International Journal for Modern Trends in Science and Technology, 8(09): 153-157, 2022

ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST0809032
Available online at: http://www.ijmtst.com/vol8issue09.html

Evaluation of trust in social networks online

N Poojitha [1] | B. N. Srinivasa Gupta [2]

[1]Master of Computer Applications (MCA), SVKP &Dr K S Raju Arts & Science College(A), Penugonda, W.G.Dt., A.P, India
[2]Associate Professor in Computer science, SVKP &Dr K S Raju Arts & Science College(A), Penugonda, W.G.Dt., A.P, India

To Cite this Article
N Poojitha and B. N. Srinivasa Gupta. Evaluation of trust in social networks online. International Journal for Modern Trends in Science and Technology 2022, 8(09), pp. 153-157. https://doi.org/10.46501/IJMTST0809032

Article Info
Received: 22 August 2022; Accepted: 12 September 2022; Published: 17 September 2022.

ABSTRACT

Assessing accept as true with in on line social networks (OSNs) is crucial for lots applications such as online advertising and marketing and community security. it is a tough trouble, however, because of the problems of dealing with complicated social network topologies and accomplishing accurate evaluation in these topologies. To address those demanding situations, we model trust by way of providing the three-valued subjective common sense (3VSL) version. 3VSL nicely models the uncertainties that exist in agree with, therefore is capable of compute believe in arbitrary graphs. We theoretically show the capability of 3VSL based totally at the Dirichlet-specific (DC) distribution and its correctness in arbitrary OSN topologies. primarily based on the 3VSL model, we similarly design the AssessTrust (AT) set of rules to correctly compute the accept as true with between any customers connected in an OSN. We validate 3VSL in opposition to two real-world OSN datasets: Advogato and pretty desirable privateness (PGP). Experimental outcomes suggest that 3VSL can appropriately model the agree with among any pair of not directly connected customers in the Advogato and PGP.

1. INTRODUCTION

Online social networks (OSNs) are a few of the most regularly visited locations at the internet. OSNs help humans not handiest to bolster their social connections with recognized friends however also to make bigger their social circles to buddies of buddies who they may not recognize formerly. consider is the permitting thing in the back of person interactions in OSNs and is important to nearly all OSN packages. as an instance, in advice and crowd sourcing systems, agree with facilitates to pick out truthful opinions and/or users . In on line marketing packages, believe is used to pick out straightforward sellers. In a proactive friendship creation machine , consider enables the discovery of capacity friendships. In wireless network domain, trust can help a mobile tool to discover sincere peers to relay its statistics . In security area, agree with is considered an essential metric to hit upon malicious customers or web sites . Given the abovementioned applications, one confounding trouble is to what diploma a consumer can accept as true with another person in an OSN. This paper worries the fundamental issue of accept as true with assessment in OSNs: given an OSN, the way to version and compute accept as true with among users?

Accept as true with is traditionally considered as recognition or the opportunity of a consumer being benign. In online advertising and marketing, users fee each different primarily based on their interactions, so the believe of a consumer may be derived from aggregated ratings. in the community protection area, however, the trust of a given user is described because the probability that this person will behave usually in the destiny. primarily based on results from preceding research , we outline trust

as the probability that a trustee will behave as expected, from the perspective of a trustor. here,
each trustor and trustee are normal users in an OSN wherein the trustor is interested by knowing how trustworthy the trustee is. This fashionable definition of agree with makes it relevant for a extensive range of applications. We additionally count on that consider in OSNs is decided via goal proof, i.e., cognition based consider, is not considered in this paper.

2. LITERATURE SURVEY

Approaches to massive trust assessment in OSNs can be roughly divided into two broad categories, based upon how trust is modeled. Assuming trust is a real number, researchers studied how to compute relative trust [11], [12] and absolute trust [13], [14] in an OSN. On the other hand, trust can be modeled as a statistical distribution [10], [15]–[17], so more accurate trust assessments are realized.
In the first category, relative trust is first studied in peerto-peer file-sharing networks [11]. Authors in [11] proposed the EigenTrust algorithm that starts from a peer and searches for trustworthy peers based on the following rules. It moves from a peer to another with the probability that is proportional to the other peer's trust score, i.e., higher the trust score, higher the moving probability. Therefore, EigenTrust will more likely reach trustworthy peers than untrustworthy ones. Later on, the relative trust of web pages is investigated in [12] to identify spam pages. The TrustRankalgorithm proposed in [12] again employs random walk on the network to rank the trustworthiness of web pages. These algorithms, however, only generate trust rankings instead of absolute trust values of peers/pages.
Unlike EigenTrust, MoleTrust [13] proposes a method to compute the trustworthiness of a particular user in a personalized way. While walking through the network, MoleTrust only considers incoming edges with trust scores greater than 0.6 and ignores the others. A user's trust score is computed by averaging all accepted incoming edges weighted by the trust scores of the users from whom the edges orientate. Similarly, TidalTrust [14] recursively searches the network with a weighted average approach. The difference between TidalTrust and MoleTrust is that TidalTrust uses only the path(s) with the highest trust score(s), however, MoleTrust considers all paths, as long as the trust score of each edge along the paths is greater than 0.6. Recently, the evolution or dynamics of trust in OSNs is studied in FluidRating [4]. FluidRating uses fluid dynamics theory to understand the evolution of trust in OSNs.
In the second category, trust is modeled as a statistical distribution, e.g., in subjective logic [15], [16], CertProp [17] and three-valued subjective logic [8], [10], [18]. In this way, trust propagation and fusion are treated as the multiplication and summation of statistical distributions. Comparing to solutions in the first category, these works achieve a higher accuracy in trust assessments. However, they have difficulty in handling complex networks due to the limitations identified in [10]. To enable trust assessment over large-scale networks, the AssessTrust algorithm is proposed in [10]. A major limitation of AssessTrust is that it is designed to compute the trustworthiness of one trustee and thus is very slow and inefficient in solving the MTA problem. In summary, existing solutions either have trouble providing accurate trust assessments or are inefficient in solving the MTA problem in a large-scale OSN.

3. PROBLEM STATEMENT

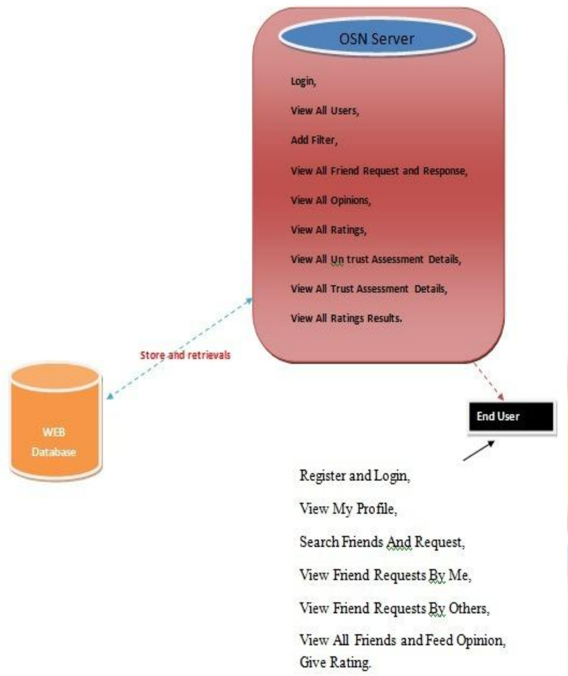
We model a social network as a directed graph G = (V,E) where a vertex u ∈V represents a user, and an edge e(u, v) ∈E denotes a trust relation from u to v. The weight of e(u, v) denotes how much u trusts v, which is commonly referred to as *direct trust*. A trustor may leverage the recommendations from other users to derive a trustee's trust, which is called *indirect trust*. We are interested in computing the indirect trust between two users who have not established a direct trust previously. To solve this problem, we first need to design a trust model that works with both direct and indirect trust. Based on the assumption that trust is determined by objective evidence, designing a trust model can be stated as follows.

- P1: *Given the interactions between a trustor and a trustee, how to model the trust of the trustee, from thetrustor's perspective?*

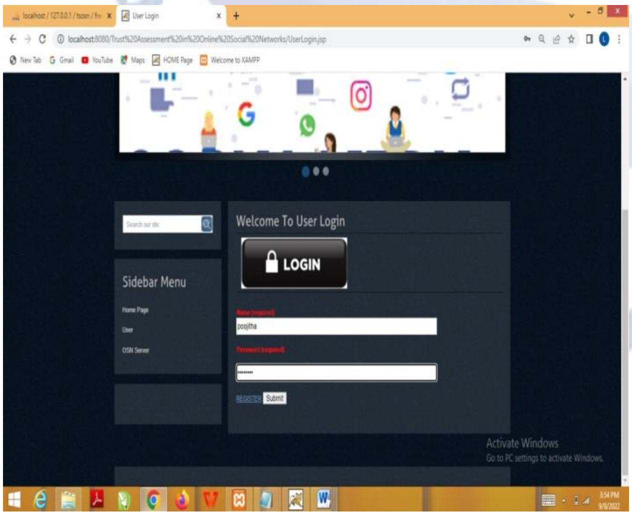
The second problem is to compute/infer indirect trust between users in an OSN. Solving this problem means the trust between two users, without previous interactions, can be computed. Because the indirect trust inference is available, a trustor can conduct a trust assessment of a trustee in an OSN. As such, the second problem is formulated as follows.

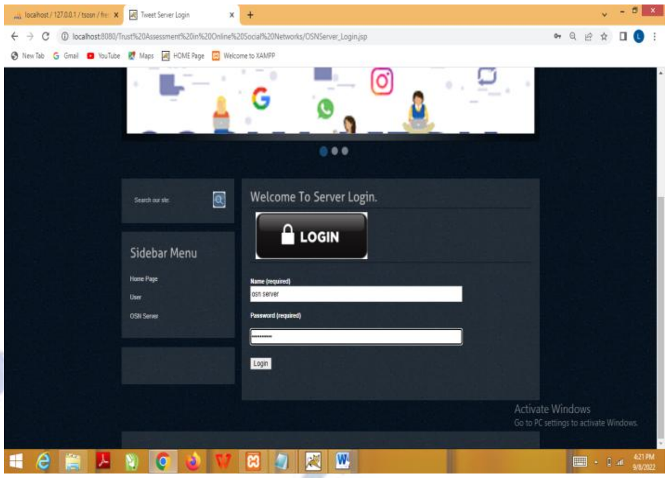
• P2: *Given a social network* G = (V,E), ∀u *and* v, *s.t.*e(u, v) 6∈E *and* ∃*at least one path from* u *to* v, *howdoes one compute* u*'s trust in* v, i.e., *how should* u *trust a stranger* v?

4. ARCHITECTURE



5. RESULTS





6. CONCLUSION

The three-valued subjective good judgment is proposed to version and compute trust between any users related inside OSNs. 3VSL introduces the uncertainty area to store proof distorted from sure spaces as trust propagates through a social network, and keeps song of proof as more than one trusts combine. We find out that there are differences among distorting and original evaluations, i.e., distorting reviews are so specific that they may be reused in agree with computation at the same time as original evaluations aren't. This property permits 3VSL to deal with complex topologies, which isn't always viable in the subjective logic version.

Based totally on 3VSL, we design the AT algorithm to compute the agree with between any pair of users in a given OSN. via recursively decomposing an arbitrary topology right into a parsing tree, we show AT is capable of compute the tree and get an appropriate consequences. An open issue to 3VSL and Opinion walk is how to estimate the value of evidences. This issue is further studied and addressed through probabilistic photo models or neural community models

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

References

[1] G. Liu, Q. Yang, H.Wang, and A. X. Liu. Three-valued subjective logic: A model for trust assessment in online social networks. *IEEE Transactions on Dependable and Secure Computing*, pages 1–1, 2019.

[2] AnirbanBasu, JaideepVaidya, Juan CamiloCorena, ShinsakuKiyomoto, Stephen Marsh, GuibingGuo, Jie

Zhang, and Yutaka Miyake. Opinions of people: Factoring in privacy and trust. *SIGAPP Appl. Comput. Rev.*, 14(3):7–21, September 2014.
[3] Paul Resnick, KoKuwabara, Richard Zeckhauser, and Eric Friedman. Reputation systems. *Communications of the ACM*, 43(12):45–48, 2000.
[4] De-Nian Yang, Hui-Ju Hung, Wang-Chien Lee, and Wei Chen. Maximizing acceptance probability for active friending in online social networks. In *19th ACM SIGKDD*, pages 713–721, 2013.
[5] Dapeng Wu, Junjie Yan, HonggangWang, Dalei Wu, and Ruyan Wang. Social attribute aware incentive mechanism for device-to-device video distribution. *IEEE Transactions on Multimedia*, 19(8):1908–1920, 2017.
[6] T. Cheng, G. Liu, Q. Yang, and J. Sun. Trust assessment in vehicular social network based on three-valued subjective logic. *IEEE Transactions on Multimedia*, 21(3):652–663,March 2019.
[7] G. Liu, Q. Chen, Q. Yang, B. Zhu, H.Wang, andW. Wang. Opinionwalk: An efficient solution to massive trust assessment in online social networks. In *IEEE INFOCOM 2017 - IEEE Conference on Computer Communica-tions*, pages 1–9, May 2017.
[8] Guangchi Liu, Qing Yang, HonggangWang, Xiaodong Lin, and M.P.Wittie. Assessment of multi-hop interpersonal trust in social networks by three-valued subjective logic. In *INFOCOM, 2014 Proceedings IEEE*, pages 1698–1706, April 2014.
26
A FULL VERSION
[9] X. Niu, G. Liu, and Q. Yang. Trustworthy website detection based on social hyperlink network analysis. *IEEE Transactions on Network Science and Engineering*, pages 1–1, 2018.
[10] Denise M Rousseau, Sim B Sitkin, Ronald S Burt, and Colin Camerer. Not so different after all: A crossdiscipline view of trust. *Academy of management review*, 23(3):393–404, 1998.
[11] D Harrison McKnight, VivekChoudhury, and Charles Kacmar. Developing and validating trust measures for e-commerce: An integrative typology. *Information systems research*, 13(3):334–359, 2002.
[12] Rino Falcone and Cristiano Castelfranchi. Social trust: A cognitive approach. In *Trust and deception in virtual societies*, pages 55–90. Springer, 2001.
[13] AudunJøsang. A logic for uncertain probabilities. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 9(03):279–311, 2001.
[14] Guangchi Liu, Qing Yang, HonggangWang, Shaoen Wu, and M. P. Wittie. Uncovering the mystery of trust in an online social network. In *2015 IEEE Conference on Communications and Network Security (CNS)*, pages 488–496, Sept 2015.
[15] Stephen Tu. The dirichlet-multinomial and dirichlet-categorical models for bayesian inference. *Computer Science Division, UC Berkeley, Tech. Rep.[Online]. Available: http://www. cs. berkeley. edu/ stephentu/writeups/dirichlet-conjugate-prior. pdf*, 2014.
[16] R. Guha, Ravi Kumar, Prabhakar Raghavan, and Andrew Tomkins. Propagation of trust and distrust. In *Proceedings of the 13th International Conference on World Wide Web*, WWW '04, pages 403–412, New York, NY, USA, 2004. ACM.
[17] Christian Borgs, Jennifer Chayes, Adam TaumanKalai, AzarakhshMalekian, andMosheTennenholtz. *A Novel Approach to Propagating Distrust*, pages 87–105. Springer Berlin Heidelberg, Berlin, Heidelberg, 2010.
[18] Cai-Nicolas Ziegler and Georg Lausen. Propagationmodels for trust and distrust in social networks. *Information Systems Frontiers*, 7(4):337–358, 2005.
[19] RamanthanGuha, Ravi Kumar, Prabhakar Raghavan, and Andrew Tomkins. Propagation of trust and distrust. In *Proceedings of the 13th international conference on World Wide Web*, pages 403–412. ACM, 2004.
[20] Yonghong Wang and Munindar P. Singh. Formal trust model for multiagent systems. In *Proceedings of the 20th International Joint Conference on Artifical Intelligence*, IJCAI'07, pages 1551–1556, San Francisco, CA, USA, 2007.Morgan Kaufmann Publishers Inc.
[21] Andreas Jakoby,MaciejLiskiewicz, and RüdigerReischuk. Space efficient algorithms for series-parallel graphs. In *STACS 2001*, pages 339–352. Springer, 2001.
[22] Chung-Wei Hang, Yonghong Wang, and Munindar P. Singh. Operators for propagating trust and their evaluation in social networks. In *Proceedings of The 8th International Conference on Autonomous Agents and Multiagent Systems - Volume 2*, AAMAS '09, pages 1025–1032, Richland, SC, 2009. International Foundation for Autonomous Agents and Multiagent Systems.
[23] Chung-Wei Hang and Munindar P Singh. Trust-based recommendation based on graph similarity. In *Proceed-ings of the 13th International Workshop on Trust in Agent Societies (TRUST). Toronto, Canada*, 2010.
[24] Chung-Wei Hang, Yonghong Wang, and Munindar P. Singh. Operators for propagating trust and their evaluation in social networks. In *Proceedings of The 8th International Conference on Autonomous Agents and Multiagent Systems - Volume 2*, AAMAS '09, pages 1025–1032, Richland, SC, 2009. International Foundation for Autonomous Agents and Multiagent Systems.
[25] f1 score. http://scikit-learn.org/stable/modules/generated/sklearn.metrics.f1_score.
[26] Daniel A Powers and Yu Xie. *Statistical methods for categorical data analysis*. Emerald Group Publishing, 2008.
[27] Jennifer Ann Golbeck. *Computing and Applying Trust in Web-based Social Networks*. PhD thesis, College Park, MD, USA, 2005. AAI3178583.
[28] ZoltánGyöngyi, Hector Garcia-Molina, and Jan Pedersen. Combating web spam with trustrank. In *Proceedings of the Thirtieth International Conference on Very Large Data Bases - Volume 30*, VLDB '04, pages 576–587. VLDB Endowment, 2004.
[29] Sepandar D. Kamvar, Mario T. Schlosser, and Hector Garcia-Molina. The eigentrust algorithm for reputation management in p2p networks. In *Proceedings of the 12th International Conference on World Wide Web*,WWW

'03, pages 640–651, New York, NY, USA, 2003. ACM.
[30] David Gefen, Elena Karahanna, and DetmarW. Straub. Trust and tam in online shopping: An integrated model. *MIS Q.*, 27(1):51–90,March 2003.
[31] Diego Gambetta. *Trust: Making and Breaking Cooperative Relations*, volume 52. Blackwell, 1988.
[32] Patricia M Doney and Joseph P Cannon. An examination of the nature of trust in buyer-seller relationships. *the Journal of Marketing*, pages 35–51, 1997.
[33] Christine Moorman, Gerald Zaltman, and RohitDeshpande. Relationships between providers and users of market research: The dynamics of trust. *Journal of marketing research*, 29(3):314–328, 1992.
[34] Shankar Ganesan. Determinants of long-termorientation in buyer-seller relationships. *the Journal ofMarketing*, pages 1–19, 1994.
[35] Sirkka L Jarvenpaa, Noam Tractinsky, and Lauri Saarinen. Consumer trust in an internet store: a cross-cultural validation. *Journal of Computer-Mediated Communication*, 5(2):0–0, 1999.
[36] Wei Wei, FengyuanXu, C.C. Tan, and Qun Li. Sybildefender: Defend against sybil attacks in large social networks. In *INFOCOM, 2012 Proceedings IEEE*, pages 1951–1959,March 2012.
[37] George Danezis and Prateek Mittal. SybilInfer: Detecting sybil nodes using social networks. In *Proceedings of the Network and Distributed System Security Symposium, NDSS 2009, San Diego, California, USA, 8th February - 11th February 2009*, 2009.
[38] Haifeng Yu, Michael Kaminsky, Phillip B. Gibbons, and Abraham D. Flaxman. Sybilguard: Defending against sybil attacks via social networks. *IEEE/ACM Trans. Netw.*, 16(3):576–589, June 2008.
[39] Haifeng Yu, P.B. Gibbons, M. Kaminsky, and Feng Xiao. SybilLimit: A near-optimal social network defense against sybil attacks. *Networking, IEEE/ACM Transactions on*, 18(3):885–898, June 2010.
[40] T. DuBois, J. Golbeck, and A. Srinivasan. Rigorous probabilistic trust-inference with applications to clustering. In *Web Intelligence and Intelligent Agent Technologies, 2009. WI-IAT '09. IEEE/WIC/ACM International Joint Conferences on*, volume 1, pages 655–658, Sept 2009.
[41] YanjunZuo, Wen-chen Hu, and Timothy O'Keefe. Trust computing for social networking. In *Information Technology: New Generations, 2009. ITNG'09. Sixth International Conference on*, pages 1534–1539. IEEE, 2009.
[42] Jennifer Ann Golbeck. Computing and applying trust in web-based social networks. 2005.
[43] Yu Zhang, Huajun Chen, and Zhaohui Wu. A social network-based trust model for the semantic web. In LaurenceT. Yang, Hai Jin, Jianhua Ma, and Theo Ungerer, editors, *Autonomic and Trusted Computing*, volume 4158 of *Lecture Notes in Computer Science*, pages 183–192. Springer Berlin Heidelberg, 2006.
[44] Lawrence Page, Sergey Brin, Rajeev Motwani, and Terry Winograd. The pagerank citation ranking: Bringing order to the web. Technical report, Stanford InfoLab, 1999.
[45] ZoranDespotovic and Karl Aberer. Probabilistic prediction of peers' performance in {P2P} networks. *Engineering Applications of Artificial Intelligence*, 18(7):771 – 780, 2005.
[46] WT Teacy, Michael Luck, Alex Rogers, and Nicholas R Jennings. An efficient and versatile approach to trust and reputation using hierarchical Bayesian modelling. *Artificial Intelligence*, 193(0):149 – 185, 2012.
[47] EhabElSalamouny, VladimiroSassone, and Mogens Nielsen. HMM-based trust model. In *Formal Aspects in Security and Trust*, pages 21–35. Springer, 2010.
[48] Xin Liu and AnwitamanDatta. Modeling context aware dynamic trust using hidden markov model. In *AAAI*, 2012.
[49] George Vogiatzis, Ian MacGillivray, andMariaChli. A probabilistic model for trust and reputation. In *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems: volume 1-Volume 1*, pages 225–232. International Foundation for Autonomous Agents and Multiagent Systems, 2010.
[50] Carol J Fung, Jie Zhang, IssamAib, and RaoufBoutaba. Dirichlet-based trust management for effective collaborative intrusion detection networks. *Network and Service Management, IEEE Transactions on*, 8(2):79–91, 2011.
[51] AudunJøsang and Simon Pope. Semantic constraints for trust transitivity. In *Proceedings of the 2Nd Asia-Pacific Conference on Conceptual Modelling - Volume 43*, APCCM '05, pages 59–68, Darlinghurst, Australia, Australia, 2005. Australian Computer Society, Inc.
[52] A. Josang and T. Bhuiyan. Optimal trust network analysis with subjective logic. In *Emerging Security Information, Systems and Technologies, 2008. SECURWARE '08. Second International Conference on*, pages 179–184, Aug 2008.
28
A FULL VERSION
[53] YonghongWang and Munindar P Singh. Trust representation and aggregation in a distributed agent system. In *AAAI*, volume 6, pages 1425–1430, 2006.

Authors Biography

N.Poojitha currently pursuing MCA in SVKP & Dr.K.SRaju Arts & Science College affiliated to Adikavi Nannaya University, Rajamahendravaram. His research interests include Data Structures, WebTechnologies, Operating Systems and Data Science.

B.N.Srinivasa Gupta is working as Associate Professor in SVKP &Dr K S Raju Arts & Science College, Penugonda, A.P. He received Masters Degree in Computer Applications from Andhra University and Computer Science & Engineering from Jawaharlal Nehru Technological University Kakinada (JNTUK),Kakinada, India. His research interests include Data Mining, Cyber Security, Artificial Intelligence