techniques. ICT Express. 8, 250–257 (2022). https://doi.org/10.1016/j.icte.2021.07.001
30. Alharbi, A., Alosaimi, W., Irfan Uddin, M.: Automatic Surveillance of Pandemics Using Big Data and Text Mining. Computers, Materials & Continua. 68, 303–317 (2021). https://doi.org/10.32604/cmc.2021.016230
31. Jones, J., Jones, J.: Optimizing Healthcare. In: 2020 IEEE International Conference on E-health Networking, Application & Services (HEALTHCOM). pp. 1–6. IEEE (2021)
32. Lee, H.J., Lee, M., Lee, H., Cruz, R.A.: Mining service quality feedback from social media: A computational analytics method. Gov Inf Q. 38, 101571 (2021). https://doi.org/10.1016/j.giq.2021.101571
33. Mecili, O., Hadj, B., Nouioua, F., Akhrouf, S., Malek, R.: Work-in-Progress: The Use of Big Data and Data Analytics in the Prevention, the Diagnosis and the Monitoring of Long-Term Diseases. Presented at the (2021)
34. Mendhe, C.H., Henderson, N., Srivastava, G., Mago, V.: A Scalable Platform to Collect, Store, Visualize, and Analyze Big Data in Real Time. IEEE Trans Comput Soc Syst. 8, 260–269 (2021). https://doi.org/10.1109/TCSS.2020.2995497
35. Mwamnyange, M., Luhanga, E., R., S.: Big Data Analytics Framework for Childhood Infectious Disease Surveillance and Response System using Modified MapReduce Algorithm. International Journal of Advanced Computer Science and Applications. 12, (2021). https://doi.org/10.14569/IJACSA.2021.0120345

36. Saifuddin, K.M., Islam, M.I.K., Akbas, E.: Drug Abuse Detection in Twitter-sphere: Graph-Based Approach. In: 2021 IEEE International Conference on Big Data (Big Data). pp. 4136–4145. IEEE (2021)
37. Sharma, A., Chandra Singh, A., Pandey, H., Srivastava, M.: Ontology-Driven Sentiment Analysis in Indian Healthcare Sector. Presented at the (2021)
38. Singh, S., Verma, R., Koul, S.: Big Data Platform Selection at a Hospital: A Rembrandt System Application. Presented at the (2021)
39. Alotaibi, S., Mehmood, R., Katib, I., Rana, O., Albeshri, A.: Sehaa: A Big Data Analytics Tool for Healthcare Symptoms and Diseases Detection Using Twitter, Apache Spark, and Machine Learning. Applied Sciences. 10, 1398 (2020). https://doi.org/10.3390/app10041398
40. Fiaidhi, J.: Envisioning Insight-Driven Learning Based on Thick Data Analytics With Focus on Healthcare. IEEE Access. 8, 114998–115004 (2020). https://doi.org/10.1109/ACCESS.2020.2995763
41. Ghosh, S., Misra, J., Ghosh, S., Podder, S.: Utilizing Social Media for Identifying Drug Addiction and Recovery Intervention. In: 2020 IEEE International Conference on Big Data (Big Data). pp. 3413–3422. IEEE (2020)
42. Kumar, A.: Using cognition to resolve duplicacy issues in socially connected healthcare for smart cities. Comput Commun. 152, 272–281 (2020). https://doi.org/10.1016/j.comcom.2020.01.041
43. Murthy, S.N., Asani, F., Srikanthan, S., Agu, E.: DeepSEAS: Smartphone-based Early Ailment Sensing Using Coupled LSTM AutoEncoders. In: 2020 IEEE International Conference on Big Data (Big Data). pp. 4911–4918. IEEE (2020)
44. Ristevski, B., Savoska, S., Blazheska-Tabakovska, N.: Opportunities for Big Data Analytics in Healthcare Information Systems Development for Decision Support. (2020)
45. Saheb, T.: An empirical investigation of the adoption of mobile health applications: integrating big data and social media services. Health Technol (Berl). 10, 1063–1077 (2020). https://doi.org/10.1007/s12553-020-00422-9
46. Vidhya, K., Shanmugalakshmi, R.: Modified adaptive neuro-fuzzy inference system (M-ANFIS) based multi-disease analysis of healthcare Big Data. J Supercomput. 76, 8657–8678 (2020). https://doi.org/10.1007/s11227-019-03132-w
47. Behera, R.K., Bala, P.K., Dhir, A.: The emerging role of cognitive computing in healthcare: A systematic literature review. Int J Med Inform. 129, 154–166 (2019). https://doi.org/10.1016/j.ijmedinf.2019.04.024
48. Tandon, A., Dhir, A., Islam, A.K.M.N., Mäntymäki, M.: Blockchain in healthcare: A systematic literature review, synthesizing framework and future research agenda. Comput Ind. 122, 103290 (2020). https://doi.org/10.1016/j.compind.2020.103290