

REFERENCES

- [1] A. Rastogi and M. Mehrotra, "Opinion Spam Detection in Online Reviews," *J. Inf. Knowl. Manag.*, vol. 16, no. 04, p. 1750036, Dec. 2017, doi: 10.1142/S0219649217500368.
- [2] U. Chakraborty and S. Bhat, "Credibility of online reviews and its impact on brand image," *Manag. Res. Rev.*, vol. 41, no. 1, pp. 148–164, Jan. 2018, doi: 10.1108/MRR-06-2017-0173.
- [3] K. Campbell, "The Importance of Product Reviews in eCommerce," *2X eCom-merce*, Sep. 03, 2014. <https://2xecommerce.com/importance-reviews-ecommerce/> (accessed Sep. 06, 2020).
- [4] M. Crawford, T. M. Khoshgoftaar, J. D. Prusa, A. N. Richter, and H. Al Najada, "Survey of review spam detection using machine learning techniques," *J. Big Data*, vol. 2, no. 23, Dec. 2015, doi: 10.1186/s40537-015-0029-9.
- [5] N. Jindal and B. Liu, "Opinion spam and analysis," in *Proceedings of the international conference on Web search and web data mining - WSDM '08*, Palo Alto, California, USA, 2008, doi: 10.1145/1341531.1341560.
- [6] Y. Ren, D. Ji, and H. Zhang, "Positive Unlabeled Learning for Deceptive Reviews Detection," in *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, Doha, Qatar, 2014, pp. 488–498. doi: 10.3115/v1/D14-1055.
- [7] M. S. Patil and A. M. Bagade, "Online Review Spam Detection using Language Model and Feature Selection," *Int. J. Comput. Appl.*, vol. 59, no. 7, pp. 33–36, Dec. 2012, doi: 10.5120/9562-4031.
- [8] J. Andrews. "Amazon sues 1,114 people for leaving fake reviews – 5 ways to spot the real ones.," *Mirror Online*. <https://www.mirror.co.uk/money/shopping-deals/amazon-sues-1114-people-leaving-6631819> (accessed Sep. 06, 2020).
- [9] S. Noekhah, E. Fouladfar, N. Salim, S. H. Ghorashi, and A. A. Hozhabri, "A Novel Approach for Opinion Spam Detection in E-Commerce," in *Proceedings of the 8th International Conference on e-Commerce with focus on e-Trust*, Iran, 2014.
- [10] L. Akoglu, H. Tong, and D. Koutra, "Graph based anomaly detection and description: a survey," *Data Min. Knowl. Discov.*, vol. 29, no. 3, pp. 626–688, May 2015, doi: 10.1007/s10618-014-0365-y.
- [11] K. Adhav, S. Z. Gawali, and R. Murumkar, "Survey on Online Spam Review Detection Methods," in *Proceedings of International Conference on Innovations in Green Energy and Healthcare Technologies (IGEHT)*, 2017, doi: 10.1109/IGEHT.2017.8094101

- [12] B. Twardowski and D. Ryzko, “Multi-agent Architecture for Real-Time Big Data Processing,” in 2014 IEEE/WIC/ACM International Joint Conferences on Web Intelligence (WI) and Intelligent Agent Technologies (IAT), Warsaw, Poland, Aug. 2014, pp. 333–337. doi: 10.1109/WI-IAT.2014.185.
- [13] A. Mukherjee et al., “Spotting opinion spammers using behavioral footprints,” in Proceedings of the 19th ACM SIGKDD international conference on Knowledge discovery and data mining, Chicago, Illinois, USA, Aug. 2013, pp. 632–640. doi: 10.1145/2487575.2487580.
- [14] T. N. Y. Times, “Daily Report: Yelp Fights Fake Reviews With Shaming,” Bits Blog, Oct. 18, 2012. <https://bits.blogs.nytimes.com/2012/10/18/daily-report-yelp-fights-fake-reviews-with-shaming/> (accessed Jun. 02, 2020).
- [15] A. Carman, “Yelp says it shut down 550 user accounts after discovering a fraudulent review ring,” The Verge, Mar. 10, 2020. <https://www.theverge.com/2020/3/10/21171972/yelp-consumer-alerts-report-suspicious-reviews-fraud> (accessed Jun. 02, 2020).
- [16] H. Coffey. “Fraudulent TripAdvisor reviews could result in jail time for culprits.” INDEPENDENT. <https://www.independent.co.uk/travel/news-and-advice/tripadvisor-fake-reviews-paid-fraud-jail-legal-case-italy-promosalento-a8534006.html> (accessed Jun. 02, 2020).
- [17] “UK investigates fake reviews on major websites,” BBC News, May 22, 2020. <https://www.bbc.com/news/technology-52771913> (accessed Jun. 02, 2020).
- [18] N. Jindal and B. Liu, “Analyzing and Detecting Review Spam,” in Seventh IEEE International Conference on Data Mining (ICDM 2007), Omaha, NE, USA, Oct. 2007, pp. 547–552. doi: 10.1109/ICDM.2007.68.
- [19] D. U. Vidanagama, T. P. Silva, and A. S. Karunananda, “Deceptive consumer review detection: a survey,” *Artif. Intell. Rev.*, vol. 53, no. 2, pp. 1323–1352, Feb. 2020, doi: 10.1007/s10462-019-09697-5.
- [20] I. Erkan and C. Evans, “The influence of eWOM in social media on consumers’ purchase intentions: An extended approach to information adoption,” *Comput. Hum. Behav.*, vol. 61, pp. 47–55, Aug. 2016, doi: 10.1016/j.chb.2016.03.003.
- [21] S. Banerjee, A. Y. K. Chua, and J.J. Kim, “Using supervised learning to classify authentic and fake online reviews,” in Proceedings of the 9th International Conference on Ubiquitous Information Management and Communication - IMCOM ’15, Bali, Indonesia, 2015, pp. 1–7. doi: 10.1145/2701126.2701130.
- [22] S. Shojaee, M. A. A. Murad, A. B. Azman, N. M. Sharef, and S. Nadali, “Detecting deceptive reviews using lexical and syntactic features,” in 2013 13th International Conference on Intelligent Systems Design and Applications, Salangor, Malaysia, Dec. 2013, pp. 53–58. doi: 10.1109/ISDA.2013.6920707.

- [23] Y. Lin, T. Zhu, X. Wang, J. Zhang, and A. Zhou, “Towards online review spam detection,” in Proceedings of the 23rd International Conference on World Wide Web - WWW '14 Companion, Seoul, Korea, 2014, pp. 341–342. doi: 10.1145/2567948.2577293.
- [24] A. Mukherjee, B. Liu, and N. Glance, “Spotting fake reviewer groups in consumer reviews,” in Proceedings of the 21st international conference on World Wide Web - WWW '12, Lyon, France, 2012, pp. 191–200. doi: 10.1145/2187836.2187863.
- [25] M. Ott, Y. Choi, C. Cardie, and J. T. Hancock, “Finding Deceptive Opinion Spam by Any Stretch of the Imagination,” in Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics., Portland, Oregon, Jun 2011, pp.309-319. doi: arXiv:1107.4557
- [26] J. Li, C. Cardie, and S. Li, “TopicSpam: a Topic-Model based approach for spam detection,” in Proceedings of the 51st Annual Meeting of the Association for Computational Linguistics, Sofia, Bulgaria, Aug 2013, pp. 217-221. Accessed: Jun. 09, 2020. [Online]. Available : <https://aclanthology.org/P13-2039>
- [27] J. Li, M. Ott, C. Cardie, and E. Hovy, “Towards a General Rule for Identifying Deceptive Opinion Spam,” in Proceedings of the 52nd Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers), Baltimore, Maryland, Jun. 2014, pp. 1566–1576. doi: 10.3115/v1/P14-1147.
- [28] J. K. Rout, S. Singh, S. K. Jena, and S. Bakshi, “Deceptive review detection using labeled and unlabeled data,” *Multimed. Tools Appl.*, vol. 76, no. 3, pp. 3187–3211, Feb. 2017, doi: 10.1007/s11042-016-3819-y.
- [29] N. Jindal, B. Liu, and E.-P. Lim, “Finding unusual review patterns using unexpected rules,” in Proceedings of the 19th ACM international conference on Information and knowledge management - CIKM '10, Toronto, ON, Canada, 2010. doi: 10.1145/1871437.1871669.
- [30] E.-P. Lim, V.A. Nguyen, N. Jindal, B. Liu, and H. W. Lauw, “Detecting product review spammers using rating behaviors,” in Proceedings of the 19th ACM international conference on Information and knowledge management - CIKM '10, Toronto, ON, Canada, 2010. doi: 10.1145/1871437.1871557.
- [31] S. Feng, L. Xing, A. Gogar, and Y. Choi, “Distributional Footprints of Deceptive Product Reviews”, *ICWSM*, vol. 6, no. 1, pp. 98-105, Aug. 2021.
- [32] R. Y. K. Lau, S. Y. Liao, R. C.-W. Kwok, K. Xu, Y. Xia, and Y. Li, “Text mining and probabilistic language modeling for online review spam detection,” *ACM Trans. Manag. Inf. Syst.*, vol. 2, no. 4, pp. 1–30, Dec. 2011, doi: 10.1145/2070710.2070716.
- [33] G. Wu, D. Greene, B. Smyth, and P. Cunningham, “Distortion as a validation criterion in the identification of suspicious reviews,” in Proceedings of the First

Workshop on Social Media Analytics - SOMA '10, Washington D.C., District of Columbia, 2010, pp. 10–13. doi: 10.1145/1964858.1964860.

- [34] G. Fei, A. Mukherjee, B. Liu, M. Hsu, M. Castellanos, and R. Ghosh, “Exploiting Burstiness in Reviews for Review Spammer Detection”, ICWSM, vol. 7, no. 1, pp. 175-184, Aug. 2021.
- [35] N.M. Kolhe, M.M. Joshi, A.B. Jadhav, and P.D. Abhang, “Fake Reviewer Groups’ Detection System,” IOSR J. Comput. Eng., vol. 16, no. 1, pp. 06–09, 2014, doi: 10.9790/0661-16150609.
- [36] S. Singh, “Improved Techniques for Online Review Spam Detection,” MTech Natl. Inst. Technol., 2015.
- [37] T. Wu, S. Liu, J. Zhang, and Y. Xiang, “Twitter spam detection based on deep learning,” in Proceedings of the Australasian Computer Science Week Multiconference on - ACSW '17, Geelong, Australia, 2017, pp. 1–8. doi: 10.1145/3014812.3014815.
- [38] G. Wang, S. Xie, B. Liu, and P. S. Yu, “Review Graph Based Online Store Review Spammer Detection,” in 2011 IEEE 11th International Conference on Data Mining, Vancouver, BC, Canada, Dec. 2011, pp. 1242–1247. doi: 10.1109/ICDM.2011.124.
- [39] Y. Xu, B. Shi, W. Tian, and W. Lam, “A Unified Model for Unsupervised Opinion Spamming Detection Incorporating Text Generality,” in Proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence (IJCAI 2015), pp.725-731, 2015.
- [40] S. Shehnepoor, M. Salehi, R. Farahbakhsh, and N. Crespi, “NetSpam: A Network-Based Spam Detection Framework for Reviews in Online Social Media,” IEEE Trans. Inf. Forensics Secur., vol. 12, no. 7, pp. 1585–1595, Jul. 2017, doi: 10.1109/TIFS.2017.2675361.
- [41] G. Jain, Manisha, and B. Agarwal, “An Overview of RNN and CNN Techniques for Spam Detection in Social Media,” Int. J. Adv. Res. Comput. Sci. Softw. Eng., vol. 6, no. 10, 2016.
- [42] H. Aghakhani, A. Machiry, S. Nilizadeh, C. Kruegel, and G. Vigna, “Detecting Deceptive Reviews using Generative Adversarial Networks,” ArXiv180510364 Cs, May 2018, Accessed: Jun. 09, 2020. [Online]. Available: <http://arxiv.org/abs/1805.10364>
- [43] S. Xie, G. Wang, S. Lin, and P. S. Yu, “Review spam detection via temporal pattern discovery,” in Proceedings of the 18th ACM SIGKDD international conference on Knowledge discovery and data mining - KDD '12, Beijing, China, 2012. doi: 10.1145/2339530.2339662.

- [44] Q. Peng and M. Zhong, "Detecting Spam Review through Sentiment Analysis," *J. Softw.*, vol. 9, no. 8, pp. 2065–2072, Aug. 2014, doi: 10.4304/jsw.9.8.2065-2072.
- [45] H. Li, Z. Chen, A. Mukherjee, B. Liu, and J. Shao, "Analyzing and Detecting Opinion Spam on a Large-Scale Dataset via Temporal and Spatial Patterns," *Proc. Ninth Int. AAI Conf. Web Soc. Media*, 2015.
- [46] H. Li et al., "Modeling Review Spam Using Temporal Patterns and Co-bursting Behaviors," *ArXiv161106625 Cs*, Nov. 2016, Accessed: Jun. 09, 2020. [Online]. Available: <http://arxiv.org/abs/1611.06625>
- [47] S. Kc and A. Mukherjee, "On the Temporal Dynamics of Opinion Spamming: Case Studies on Yelp," in *Proceedings of the 25th International Conference on World Wide Web - WWW '16*, Canada, 2016, pp. 369–379. doi: 10.1145/2872427.2883087.
- [48] S. P. Algur, J. G. Biradar, and P. Bhat, "GARCH (1, 1) Outlier Detection Technique for Review Spam Detection," *International Journal of Emerging Trends & Technology in Computer Science*, vol. 5, no. 6, pp. 6-15, Dec 2016.
- [49] W. Liu, J. He, S. Han, F. Cai, Z. Yang, and N. Zhu, "A Method for the Detection of Fake Reviews Based on Temporal Features of Reviews and Comments," *IEEE Eng. Manag. Rev.*, vol. 47, no. 4, pp. 67–79, Fourthquarter 2019, doi: 10.1109/EMR.2019.2928964.
- [50] L. You, Q. Peng, Z. Xiong, D. He, M. Qiu, and X. Zhang, "Integrating aspect analysis and local outlier factor for intelligent review spam detection," *Future Gener. Comput. Syst.*, vol. 102, pp. 163–172, Jan. 2020, doi: 10.1016/j.future.2019.07.044.
- [51] I. Chatterjee, M. Zhou, A. Abusorrah, K. Sedraoui, and A. Alabdulwahab, "Statistics-Based Outlier Detection and Correction Method for Amazon Customer Reviews," *Entropy*, vol. 23, no. 12, Dec. 2021, doi: 10.3390/e23121645.
- [52] S. Afzal, A. Afzal, M. Amin, S. Saleem, N. Ali, and M. Sajid, "A Novel Approach for Outlier Detection in Multivariate Data," *Math. Probl. Eng.*, vol. 2021, p. e1899225, Oct. 2021, doi: 10.1155/2021/1899225.
- [53] X. Li, S. Deng, L. Li, and Y. Jiang, "Outlier Detection Based on Robust Mahalanobis Distance and Its Application," *Open J. Stat.*, vol. 9, no. 1, Jan. 2019, doi: 10.4236/ojs.2019.91002.
- [54] S. Kusumasondjaja, "Credibility of Online Reviews and Initial Online Trust in Hotel Services; The Roles of Similarity and Review Quality," in *Proceedings of the Australia New Zealand Marketing Academy Conference*, Perth, Nov. 2011.
- [55] R. Li and A. Suh, "Factors Influencing Information credibility on Social Media Platforms: Evidence from Facebook Pages," *Procedia Comput. Sci.*, vol. 72, pp. 314–328, 2015, doi: 10.1016/j.procs.2015.12.146.

- [56] M. Y. Cheung and C. Luo, “How do People Evaluate Electronic Word-Of-Mouth? Informational and Normative Based Determinants of Perceived Credibility of Online Consumer Recommendations in China,” in PACIS 2007 Proceedings, 2007. [Online]. Available: <https://aisel.aisnet.org/pacis2007/18>
- [57] S. Kusumasondjaja, T. Shanka, and C. Marchegiani, “Credibility of online reviews and initial trust: The roles of reviewer’s identity and review valence,” *J. Vacat. Mark.*, vol. 18, no. 3, pp. 185–195, Jul. 2012, doi: 10.1177/1356766712449365.
- [58] J.-S. Chiou, C.-C. Hsiao, and T.-Y. Chiu, “The credibility and attribution of online reviews: Differences between high and low product knowledge consumers,” *Online Inf. Rev.*, vol. 42, no. 5, pp. 630–646, Sep. 2018, doi: 10.1108/OIR-06-2017-0197.
- [59] M. L. Jensen, J. M. Averbeck, Z. Zhang, and K. B. Wright, “Credibility of Anonymous Online Product Reviews: A Language Expectancy Perspective,” *J. Manag. Inf. Syst.*, vol. 30, no. 1, pp. 293–324, Jul. 2013, doi: 10.2753/MIS0742-1222300109.
- [60] G. Craciun and K. Moore, “Credibility of negative online product reviews: Reviewer gender, reputation and emotion effects,” *Comput. Hum. Behav.*, vol. 97, pp. 104–115, Aug. 2019, doi: 10.1016/j.chb.2019.03.010.
- [61] S. Mukherjee, S. Dutta, and G. Weikum, “Credible Review Detection with Limited Information using Consistency Analysis,” *ArXiv170502668 Cs Stat*, May 2017, Accessed: Jun. 02, 2020. [Online]. Available: <http://arxiv.org/abs/1705.02668>
- [62] Y. Shirai, “Evaluation of Credibility for Reviewers and Review Scores Based on Link Analysis,” *Int. J. Mach. Learn. Comput.*, vol. 9, no. 5, pp. 682–687, Oct. 2019, doi: 10.18178/ijmlc.2019.9.5.858.
- [63] J. C. Weyerer, “Online Review Credibility,” *Journal of Electronic Commerce Research*, vol. 20, no. 1, 2019.
- [64] R. Filieri, C. F. Hofacker, and S. Alguezaui, “What makes information in online consumer reviews diagnostic over time? The role of review relevancy, factuality, currency, source credibility and ranking score,” *Comput. Hum. Behav.*, vol. 80, pp. 122–131, Mar. 2018, doi: 10.1016/j.chb.2017.10.039.
- [65] A. Prabakaran and M. Chen, “Product Review Credibility Analysis,” in 2019 International Conference on Computing, Networking and Communications (ICNC), Honolulu, HI, USA, Feb. 2019, pp. 11–15. doi: 10.1109/ICCNC.2019.8685490.
- [66] Y. Shan, “The Credibility of Online Product Reviews: Do Perceived Similarity, Source Prestige, and Argument Quality Foster the Emergence of Trust?,” Ph.D. dissertation. University of Georgia. [Online]. Available: http://getd.libs.uga.edu/pdfs/shan_yan.201408_phd.pdf

- [67] S. Hu, A. Kumar, F. Al-Turjman, S. Gupta, S. Seth, and Shubham, "Reviewer Credibility and Sentiment Analysis Based User Profile Modelling for Online Product Recommendation," *IEEE Access*, vol. 8, pp. 26172–26189, 2020, doi: 10.1109/ACCESS.2020.2971087.
- [68] E. E. Ogheneovo and P. A. Nlerum, "Managing Uncertainty in Artificial Intelligence and Expert Systems Using Bayesian Theory and Probabilistic Reasoning," *Am. J. Eng. Res.*, p. 8, 2020.
- [69] L. A. Zadeh, "The role of fuzzy logic in the management of uncertainty in expert systems," *Fuzzy Sets Syst.*, vol. 11, no. 1–3, pp. 199–227, 1983, doi: 10.1016/S0165-0114(83)80081-5.
- [70] P. Asopa, S. Asopa, N. Joshi, and I. Mathur, "Evaluating student performance using fuzzy inference system in fuzzy ITS," in 2016 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Jaipur, India, Sep. 2016, pp. 1847–1851. doi: 10.1109/ICACCI.2016.7732318.
- [71] E. Maraj and S. Kuka, "Credit Risk Assessment using Fuzzy Logic," *Journal of Multidisciplinary Engineering Science and Technology (JMEST)*, vol. 6, no. 6, pp.10239-10242, 2019.
- [72] S. A. Kalogirou, "Chapter eleven - Designing and Modeling Solar Energy Systems," in *Solar Energy Engineering*, S. A. Kalogirou, Ed. Boston: Academic Press, 2009, pp. 553–664. doi: 10.1016/B978-0-12-374501-9.00011-X.
- [73] H. Singh et al., "Real-Life Applications of Fuzzy Logic," *Adv. Fuzzy Syst.*, vol. 2013, Aug. 2013, doi: 10.1155/2013/581879.
- [74] N. Alavi, "Date grading using rule-based fuzzy inference system," *Journal of Agricultural Technology*, vol. 8, no.4, pp. 1243-1254, 2012.
- [75] S. Thakur, S. N. Raw, and R. Sharma, "Design of A Fuzzy Model for Thalassemia Disease Diagnosis: Using Mamdani Type Fuzzy Inference System (FIS)," *International Journal of Pharmacy and Pharmaceutical Sciences*, vol. 8, no. 4, pp. 356-361, Apr 2016.
- [76] G. A. and D. J. Varma, "Fuzzy Based Summarization of Product Reviews for Better Analysis," *Indian J. Sci. Technol.*, vol. 9, no. 31, pp. 1–9, May 2016, doi: 10.17485/ijst/2016/v9i31/98481.
- [77] M. T. Altabbaa, T. Ayabakan, and A. S. Ogreneci, "Fuzzy logic for decision extraction from product reviews," in 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), Chennai, Aug. 2017, pp. 82–85. doi: 10.1109/ICECDS.2017.8389573.
- [78] P. H. Rahmath and T. Ahmad, "Fuzzy based Sentiment Analysis of Online Product Reviews using Machine Learning Techniques," *International Journal of Computer Applications*, vol.99,no.16, pp.9-16, 2014. doi: 10.5120/17463-8243.

- [79] A. J. J. Mary and L. Arockiam, "A Framework for Aspect Based Sentiment Analysis using Fuzzy," *ICTACT Journal on Soft Computing.*, vol. 08, no. 02, pp.1611-1615, Jan 2018.
- [80] H. Abbasimehr and M. Tarokh, "A New Approach to Compute a Realistic Credibility Rank for Reviewers Using Fuzzy Inference," *International Journal of Information & Communication Technology Research*, vol.7, no.1, 2015.
- [81] E. D. Wahyuni and A. Djunaidy, "Fake Review Detection From a Product Review Using Modified Method of Iterative Computation Framework," *MATEC Web Conf.*, vol. 58, 2016, doi: 10.1051/mateconf/20165803003.
- [82] C. L. Lai, K. Q. Xu, R. Y. K. Lau, Y. Li, and L. Jing, "Toward a Language Modeling Approach for Consumer Review Spam Detection," in *2010 IEEE 7th International Conference on E-Business Engineering*, Shanghai, China, Nov. 2010, pp. 1–8. doi: 10.1109/ICEBE.2010.47.
- [83] H. Xue, F. Li, H. Seo, and R. Pluretti, "Trust-Aware Review Spam Detection," p. 8, 2015.
- [84] Xinkai Yang, "One methodology for spam review detection based on review coherence metrics," in *Proceedings of 2015 International Conference on Intelligent Computing and Internet of Things*, Harbin, China, Jan. 2015, pp. 99–102. doi: 10.1109/ICAOT.2015.7111547.
- [85] Z. Hai, P. Zhao, P. Cheng, P. Yang, X.-L. Li, and G. Li, "Deceptive Review Spam Detection via Exploiting Task Relatedness and Unlabeled Data," in *Proceedings of the 2016 Conference on Empirical Methods in Natural Language Processing*, Austin, Texas, 2016, pp. 1817–1826. doi: 10.18653/v1/D16-1187.
- [86] A. L. Holla, "A Comparative Study on Fake Review Detection Techniques," *International Journal of Engineering Research in Computer Science and Engineering*, vol. 5, no. 4, , 2018.
- [87] N. Hussain, H. Turab Mirza, I. Hussain, F. Iqbal, and I. Memon, "Spam Review Detection Using the Linguistic and Spammer Behavioral Methods," *IEEE Access*, vol. 8, pp. 53801–53816, 2020, doi: 10.1109/ACCESS.2020.2979226.
- [88] K. Sharma and K.I. Lin, "Review spam detector with rating consistency check," in *Proceedings of the 51st ACM Southeast Conference on - ACMSE '13*, Savannah, Georgia, 2013. doi: 10.1145/2498328.2500083.
- [89] J. T. Hancock, L. E. Curry, S. Goorha, and M. Woodworth, "On Lying and Being Lied To: A Linguistic Analysis of Deception in Computer-Mediated Communication," *Discourse Process.*, vol. 45, no. 1, pp. 1–23, Dec. 2007, doi: 10.1080/01638530701739181.
- [90] T. Ong, M. Mannino, and D. Gregg, "Linguistic characteristics of skill reviews," *Electron. Commer. Res. Appl.*, vol. 13, no. 2, pp. 69–78, Mar. 2014, doi: 10.1016/j.elerap.2013.10.002.

- [91] C. G. Harris, "Detecting deceptive opinion spam using human computation," in *In Proceedings of AAAI Workshops at the Twenty-Sixth AAAI Conference on Artificial Intelligence*, pp. 87–93, 2012.
- [92] M. S.- Pawar, "Formation of Smart Sentiment Analysis Technique for Big Data," *Int. J. Innov. Res. Comput. Commun. Eng.*, vol. 02, no. 12, pp. 7481–7488, Jan. 2015, doi: 10.15680/IJIRCCE.2014.0212034.
- [93] T. N. T. Ngoc, "Mining aspects of customer's review on the social network," *J. Big Data*, vol.6, no.22, 2019. doi: 10.1186/s40537-019-0184-5
- [94] X. Fang and J. Zhan, "Sentiment analysis using product review data," *J. Big Data*, vol. 2, no. 5, Dec. 2015, doi: 10.1186/s40537-015-0015-2.
- [95] W. Zhang, R. Lau, and C. Li, "Adaptive Big Data Analytics for Deceptive Review Detection in Online Social Media," *In Proceedings of International Conference on Information Systems, Auckland, New Zealand, Dec 2014*
- [96] V. Agarwal, "Research on Data Preprocessing and Categorization Technique for Smartphone Review Analysis," *Int. J. Comput. Appl.*, vol. 131, pp. 30–36, Dec. 2015, doi: 10.5120/ijca2015907309.
- [97] M. del P. Salas-Zárate, R. Valencia-García, A. Ruiz-Martínez, and R. Colomo-Palacios, "Feature-based opinion mining in financial news: An ontology-driven approach," *J. Inf. Sci.*, vol. 43, no. 4, pp. 458–479, Aug. 2017, doi: 10.1177/0165551516645528.
- [98] K. Wójcik and J. Tuchowski, "Ontology Based Approach to Sentiment Analysis," *In Proceedings of 6th Int. Sci. Conf. Fac. Manag. Crac. Univ. Econ.*, 2014.
- [99] D. Rotovei, "Multi-Agent Aspect Level Sentiment Analysis in CRM Systems," *In Proceedings of 2016 18th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC)*, 2016, pp. 400–407, doi: 10.1109/SYNASC.2016.068.
- [100] S. Kolkur, G. Dantal, and R. Mahe, "Study of Different Levels for Sentiment Analysis," *International Journal of Current Engineering and Technology*, vol.5,no.2, Apr 2015. [Online]. Available: <http://inpressco.com/category/ijcet/>
- [101] Dr. M. Asghar, A. Khan, S. Ahmad, and F. Kundi, "A Review of Feature Extraction in Sentiment Analysis," *J. Basic Appl. Res. Int.*, vol. 4, pp. 181–186, Jan. 2014.
- [102] M. Hu and B. Liu, "Mining and summarizing customer reviews," in *Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining*, New York, NY, USA, Aug. 2004, pp. 168–177. doi: 10.1145/1014052.1014073.

- [103] K. Schouten and F. Frasincar, “Survey on Aspect-Level Sentiment Analysis,” *IEEE Trans. Knowl. Data Eng.*, vol. 28, no. 3, pp. 813–830, Mar. 2016, doi: 10.1109/TKDE.2015.2485209.
- [104] A.M. Popescu and O. Etzioni, “Extracting Product Features and Opinions from Reviews,” In Proceedings of the conference on Human Language Technology and Empirical Methods in Natural Language Processing, Vancouver, pp. 339–346, Oct 2005.
- [105] G. Carenini, R. T. Ng, and E. Zwart, “Extracting knowledge from evaluative text,” in Proceedings of the 3rd international conference on Knowledge capture - K-CAP '05, Banff, Alberta, Canada, 2005. doi: 10.1145/1088622.1088626.
- [106] W. Holzinger, B. Krüpl, and M. Herzog, “Using Ontologies for Extracting Product Features from Web Pages,” in *The Semantic Web - ISWC 2006*, vol. 4273, I. Cruz, S. Decker, D. Allemang, C. Preist, D. Schwabe, P. Mika, M. Uschold, and L. M. Aroyo, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg, 2006, pp. 286–299. doi: 10.1007/11926078_21.
- [107] S. Ben-David, J. Blitzer, K. Crammer, and F. Pereira, “Analysis of Representations for Domain Adaptation,” in *Advances in Neural Information Processing Systems*, 2007, vol. 19. Accessed: Nov. 01, 2021. [Online]. Available: <https://papers.nips.cc/paper/2006/hash/b1b0432ceafb0ce714426e9114852ac7-Abstract.html>
- [108] L. Ferreira, N. Jakob, and I. Gurevych, “A Comparative Study of Feature Extraction Algorithms in Customer Reviews,” in *2008 IEEE International Conference on Semantic Computing*, Aug. 2008, pp. 144–151. doi: 10.1109/ICSC.2008.40.
- [109] Z. Zhai, B. Liu, H. Xu, and P. Jia, “Clustering product features for opinion mining,” in Proceedings of the fourth ACM international conference on Web search and data mining - WSDM '11, Hong Kong, China, 2011. doi: 10.1145/1935826.1935884.
- [110] M. Chen and T. Yao, “Combining dependency parsing with shallow semantic analysis for Chinese opinion-element relation identification,” in *2010 4th International Universal Communication Symposium*, Oct. 2010, pp. 299–305. doi: 10.1109/IUCS.2010.5666009.
- [111] C. Lin and Y. He, “Joint sentiment/topic model for sentiment analysis,” in Proceedings of the 18th ACM conference on Information and knowledge management, New York, NY, USA, Nov. 2009, pp. 375–384. doi: 10.1145/1645953.1646003.
- [112] A. Alkadri and A. Elkorany, “Semantic Feature Based Arabic Opinion Mining Using Ontology,” *Int. J. Adv. Comput. Sci. Appl.*, vol. 7, Jun. 2016, doi: 10.14569/IJACSA.2016.070576.
- [113] J. Wang and H. Ren, “Feature-based Customer Review Mining,” p. 9.

- [114] S. Mukherjee and S. Joshi, "Sentiment Aggregation using ConceptNet Ontology," in Proceedings of the Sixth International Joint Conference on Natural Language Processing, Nagoya, Japan, Oct. 2013, pp. 570–578. Accessed: Nov. 01, 2021. [Online]. Available: <https://aclanthology.org/I13-1065>
- [115] B. Wang, R. McKay, H. Abbass, and M. Barlow, "A Comparative Study for Domain Ontology Guided Feature Extraction" In Proceedings of Twenty-Sixth Australasian Computer Science Conference (ACSC2003), Adelaide, South Australia, Feb 2003.
- [116] C. Vicient, D. S´nchez, and A. Moreno, "Ontology-Based Feature Extraction," in 2011 IEEE/WIC/ACM International Conferences on Web Intelligence and Intelligent Agent Technology, Aug. 2011, vol. 3, pp. 189–192. doi: 10.1109/WI-IAT.2011.199.
- [117] P. D. Turney, "Mining the Web for Synonyms: PMI-IR versus LSA on TOEFL," in Machine Learning: ECML 2001, vol. 2167, L. De Raedt and P. Flach, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg, 2001, pp. 491–502. doi: 10.1007/3-540-44795-4_42.
- [118] A. Sureka and D. Correa, "Generating Domain-Specific Ontology from Common-Sense Semantic Network for Target-Specific Sentiment Analysis," 2010. [Online]. Available: <https://www.semanticscholar.org/paper/Generating-Domain-Specific-Ontology-from-Semantic-Sureka-Correa/58d452725a1e23dec87186ab138e65a8bc5daf5f>
- [119] A. Mukherjee, V. Venkataraman, B. Liu, and N. Glance, "Fake Review Detection: Classification and Analysis of Real and Pseudo Reviews," Technical Report, Dept. Comp. Science, University of Illinois at Chicago, 2013.
- [120] A. Heydari, M. Tavakoli, and N. Salim, "Detection of fake opinions using time series," *Expert Syst. Appl.*, vol. 58, pp. 83–92, Oct. 2016, doi: 10.1016/j.eswa.2016.03.020.
- [121] D. Savage, X. Zhang, X. Yu, P. Chou, and Q. Wang, "Detection of opinion spam based on anomalous rating deviation," *Expert Syst. Appl.*, vol. 42, no. 22, pp. 8650–8657, Dec. 2015, doi: 10.1016/j.eswa.2015.07.019.
- [122] E. Belghache, J.-P. Georgé, and M.-P. Gleizes, Towards an Adaptive Multi-agent System for Dynamic Big Data Analytics. 2016. doi: 10.1109/UIC-ATC-ScalCom-CBDCCom-IoP-SmartWorld.2016.0121.
- [123] T. Erl, Khattak Wajid, and P. Buhler, *Big Data Fundamentals: Concepts, Drivers & Techniques*, 1st ed. Pearson, 2016.
- [124] A. Famili, W.-M. Shen, R. Weber, and E. Simoudis, "Data preprocessing and intelligent data analysis," *Intell. Data Anal.*, vol. 1, no. 1, pp. 3–23, Jan. 1997, doi: 10.1016/S1088-467X(98)00007-9.

- [125] S. Pradha, M. N. Halgamuge, and N. T. Q. Vinh, "Effective Text Data Preprocessing Technique for Sentiment Analysis in Social Media Data," in 2019 11th International Conference on Knowledge and Systems Engineering (KSE), Oct. 2019, pp. 1–8. doi: 10.1109/KSE.2019.8919368.
- [126] R. Deshmukh and V. Wangikar, Data Cleaning: Current Approaches and Issues. in Proceedings of IEEE International Conference on Knowledge Engineering, Aurangabad, Jan 2011.
- [127] C. Fan, M. Chen, X. Wang, J. Wang, and B. Huang, "A Review on Data Preprocessing Techniques Toward Efficient and Reliable Knowledge Discovery From Building Operational Data," *Front. Energy Res.*, vol. 9, 2021, doi: 10.3389/fenrg.2021.652801.
- [128] E. Alshdaifat, D. Alshdaifat, A. Alsarhan, F. Hussein, and S. M. F. S. El-Salhi, "The Effect of Preprocessing Techniques, Applied to Numeric Features, on Classification Algorithms' Performance," *Data*, vol. 6, no. 2, Jan. 2021, doi: 10.3390/data6020011.
- [129] S. Gharatkar, A. Ingle, T. Naik, and A. Save, "Review preprocessing using data cleaning and stemming technique," in 2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Mar. 2017, pp. 1–4. doi: 10.1109/ICIIECS.2017.8276011.
- [130] F. Magliani et al., "A Comparison between Preprocessing Techniques for Sentiment Analysis in Twitter," in Proceedings Kdweb, Cagliari, 2016.
- [131] J. Mahilraj, G. Tigistu and S. Tumsa, "Text Preprocessing Method on Twitter Sentiment Analysis using Machine Learning," *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, vol.9, no.11, Sep 2020
- [132] Z. Jianqiang and G. Xiaolin, "Comparison Research on Text Pre-processing Methods on Twitter Sentiment Analysis," in *IEEE Access*, vol. 5, pp. 2870-2879, 2017, doi: 10.1109/ACCESS.2017.2672677.
- [133] M. Sohrabi and F. Hemmatian, "An Efficient Preprocessing Method for Supervised Sentiment Analysis by Converting Sentences to Numerical Vectors: a Twitter Case Study," *Multimed. Tools Appl.*, vol. 78, Sep. 2019, doi: 10.1007/s11042-019-7586-4.
- [134] P. Jermyn, M. Dixon and B.J. Read, "Preparing clean views of data for data mining" . In *ERCIM Work. on Database Res.*, pp.1–15,1999.
- [135] M. Lenzerini, "Data Integration: A Theoretical Perspective," In Proceedings of the Twenty-first ACM SIGACT-SIGMOD-SIGART Symposium on Principles of Database Systems, Wisconsin, USA, Jan 2002. doi: 10.1145/543613.543644.
- [136] I. F. Cruz and H. Xiao, "The Role of Ontologies in Data Integration," *International Journal of Engineering Intelligent Systems for Electrical Engineering and Communications*, vol.13, no.4, Dec 2015.

- [137] F. D. Ahmed, A. N. Jaber, M. S. Ahmad, and M. Binti Abdul Majid, "Agent-based Big Data Analytics in retailing: A case study," in 2015 4th International Conference on Software Engineering and Computer Systems (ICSECS), Aug. 2015, pp. 67–72. doi: 10.1109/ICSECS.2015.7333085.
- [138] M. Reddy and G. M. P. O'Hare, "The blackboard model: a survey of its application," *Artif. Intell. Rev.*, vol. 5, no. 3, pp. 169–186, 1991, doi: 10.1007/BF00143760.
- [139] D.D. Corkill, D.D. "Blackboard and Multi-Agent Systems & the Future", in Proceedings of International Lisp Conference, New York, October 2003.
- [140] M. Mohammadian, "Intelligent Data Mining and Information Retrieval from World Wide Web for E-Business Applications". [Online]. Available: <http://www.ssgrr.it/en/ssgrr2002w/papers/230.pdf>.
- [141] H. Labiod, K. Boudaoud, and J. Labetoulle, "Towards a new approach for intrusion detection with intelligent agents," *Journal of Networking and Information Systems*, vol.2, pp.701-739,2000.
- [142] M. F. Santos, F. Portela, and M. Vilas-Boas, "INTCARE - Multi-agent Approach for Real-time Intelligent Decision Support in Intensive Medicine:," in Proceedings of the 3rd International Conference on Agents and Artificial Intelligence, Rome, Italy, 2011, pp. 364–369. doi: 10.5220/0003182603640369.
- [143] H. L. Zhang and H. C. Lau, "Agent-based problem solving methods in Big Data environment," *Web Intell. Agent Syst. Int. J.*, vol. 12, no. 4, pp. 343–345, 2014, doi: 10.3233/WIA-140300.
- [144] J. Yen, M. S. El-Nasr, and T. R. Ioerger, "Fuzzy logic and intelligent agents," in FUZZ-IEEE'99. 1999 IEEE International Fuzzy Systems. Conference Proceedings (Cat. No.99CH36315), Aug. 1999, vol. 1, pp. 342–343 vol.1. doi: 10.1109/FUZZY.1999.793262.
- [145] A.J. Fougères, "A Modelling Approach Based on Fuzzy Agents," *ArXiv*, vol. abs/1302.6442, Feb. 2013.
- [146] D. Vidanagama, T. Silva, and A. S. Karunananda, "Feature-Wise Opinion Summarization of Consumer Reviews Using Domain Ontology," in *Inventive Computation and Information Technologies*, Singapore, 2021, pp. 583–599. doi: 10.1007/978-981-33-4305-4_43.
- [147] R. Gayathri and V. Uma, "Ontology based knowledge representation technique, domain modeling languages and planners for robotic path planning: A survey," *ICT Express*, vol. 4, no. 2, pp. 69–74, Jun. 2018, doi: 10.1016/j.icte.2018.04.008.
- [148] P. Oliveira, F. Rodrigues, and P. Rangel Henriques, "An Ontology-Based Approach for Data Cleaning," In Proceedings of the 11th International Conference on Information Quality, MA, USA, Nov 2006.

- [149] R. Almeida, P. Maio, P. Oliveira, and J. Barroso, "An Ontology-based Methodology for Reusing Data Cleaning Knowledge:," in Proceedings of the 7th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management, Lisbon, Portugal, 2015, pp. 202–211. doi: 10.5220/0005596402020211.
- [150] M. Gagnon, "Ontology-based integration of data sources," in 2007 10th International Conference on Information Fusion, Quebec City, QC, Canada, Jul. 2007, pp. 1–8. doi: 10.1109/ICIF.2007.4408086.
- [151] H. Wache, T. Vögele, U. Visser, H. Stuckenschmidt, G. Schuster, H. Neumann, and S. Hübner, "Ontology-based Integration of Information - A Survey of Existing Approaches," In Proceedings of IJCAI-01 Workshop: Ontologies and Information Sharing, Seattle, WA, vol. pp. 108-117,2001.
- [152] M. Hadzic, P. Wongthongtham, T. Dillon, and E. Chang, "Ontology-Based Multi-Agent Systems", Berlin, Heidelberg: Springer Berlin Heidelberg, 2009. doi: 10.1007/978-3-642-01904-3.
- [153] D. Lavbič, O. Vasilecas, and R. Rupnik, "Ontology-based multi-agent system to support business users and management," Technol. Econ. Dev. Econ., vol. 16, no. 2, pp. 327–347, Jun. 2010, doi: 10.3846/tede.2010.21.
- [154] Q. Xu and H. Zhao, "Using Deep Linguistic Features for Finding Deceptive Opinion Spam," In Proceedings of COLING 2012: Posters, The COLING 2012 Organizing Committee, pp. 1341–1350. [Online] Available : <https://aclanthology.org/C12-2131>.
- [155] K. Shivagangadhar, H. Sagar, S. Sathyan, C.H. Vanipriya, "Fraud Detection in Online Reviews using Machine Learning Techniques," International Journal of Computational Engineering Research (IJCER), vol.5, no.5, Mar 2015.
- [156] A. Mukherjee and V. Venkataraman, "Opinion Spam Detection: An Un-supervised Approach using Generative Models," 2014. [Online] Available : http://www2.cs.uh.edu/arjun/tr/UH_TR_2014_07.pdf
- [157] Y. Ren and Y. Zhang, "Deceptive Opinion Spam Detection Using Neural Network," in Proceedings of the 26th International Conference on Computational Linguistics: Technical Papers, Osaka, Japan, pp.140-150,2016.
- [158] G. Caire. "Jade Programming for Beginners." 2009, [Online] Available: <https://jade.tilab.com/doc/tutorials/JADEProgramming-Tutorial-for-beginners.pdf>
- [159] D. Klein and C.D.Manning, "Fast Exact Inference with a Factored Model for Natural Language Parsing." in Proceedings of the Conference on Advances in Neural Information Processing Systems, Jan 2002.
- [160] "WordNet — A Lexical Database for English," 2010. [Online] Available : <https://wordnet.princeton.edu/> (accessed May 23, 2020).

- [161] S. Baccianella, A. Esuli, and F. Sebastiani, "SENTIWORDNET 3.0: An Enhanced Lexical Resource for Sentiment Analysis and Opinion Mining," Proc. Seventh Int. Conf. Lang. Resour. Eval. LREC10, 2010.
- [162] P. Cingolani and J. Alcalá-Fdez, "jFuzzyLogic: A Java Library to Design Fuzzy Logic Controllers According to the Standard for Fuzzy Control Programming," Int. J. Comput. Intell. Syst., vol. 6, pp. 61–75, Jun. 2013, doi: 10.1080/18756891.2013.818190.
- [163] C. Wang, "A Study of Membership Functions on Mamdani-Type Fuzzy Inference System for Industrial Decision-Making," MSc Thesis, Graduate and Research Committee of Lehigh University, 2015. [Online]. Available : <https://preserve.lib.lehigh.edu/islandora/object/preserve>