July 2025: Top 10 Cited Articles in Software Engineering & Applications

International Journal of Software Engineering & Applications (IJSEA)** ERA Indexed **

ISSN : 0975 - 9018 (Online); 0976-2221 (Print)

https://www.airccse.org/journal/ijsea/ijsea.html

Citations, h-index, i10-index

Citations 5652 h-index 35 i10-index 123

A REVIEW OF SOFTWARE QUALITY MODELS FOR THE EVALUATION OF SOFTWARE PRODUCTS

José P. Miguel[1], David Mauricio[2] and Glen Rodríguez[3]

[1]Universidad Peruana Cayetano Heredia, Peru
[2]National University of San Marcos,Peru
[3]National University of Engineering, Peru

ABSTRACT

Actually, software products are increasing in a fast way and are used in almost all activities of human life. Consequently measuring and evaluating the quality of a software product has become a critical task for many companies. Several models have been proposed to help diverse types of users with quality issues. The development of techniques for building software has influenced the creation of models to assess the quality. Since 2000 the construction of software started to depend on generated or manufactured components and gave rise to new challenges for assessing quality. These components introduce new concepts such as configurability, reusability, availability, better quality and lower cost. Consequently the models are classified in basic models which were developed until 2000, and those based on components called tailored quality models. The purpose of this article is to describe the main models with their strengths and point out some deficiencies. In this work, we conclude that in the present age, aspects of communications play an important factor in the quality of software.

KEYWORDS

Software Quality, Models, Software quality models, Software components, COTS.

For More Details : **https://airccse.org/journal/ijsea/papers/5614ijsea03.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol5.html**

REFERENCES

[1] Côte M & Suryn W & Georgiadou E. (2007).) "In search for a widely applicable and accepted software quality model for software quality engineering paper," Software Quality Journal, 15, 401– 416

[2] IEEE. (1990). IEEE Std 610.12-1990 (1990)- "IEEE Standard Glossary of Software Engineering Terminology," http://web.ecs.baylor.edu/faculty/grabow/Fall2013/csi3374/secure/Standards/IEEE610.12.pd f

[3] IEEE. (1998). Standard for Software Maintenance, Software Engineering Standards Subcommittee of the IEEE Computer Society.

[4] Xu Lai & Sjaak Brinkkemper. (2007). "Concepts of Product Software: Paving the Road for Urgently Needed Research," Technical report, Institute of Information and Computing Sciences, Utrecht University, The Netherlands. European Journal of Information Systems 16, 531–541.

[5] ISO/IEC IS 9126-1. (2001). Software Engineering - Product Quality – Part 1: Quality Model. International Organization for Standarization, Geneva, Switzerland.

[6] Thapar SS & Singh P & Rani S. (2012). "Challenges to the Development of Standard Software Quality Model," International Journal of Computer Applications (0975 – 8887) Volume 49– No.10, pp 1-7.

[7] Mc Call, J. A. &, Richards, P. K. & Walters, G. F. (1977). Factors in Software Quality, Volumes I,II, and III. US Rome Air Development Center Reports, US Department of Commerce, USA.

[8] Boehm, B. W., Brown, H., Lipow,M. (1978) "Quantitative Evaluation of Software Quality," TRW Systems and Energy Group, 1978

[9] Grady, R. B. (1992). Practical Software Metrics for Project Management and Process Improvement. Prentice Hall, Englewood Cliffs, NJ, USA

[10] Dromey, R. G. (1995). "A model for software product quality," IEEE Transactions on Software Engineering, 21:146-162

[11] ISO/IEC TR 9126-2. (2003). Software Engineering - Product Quality - Part 2: External Metrics. International Organization for Standardization, Geneva, Switzerland.

[12] ISO/IEC TR 9126-3. (2003): Software Engineering - Product Quality - Part 3: Internal Metrics, International Organization for Standardization, Geneva, Switzerland.

[13] ISO/IEC TR 9126-4. (2004): Software Engineering - Product Quality - Part 4: Quality in Use Metrics. International Organization for Standardization, Geneva, Switzerland.

[14] ISO/ IEC CD 25010. (2008). Software Engineering: Software Product Quality Requirements and Evaluation (SQuaRE) Quality Model and guide. International Organization for Standardization, Geneva, Switzerland.

[15] Bertoa, M & Vallecillo A. (2002). "Quality Attributes for COTS Components," I+D Computación, Vol 1, Nro 2, 128-144.

[16] Georgiadoui, Elli "GEQUAMO-A Generic, Multilayered, Customizable Software Quality model, Software Quality Journal, 11, 4, 313-323. DOI=10.1023/A:1025817312035

[17] Alvaro A & Almeida E.S. & Meira S.R.L. (2005). "Towards a Software Component Quality Model," Submitted to the 5th International Conference on Quality Software (QSIC).

[18] Rawashdeh A, & Matalkah Bassem. (2006). "A New Software Quality Model for Evaluating COTS Components," Journal of Computer Science 2 (4): 373-381, 2006

[19] Klas Michael & Constanza Lampasona & Jurgen Munch. (2011). "Adapting Software Quality Models: Practical Challenges, Approach, and First Empirical Results," 37th EUROMICRO Conference on Software Engineering and Advanced Applications, 978-0-7695-4488-5/11, IEEE pp. 341-348

[20] Ayala Claudia & Hauge, Øyvind & Conradi Reidar & Franch Xavier & Li Jingyue. (2010). "Selection of third party software in Off-The-Shelf-based software development—An interview study with industrial practitioners," The Journal of Systems and Software, pp 24- 36

[21] Samarthyam G & Suryanarayana G & Sharma T, Gupta S. (2013). "MIDAS: A Design Quality Assessment Method for Industrial Software," Software Engineering in Practice, ICSE 2013, San Francisco, CA, USA, pp 911-920

[22] Pensionwar Rutuja K & Mishra Anilkumar & Singh Latika. (2013). "A Systematic Study Of Software Quality – The Objective Of Many Organizations, " International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 5.

[23] Trendowicz, A & Punter, T. (2003) "Quality modeling for software product lines," Proceedings of the 7th ECOOP Workshop on Quantitative Approaches in Object-Oriented Software Engineering, QAOOSE, Darmstadt, Germany

[24] Al-Badareen Anas Bassam. (2011). "Software Quality Evaluation: User's View," International

Journal of Applied Mathematics and Informatics, Issue 3, Volume 5, pp 200- 207.
[25] Dubey, S.K & Soumi Ghosh & Ajay Rana. (2012). "Comparison of Software Quality Models: An Analytical Approach," International Journal of Emerging Technology and Advanced Engineering, Volume 2, Issue 2, pp 111-119
[26] Al-Qutaish, Rafa E. (2010). "Quality Models in Software Engineering Lite
[27] Ghayathri J & Priya E. M. (2013) "Software Quality Models: A Comparative Study," International Journal of Advanced Research in Computer Science and Electronics Engineering (IJARCSEE) ,Volume 2, Issue 1, pp 42-51.
[28] Samadhiya Durgesh & Wang Su-Hua & Chen Dengjie.(2010), "Quality Models: Role and Value in Software Engineering," 2nd International Conference on Software Technology and Engineering(ICSTE). Pp 320-324.
[29] ASQ (2007). American Society for Quality. Glossary. http://www.asq.org/glossary/q.html , jan 2007.
[30] Alvaro A. &. Almeida E.S & Meira. S.R.L (2010). "A Software Component Quality Framework," ACM SIGSOFT SEN 35, 1 (Mar. 2010), 1-4.
[31] Glott R. & Arne-Kristian Groven & Kirsten Haaland & Anna Tannenberg. (2010). "Quality models for Free/Libre Open Source Software– towards the "Silver Bullet"?," EUROMICRO Conference on Software Engineering and Advanced Applications IEEE Computer Society, 439-446.
[32] Adewumi Adewole, Sanjay Misra and Nicholas Omoregbe. (2013). "A Review of Models for Evaluating Quality in Open Source Software," 2013 International Conference on Electronic Engineering and Computer Science, IERI Procedia 4, 88 – 92.
[33] Haaland K & Groven AK & Regnesentral N & Glott R & Tannenberg A. (2010). "Free/Libre Open Source Quality Models-a comparisonbetween two approaches," 4th FLOS International Workshop on Free/Libre/Open Source Software, pp. 1-17.
[34] Duijnhouwer FW & Widdows. (2003). "C. Open Source Maturity Model, ". Capgemini Expert Letter.
[35] Wasserman AI & Pal M & Chan C. (2006). "Business Readiness Rating for Open Source," Proceedings of the EFOSS Workshop, Como, Italy.
[36] Samoladas I & Gousios G & Spinellis D & Stamelos I. (2008). "The SQO-OSS quality model: measurement based open source software evaluation," Open source development, communities and quality. 237-248.
[37] AL-Badareen Anas Bassam & Mohd Hasan Selamat & Marzanah A. Jabar & Jamilah Din & Sherzod Turaev. (2011). "Software Quality Models: A Comparative Study", J.M. Z

E-Government Maturity Models: A Comparative Study

Abdoullah Fath-Allah[1], Laila Cheikhi[1], Rafa E. Al-Qutaish[2] and Ali Idri[1]

[1]Mohammed V University, Morocco
[2]University of Québec, Canada

ABSTRACT

Many maturity models have been used to assess or rank e-government portals. In order to assess electronic services provided to the citizens, an appropriate e-government maturity model should be selected. This paper aims at comparing 25 e-government maturity models to find the similarities and differences between them and also to identify their weaknesses and strengths. Although the maturity models present large similarities between them, our findings show that the features included in those models differ from a maturity model to another. Furthermore, while some maturity models are covering some features and introducing new ones, it seems that others are just ignoring them.

KEYWORDS

E-government, portal, maturity model, comparison, best practices, e-services, maturity stages

For More Details : **https://airccse.org/journal/ijsea/papers/5314ijsea06.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol5.html**

REFERENCES

[1] Lee, S.hyun. & Kim Mi Na, (2008) "This is my paper", ABC Transactions on ECE, Vol. 10, No. 5, pp120-122.

[2] Gizem, Aksahya & Ayese, Ozcan (2009) Coomunications & Networks, Network Books, ABC Publishers.

[3] Concha, G., Astudillo, H., Porrúa, M., & Pimenta, C. (2012). E-Government procurement observatory, maturity model and early measurements. Government Information Quarterly, 29, S43–S50.

[4] KPMG. (2000). e-Government Capacity Check Diagnostic Tool. Retrieved April 17, 2014, from http://www.tbs-sct.gc.ca/emf-cag/risk-risques/tools-outils-eng.asp

[5] Cresswell, A. M., Pardo, T. A., & Canestraro, D. S. (2006). Digital capability assessment for eGovernment: A multi-dimensional approach. In Electronic Government (pp. 293–304). Springer. Retrieved from http://link.springer.com/chapter/10.1007/11823100_26

[6] Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. Government Information Quarterly, 18(2), 122–136.

[7] Andersen, K. V., & Henriksen, H. Z. (2006). E-government maturity models: Extension of the Layne and Lee model. Government Information Quarterly, 23(2), 236–248.

[8] United-Nations. (2012). UN E-Government Survey 2012: E-Government for the People. Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf

[9] Alhomod, S. M., Shafi, M. M., Kousarrizi, M. N., Seiti, F., Teshnehlab, M., Susanto, H., Batawi, Y. A. (2012). Best Practices in E government: A review of Some Innovative Models Proposed in Different Countries. International Journal of Electrical & Computer Sciences, 12(01), 1–6.

[10] Hiller, J. S., & Belanger, F. (2001). Privacy strategies for electronic government. E-Government, 200, 162–198.

[11] Almazan, R. S., & Gil-Garcia, J. R. (2008). E-Government Portals in Mexico. Retrieved from http://www.igi-global.com/chapter/electronic-government-concepts-methodologies-tools/9818

[12] Cisco IBSG. (2007). e-Government Best Practices learning from success, avoiding the pitfalls. Retrieved from http://siteresources.worldbank.org/EXTEDEVELOPMENT/Resources/20080222_Phil_eGov_workshop.pdf?resourceurlname=20080222_Phil_eGov_workshop.pdf

[13] Baum, C., & Di Maio, A. (2000). Gartner's four phases of e-government model. Gartner Group.

[14] West, D. M. (2004). E-Government and the Transformation of Service Delivery and Citizen Attitudes. Public Administration Review, 64(1), 15–27.

[15] Moon, M. J. (2002). The Evolution of E-Government among Municipalities: Rhetoric or Reality? Public Administration Review, 62(4), 424–433.

[16] Toasaki, Y. (2003). e-Government from A User's Perspective. APEC telecommunication and information working group, Chinese Taipei.

[17] Deloitte Consulting, & Deloitte & Touche. (2000). At the dawn of e-government: The citizen as customer. New York: Deloitte Research. Retrieved from http://www.egov.vic.gov.au/pdfs/egovernment.pdf

[18] Howard, M. (2001). E-government across the globe: how will'e'change government. E-Government, 90, 80.

[19] Shahkooh, K. A., Saghafi, F., & Abdollahi, A. (2008). A proposed model for e-Government maturity. In Information and Communication Technologies: From Theory to Applications, 2008. ICTTA 2008. 3rd International Conference on (pp. 1–5). Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=4529948

[20] Lee, G., & Kwak, Y. H. (2012). An Open Government Maturity Model for social media-based public engagement. Government Information Quarterly. Retrieved from http://www.sciencedirect.com/

[21] science/article/pii/S0740624X1200086X

[22] Siau, K., & Long, Y. (2005). Synthesizing e-government stage models–a meta-synthesis based on metaethnography approach. Industrial Management & Data Systems, 105(4), 443–458.

[23] Wescott, C. G. (2001). E-Government in the Asia-pacific region. Asian Journal of Political Science, 9(2), 1–24.

[24] Chandler, S., & Emanuels, S. (2002). Transformation not automation. In Proceedings of 2nd EuropeanConference on E-government (pp. 91–102). Retrieved from http://books.google.com/books?hl=en

&lr=&id=3YZP9nBw7AUC&oi=fnd&pg=PA92&dq=Transformation+not+automation&ots=aFmYqHo V3x&sig=61L6hnIMq50kPKoh9ujsdITEDD4
[25] Kim, D.-Y., & Grant, G. (2010). E-government maturity model using the capability maturity model integration. Journal of Systems and Information Technology, 12(3), 230–244.
[26] Chen, J., Yan, Y., & Mingins, C. (2011). A Three-Dimensional Model for E-Government Development with Cases in China's Regional E-Government Practice and Experience. In Management of e-Commerce and e-Government (ICMeCG), 2011 Fifth International Conference on (pp. 113–120). Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6092643
[27] Windley, P. J. (2002). eGovernment maturity. USA: Windleys' Technolometria. Retrieved from http://www.windley.com/docs/eGovernment%20Maturity.pdf
[28] Reddick, C. G. (2004). A two-stage model of e-government growth: Theories and empirical evidence for US cities. Government Information Quarterly, 21(1), 51–64.
[29] Rohleder, S. J., & Jupp, V. (2003). e-government Leadership: Engaging the customer. Accenture.
[30] N.A.O. (2002). Government on the Web II. Retrieved from http://www.nao.org.uk/publications/0102/government_on_the_web_ii. aspx
[31] Netchaeva, I. (2002). E-Government and E-Democracy A Comparison of Opportunities in the North and South. International Communication Gazette, 64(5), 467–477.
[32] UN, & ASPA. (2001). Benchmarking E-government: A Global Perspective. Retrieved from unpan1.un.org/intradoc/groups/public/documents/un/unpan021547.pdf
[33] Holden, S. H., Norris, D. F., & Fletcher, P. D. (2003). Electronic government at the local level: Progress to date and future issues. Public Performance & Management Review, 325–344.
[34] Karokola, G., & Yngström, L. (2009). Discussing E-Government Maturity Models for Developing World-Security View. In Proceedings of the Information Security South Africa Conference (pp. 81–98). Retrieved from http://www.researchgate.net/publication/220803190_A_Framework_for_Web_Services_Security_Policy_Negotiation/file/9fcfd50f7d806aafc8.pdf#page=101

FACTORS INFLUENCING QUALITY OF MOBILE APPS: ROLE OF MOBILE APP DEVELOPMENT LIFE CYCLE

Venkata N Inukollu[1], Divya D Keshamon[1], Taeghyun Kang[2] and Manikanta Inukollu[3]

[1]Texas Tech University, USA
[2]Wake forest university, USA and 3Bhaskar Engineering College, India

ABSTRACT

In this paper, The mobile application field has been receiving astronomical attention from the past few years due to the growing number of mobile app downloads and withal due to the revenues being engendered .With the surge in the number of apps, the number of lamentable apps/failing apps has withal been growing. Interesting mobile app statistics are included in this paper which might avail the developers understand the concerns and merits of mobile apps. The authors have made an effort to integrate all the crucial factors that cause apps to fail which include negligence by the developers, technical issues, inadequate marketing efforts, and high prospects of the users/ consumers. The paper provides suggestions to eschew failure of apps. As per the various surveys, the number of lamentable/failing apps is growing enormously, primarily because mobile app developers are not adopting a standard development life cycle for the development of apps. In this paper, we have developed a mobile application with the aid of traditional software development life cycle phases (Requirements, Design, Develop, Test, and, Maintenance) and we have used UML, M-UML, and mobile application development technologies.

KEYWORDS

Mobile applications, low quality/bad apps, mobile apps marketing, Mobile Application development, Mobile Software Engineering, M-UML, UML

For More Details : **https://airccse.org/journal/ijsea/papers/5514ijsea02.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol5.html**

REFERENCES

[1] Mobile application history, http://en.wikipedia.org/wiki/Mobile_app

[2] Mobile Stats, http://www.slideshare.net/vaibhavkubadia75/mobile-web-vs-mobile-apps27540693?from_search=1

[3] Mobile Website vs Apps, http://www.hswsolutions.com/services/mobile-web-development/mobilewebsite-vs-apps/

[4] Uskov, V.L., "Mobile software engineering in mobile computing curriculum," Interdisciplinary Engineering Design Education Conference (IEDEC), pp.93,99, 4-5 March 2013

[5] Users Reveal Top Frustrations that Lead to Bad Mobile App Reviews, statistics report https://blog.apigee.com/detail/users_reveal_top_frustrations_that_lead_to_bad_mobile_app_ reviews_ infographic

[6] Wooldridge, Dave, and Michael Schneider. The business of iPhone app development: Making and marketing apps that succeed. Apress, 2010

[7] Android applications stats report, http://www.appbrain.com/stats/number-of-android-apps

[8] An App "Middle Class" Continues To Grow, http://techcrunch.com/2013/11/08/an-app- middle-classcontinues-to-grow-independently-owned-apps-with-a-million-plus-users-up- 121-in-past-18-months

[9] Developers attitude towards app marketing, http://appflood.com/appflood-wordpress/wpcontent/uploads/2013/06/AppFlood-Developer-Attitudes-to-App-Marketing- 2013.pdf

[10] When mobile apps go bad, http://www.infoworld.com/d/mobile-technology/when-mobile- apps-gobad-178063

[11] Make a good app to great app http://gigaom.com/2008/03/26/what-makes-a-good-mobile-applicationgreat/

[12] Wasserman, Tony. "Software engineering issues for mobile application development." FoSER 2010 (2010)

[13] Pekka Abrahamsson, "Mobile-D: an agile approach for mobile application development' Approach" Conference on Object Oriented Programming Systems Languages and Applications, pp l74 - 175, 2004.

[14] Tracy, Kim W. "Mobile Application Development Experiences on Apple's iOS and Android OS." Potentials, IEEE 31, no. 4 (2012): 30-34.

[15] Jeong, Yang-Jae, Ji-Hyeon Lee, and Gyu-Sang Shin. "Development process of mobile applicationSW based on agile methodology." In Advanced Communication Technology, 2008. ICACT 2008. 10th International Conference on, vol. 1, pp. 362-366. IEEE, 2008.

[16] Agboma, Florence, and Antonio Liotta. "Addressing user expectations in mobile content delivery." Mobile Information Systems 3, no. 3 (2007):153-164.

[17] Inukollu, Venkata Narasimha, Sailaja Arsi, and Srinivasa Rao Ravuri. " High level view of cloud security: issues and solutions." International Journal of Computer Science & Information Technology 6, no. 2 (2014).

[18] Pressman, Roger S., and Darrel Ince. Software engineering: a practitioner's approach. Vol. 5. New York: McGraw-hill, 1992.

[19] Rubin, K. Essential Scrum: A Practical Guide to the Most Popular Agile Process. Addison-WesleyProfessional, 2012.

[20] Wasserman, Tony. "Software engineering issues for mobile application development." FoSER 2010 (2010).

[21] Kniberg, H. Scrum and XP from the Trenches (Enterprise Software Development). Lulu, come, 2007

[22] World Mobile Applications Market - Advanced Technologies, Global Forecast (2010 - 2015) reportby Markets&Markets,http://www.marketsandmarkets.com /Market-Reports/mobile- applications228.html

[23] “Worldwide and U.S. Mobile Applications,Storefronts, and Developer 2010 – 2014 Forecasts and Year-End 2010 Vendor Market Shares: The "Appification" of Everything” report by IDC, http://www.idc.com/
[24] Mobile application development tools and techniques, http://en.wikipedia.org/wiki/Mobile_application_development
[25] G. Booch, J. Rumbaugh, I. Jacobson, The Unified Modeling Language User Guide, Addison- Wesley, Reading, MA, 1998.
[26] Saleh, Kassem, and Christo El-Morr.the "M-UML: an extension to UML for the modeling of mobile agent-based software systems." Information and Software Technology 46, no. 4 (2004): 219-227.
[27] Social,networking,history,principles,http://en.wikipedia.org/wiki/Social_network
[28] Tracy, Kim W. "Mobile Application Development Experiences on Apple’s iOS and Android OS." Potentials, IEEE 31, no. 4 (2012): 30-34.
[29] Android SDK, http://developer.android.com/sdk/index.html
[30] Kalra, Gursev. "Mobile Application Security Testing." Foundstone Professional Services, a division of McAfee, http://www. foundstone. com (2009).
[31] Thompson, Chris, Jules White, Brian Dougherty, and Douglas C. Schmidt. "Optimizing mobile application performance with model–driven engineering." In Software Technologies for Embedded and Ubiquitous Systems, pp. 36-46. Springer Berlin Heidelberg, 2009.
[32] Pekka Abrahamsson, "Mobile-D: an agile approach for mobile application development' Approach" Conference on Object Oriented Programming Systems Languages and Applications, ppl74 - 175, 2004.
[33] Yang-Jae Jeong; Ji-Hyeon Lee; Gyu-Sang Shin, "Development Process of Mobile Application SW Based on Agile Methodology," Advanced Communication Technology, 2008. ICACT 2008. 10th International Conference on, pp.362,366, 17-20 Feb. 2008

PEOPLE FACTORS IN AGILE SOFTWARE DEVELOPMENT AND PROJECT MANAGEMENT

Vikash Lalsing[1], Somveer Kishnah[2] and Sameerchand Pudaruth[3]

[1]TNT Express ICS Mauritius, Ebene Cybercity, Rose Hill
[2]University of Mauritius, Reduit, Moka

ABSTRACT

With the increasing popularity of Agile Methods, many software organisations are moving away from traditional methods to adopt Agile development methodologies. Instead of being predictive, Agile is rather adaptive and people-focussed. It advocates a small and collaborative team that work closely together. But team size is a factor that is in turn constrained by people factors. When implementing Agile, these key factors are often overlooked. This study aims at identifying the underlying people factors to consider when adopting Agile for a team to be effective. The method used is the study of three different sized Agile teams developing products based on the same technologies and using Scrum. Both objective and subjective measures were used and the results are supported by a survey. The results clearly show that for agile methodologies to work well, it is crucial to select the right people for the right team.

KEYWORDS

Agile Methodology, Scrum, Agile Teams, Software Development, Project Management

For More Details : **https://airccse.org/journal/ijsea/papers/3112ijsea09.pdf**
Volume Link : **https://www.airccse.org/journal/ijsea/vol3.html**

REFERENCES

[1] Abilla, P., 2006. Team Dynamics: Size Matters Redux. [Online]. Available: http://www.shmula.com/team-dynamics-size-matters-redux/182/. [Accessed: 27th April 2011]

[2] Agile Manifesto (2011). The Agile Manifesto. [Online]. Available : www.Agilemanifesto.org. [Accessed: 10th August 2011)

[3] Ambler, S.W., 2010a. 2010 IT Project Success Survey. [Online]. Available: http://www.ambysoft.com/surveys/success2010.html. [Accessed: 1st April 2011]

[4] Ancona, D.G., Caldwell, D.F., 1992. Work-groups; Organizational-climate; Organizationaleffectiveness. Administrative Science Quarterly. 37(??)p. 634-65.

[5] Baddeley A, Della Sala, S., 1996. Working memory and executive control. Philos. Trans. R. Soc. Lond., B, Biol. Sci. 351 (1346): 1397–403.

[6] Boehm, B., 1981, Software Engineering Economics, Englewood Cliffs, N.J., USA, Prentice- Hall.

[7] Bahli, B. and Bu¨yu¨kkurt, M.D., 2005. Group performance in information systems project groups: an empirical study, Journal of Information Technology Education, Vol. 4.

[8] Bustamante, A., Sawhney, R., 2011. Agile XXL: Scaling Agile for Project Teams, Seapine Software, Inc.

[9] Brady, K., 2006. AGILE/SCRUM Fails to get to grips with Human Psychology. [Online]. Available: http://www.claretyconsulting.com/it/comments/Agile-Scrum-fails-to-get-to- grips-with-humanpsychology/2006-08-17/. [Accessed : 3rd August 2011]

[10] Conboy, K. Coyle, S. Lero, X.W. Pikkarainen, M., 2011. People over Process: Key Challenges in Agile Development July/August 2011 (vol. 28 no. 4) pp. 48-57

[11] Csíkszentmihályi, M., 1990. Flow: The Psychology of Optimal Experience. New York: Harper and Row, ISBN 0-06-092043-2.

[12] Fayol, H., 1917. (French), Administration industrielle et générale; prévoyance, organisation, commandement, coordination, contrôle. Paris, H. Dunod et E. Pinat.

[13] Hastie, S., 2004. The Agile Mindset: what does it take to make this stuff work? Software Education Associates Ltd, Agile Development Conference Wellington & Sydney, September 2004

[14] Huckman, R.S., Staats, B.R. and Upton, D.M., 2009. Team familiarity, role experience, and performance: evidence from Indian Software Services, Management Science, Vol. 55 No. 1, pp. 85-100.

[15] Johnson, R., 2008. Six Principles of Effective Management. [Online]. Available: http://ezinearticles.com/?Six-Principles-of-Effective-Team-Management&id=1803062. [Accessed: 28th March 2011]

[16] Kemerer, C., 1989. An agenda for research in the managerial evaluation of computer-aided software engineering (CASE) tool impacts, Proceedings of the 22nd Annual Hawaii International Conference on System Sciences, Hawaii, pp. 219-28.

[17] Lencioni, P., 2002. The Five Dysfunctions of a Team. Jossey-Bass

[18] Ong, A., Tan, G.W. and Kankanhalli, A., 2005. Team expertise and performance in information systems development projects, Proceedings of the 9th Asia Pacific Conference on Information Systems, Bangkok, Thailand, July 7-10.

[19] Standish Group., 2009. Chaos Report 2009. [Online]. Available from: http://www1.standishgroup.com/newsroom/chaos_2009.php. [Accessed 20th May 2011].

[20] Sudhakar, G.P. Farooq, A. Patnaik, S., 2011. Soft factors affecting the performance of software development teams. Team Performance Management Vol. 17 No. 3/4, 2011 pp. 187- 205

[21] Tuckman, B., 1965. Developmental sequence in small groups. Psychological Bulletin 63 (6): 384–99

[22] Whitworth, E., 2006. Agile Experience: Communication and Collaboration in Agile Software Development Teams. M.A Carleton University, Canada.

Different Approaches To Black box Testing Technique For Finding Errors

Mohd. Ehmer Khan,Al Musanna

College of Technology, Sultanate of Oman

ABSTRACT

Software testing is the process of analyzing software to find the difference between required and existing condition. Software testing is performed throughout the development cycle of software and it is also performed to build quality software, for this purpose two basic testing approaches are used, they are white box testing and black box testing. One of the software testing technique which I have explain in my paper is Black Box Testing, it is a method of generating test cases that are independent of software internal structure, I have also briefly explore various different approaches to black box testing technique for finding errors. Since black box testing is always based either directly or indirectly on the software specification so it is also called specification based testing.

KEYWORDS

Equivalence Partitioning, Boundary Value Analysis, Fuzz Testing, Orthogonal Array Testing, All Pair Testing

For More Details : **https://www.airccse.org/journal/ijsea/papers/1011ijsea04.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol2.html**

REFERENCES

[1] Black Box Test Tool available at https://buildsecurityin.us-cert.gov/bsi/articles/tools/blackbox/261-BSI.html

[2] Advantages and Disadvantages of Black Box Testing available at http://www.geekinterview.com/blogs/243-advantages-and-disadvantages-black-box-testing.html

[3] The Pros and Cons of Black Box Testing Technique available at http://www.testplant.com/download_files/BB_vs_WB_testing.pdf

[4] Black Box Testing available at http://www.webopedia.com/TERM/B/Black_Box_Testing.html

[5] An Integrated Approach to Software Engineering (Third Edition) by Pankaj Jalote, published in Narosa Publishing House Pvt. Ltd.

[6] Black Box Testing available at http://www.softwaretestinghelp.com/black-box-testing/

[7] Boundary Value Analysis by Blake Neate (327966) available at http://www.cs.swan.ac.uk/~csmarkus/CS339/dissertations/NeateB.pdf

[8] Fuzzing available at https://www.owasp.org/index.php/Fuzzing

[9] Example of Cause Effect Graph proposed by G. J. Mayers on 13/9/2007

[10] Standard glossary of terms used in Software Testing (ISTQB) version 2.1 (dd. April 1st, 2010) by Erik van Veenendaal (The Netherlands)

[11] Orthogonal Testing available at http://mytestingexp.wordpress.com/2010/08/05/orthogonaltesting-and-pairwise-testing/

[12] The new age of Black Box Testing available at http://www.globalservicesmedia.com/ITOutsourcing/Product-Development/The-New-Age-of-Black-BoxTesting/22/4/0/GS100208218035

AUTHORS

Mohd. Ehmer Khan I completed my B.Sc in 1997 and M.C.A. in 2001 from Aligarh Muslim University, Aligarh, India, and pursuing Ph.D (Computer Science) from Singhania University, Jhunjhunu, India. I have worked as a lecturer at Aligarh College Engineering & Management, Aligarh, India from 1999 to 2003. From 2003 to 2005 worked as a lecturer at Institute of Foreign Trade & Management, Moradabad, India. From 2006 to present working as a lecturer in the Department of Information Technology, Al Musanna College of Technology, Ministry of Manpower, Sultanate of Oman. I am recipient of PG Merit Scholarship in MCA. My research area is software engineering with special interest in driving and monitoring program executions to find bugs, using various software testing techniques

FORMALIZATION OF THE DATA FLOW DIAGRAM RULES FOR CONSISTENCY CHECK

Rosziati Ibrahim and Siow Yen Yen

Universiti Tun Hussein Onn Malaysia (UTHM], Malaysia

ABSTRACT

In system development life cycle (SDLC), a system model can be developed using Data Flow Diagram (DFD). DFD is graphical diagrams for specifying, constructing and visualizing the model of a system. DFD is used in defining the requirements in a graphical view. In this paper, we focus on DFD and its rules for drawing and defining the diagrams. We then formalize these rules and develop the tool based on the formalized rules. The formalized rules for consistency check between the diagrams are used in developing the tool. This is to ensure the syntax for drawing the diagrams is correct and strictly followed. The tool automates the process of manual consistency check between data flow diagrams.

KEYWORDS

Consistency Check, Context Diagram, Data Flow Diagram, Formal Method

For More Details :**https://airccse.org/journal/ijsea/papers/1010ijsea6.pdf**
Volume Link : **https://www.airccse.org/journal/ijsea/vol1.html**

REFERENCES

[1] Ahmed Jilani, A. A., Nadeem, A., Kim, T. H. and Cho, E. S. (2008). Formal Representations of the Data Flow Diagram: A Survey. Proc. of the 2008 Advanced Software Engineering and Its Applications. Washington, USA: IEEE Computer Society. pp. 153-158.

[2] Lucas, F.J., Molina, F. and Toval, A. (2009). A Systematic Review of UML Model Consistency Management. Information and Software Technology, 51(12), pp. 1 – 15.

[3] Dennis, A., Wixom, B.H. and Roth, R.M. (2006). Systems Analysis and Design. 3rd ed. Hoboken: John Wiley & Sons, Inc.

[4] Dixit, J. B. and Kumar, R. (2008). Structured System Analysis and Design. Paperback ed. New Delhi, India: Laxmi Publisher.

[5] Tao, Y.L. and Kung, C.H. (1991). Formal Definition and Verification of Data Flow Diagrams. Journal of Systems and Software, 16(1), pp. 29-36.

[6] Tong, L. and Tang, C.S. (1991). Semantic Specification and Verification of Data Flow Diagrams. Journal of Computer Science and Technology, 6(1), pp. 21-31.

[7] Lee, P.T and Tan, K.P. (1992). Modelling of visualized data-flow diagrams using Petri Net Model. Software Engineering Journal, January 1992, pp. 4-12.

[8] Kim, D.H. and Chong, K. (1996). A Method of Checking Errors and Consistency in the Process of ObjectOriented Analysis. Proceedings of the 1996 Third Asia-Pacific Software Engineering Conference. Korea: IEEE Computer Society. Pp. 208-216.

[9] Rosziati Ibrahim and Noraini Ibrahim. A Tool for Checking Conformance of UML Specification. Proceedings of the 2009 World Academic of Science and Technology (WASET), Volume 51 (v51-45), pp262-266.

[10] Leavens, G.T., Wahls, T. and Bakar, A.L. (1999). Formal Semantics for SA Style Data Flow Diagram Specification Languages. Proceedings of the 1999 ACM Symposium on Applied Computing. Oregon, US: IEEE Computer Society. pp. 526–532.

[11] Jeffrey, A. H., George, J.F. and Valacich, J.S. (2002) Modern Systems Analysis and Design. 3rd ed. US: Prentice-Hall.

[12] Donald, S. and Le Vie, Jr. (2000). Understanding Data Flow Diagram. Proceedings of the 47th annual conference on Society for Technical Communication. Texas: Integrated Concepts, Inc.

[13] Gao Xiaolei and Huaikou Miao. (2008). The Axiomatic Semantics of PDFD. Proceedings of the 2008 Japan-China Joint Workshop on Frontier of Computer Science and Technology, IEEE Computer Society, pp. 139-146.

AUTHORS

Rosziati Ibrahim is with the Software Engineering Department, Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia (UTHM). She obtained her PhD in Software Specification from the Queensland University of Technology (QUT), Brisbane and her MSc and BSc (Hons) in Computer Science and Mathematics from the University of Adelaide, Australia. Her research area is in Software Engineering that covers Software Specification, Software Testing, Operational Semantics, Formal Methods, Data Mining and Object-Oriented Technology.

Siow Yen Yen is a student at the Department of Software Engineering, Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia (UTHM), Batu Pahat, Johor, Malaysia.

BENCHMARKING MACHINE LEARNING TECHNIQUES FOR SOFTWARE DEFECT DETECTION

Saiqa Aleem[1], Luiz Fernando Capretz[1] and Faheem Ahmed[2] [1]Western University, Canada
[2]Thompson Rivers University, Canada

ABSTRACT

Machine Learning approaches are good in solving problems that have less information. In most cases, the software domain problems characterize as a process of learning that depend on the various circumstances and changes accordingly. A predictive model is constructed by using machine learning approaches and classified them into defective and non-defective modules. Machine learning techniques help developers to retrieve useful information after the classification and enable them to analyse data from different perspectives. Machine learning techniques are proven to be useful in terms of software bug prediction. This study used public available data sets of software modules and provides comparative performance analysis of different machine learning techniques for software bug prediction. Results showed most of the machine learning methods performed well on software bug datasets.

KEYWORDS

Machine Learning Methods, Software Bug Detection, Software Analytics, Predictive Analytics

For More Details : **https://airccse.org/journal/ijsea/papers/6315ijsea02.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol6.html**

REFERENCES

[1] J. Xu, D. Ho & L. F. Capretz (2010) "An empirical study on the procedure to derive software qualityestimation models", International Journal of Computer Science & Information Technology (IJCSIT),AIRCC Digital Library, Vol. 2, Number 4, pp. 1-16.

[2] S. Kumaresh & R. Baskaran (2010) "Defect analysis and prevention for software process qualityimprovement", International Journal of Computer Applications, Vol. 8, Issue 7, pp. 42- 47.

[3] K. Ahmad & N. Varshney (2012) "On minimizing software defects during new product developmentusing enhanced preventive approach", International Journal of Soft Computing and Engineering, Vol.2, Issue 5, pp. 9-12.

[4] C. Andersson (2007) "A replicated empirical study of a selection method for software reliability growth models", Empirical Software Engineering, Vol.12, Issue 2, pp. 161-182.

[5] N. E. Fenton & N. Ohlsson (2000) "Quantitative analysis of faults and failures in a complex softwaresystem", IEEE Transactions on Software Engineering, Vol. 26, Issue 8, pp. 797-814.

[6] T. M. Khoshgoftaar & N. Seliya (2004) "Comparative assessment of software quality classification techniques: An empirical case study", Empirical Software Engineering, Vol. 9, Issue 3, pp. 229-257.

[7] T. M. Khoshgoftaar, N. Seliya & N. Sundaresh (2006) "An empirical study of predicting software faults with case-based reasoning", Software Quality Journal, Vol. 14, No. 2, pp. 85- 111.

[8] T. Menzies, J. Greenwald & A. Frank (2007) "Data mining static code attributes to learn defect predictors", IEEE Transaction Software Engineering., Vol. 33, Issue 1, pp. 2-13.

[9] R. Spiewak & K. McRitchie (2008) "Using software quality methods to reduce cost and prevent defects", Journal of Software Engineering and Technology, pp. 23-27.

[10] D. Shiwei (2009) "Defect prevention and detection of DSP-Software", World Academy of Science, Engineering and Technology, Vol. 3, Issue 10, pp. 406-409.

[11] P. Trivedi & S. Pachori (2010) "Modelling and analyzing of software defect prevention using ODC", International Journal of Advanced Computer Science and Applications, Vol. 1, No. 3, pp. 75- 77.

[12] T. R. G. Nair & V. Suma (2010) "The pattern of software defects spanning across size complexity", International Journal of Software Engineering, Vol. 3, Issue 2, pp. 53- 70.

[13] S. Lessmann, B. Baesens, C. Mues & S. Pietsch (2008) "Benchmarking classification models for software defect prediction: A proposed framework and novel finding", IEEE Transaction on Software Engineering, Vol. 34, Issue 4, pp. 485-496.

[14] K. El-Emam, S. Benlarbi, N. Goel, & S.N. Rai (2001) "Comparing Case- Based Reasoning Classifiers for Predicting High-Risk Software Components", Journal of Systems and Software, Vol. 55, No. 3, pp. 301-320.

[15] L.F. Capretz & P.A. Lee, (1992) "Reusability and life cycle issues within an object-oriented design methodology", in book: Technology of Object-Oriented Languages and Systems, pp. 139-150, Prentice-Hall.

[16] K. Ganesan, T. M. Khoshgoftaar & E.B. Allen (2000) "Case-Based Software Quality Prediction", International Journal of Software Engineering and Knowledge Engineering, Vol. 10, No. 2, pp. 139-152.

[17] T. C. Sharma & M. Jain (2013) "WEKA approach for comparative study of classification algorithm", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 2, Issue 4, 7 pages.

[18] K. O. Elish & M. O. Elish (2008) "Predicting defect-prone software modules using support vector machines", Journal of Systems and Software, Vol. 81, pp. 649–660.

[19] L. Guo, Y. Ma, B. Cukic & H. Singh (2004) "Robust prediction of fault proneness by random forests", Proceedings of the 15th International Symposium on Software Reliability Engineering (ISSRE'04), pp. 417–428.

[20] H. A. Al-Jamimi & L. Ghouti (2011) "Efficient prediction of software fault proneness modules using support vertor machines and probabilistic neural networks", 5th Malaysian Conference in Software Engineering (MySEC), IEEE Press, pp. 251-256.

[21] T. Khoshgoftaar, E. Allen, J. Hudepohl & S. Aud (1997) "Application of neural networks to software quality modeling of a very large telecommunications system", IEEE Transactions on Neural Networks, Vol. 8, No. 4, pp. 902–909.

[22] P. J. Kaur & Pallavi, (2013) "Data mining techniques for software defect prediction", International Journal of Software and Web Sciences (IJSWS), Vol. 3, Issue 1, pp. 54-57.

[23] A. Okutan & O. T. Yıldız (2014) “Software defect prediction using Bayesian networks”, Empirical Software Engineering, Vol. 19, pp. 154-181.
[24] N. Fenton, M. Neil & D. Marquez, (2008) “Using Bayesian networks to predict software defects and reliability”, Journal of Risk Reliability, Vol. 222, No. 4, pp. 701–712.
[25] T. Wang, W. Li, Weihua, H. Shi & Z. Liu (2011) “Software defect prediction based on classifiers ensemble”, Journal of Information & Computational Science, Vol. 8, Issue 1, pp. 4241–4254.
[26] S. Adiu & N. Geethanjali (2013) “Classification of defects in software using decision tree algorithm”, International Journal of Engineering Science and Technology (IJEST), Vol. 5, Issue 6, pp. 1332-1340.
[27] S. J. Dommati, R. Agrawal, R. Reddy & S. Kamath (2012) “Bug classification: Feature extraction and comparison of event model using Naïve Bayes approach”, International Conference on Recent Trends in Computer and Information Engineering (ICRTCIE'2012), pp. 8-12.
[28] J. Han, M. Kamber & P. Jian (2011) Data Mining Concepts and Techniques, San Francisco, CA: Morgan Kaufmann, Publishers.
[29] L. Breiman (1996) “Bagging predictors”, Machine Learning, Vol. 24, No. 2, pp. 123 – 140.
[30] Y. Freund & R. Schapire (1996) “Experiments with a new boosting algorithm”, Proceedings of International Conference on Machine Learning, pp. 148-156.
[31] L. Breiman (2001) “Random forests”, Machine Learning, Vol. 45, No. 1, pp. 5 – 32.
[32] L. Rokach (2009) “Taxonomy for characterizing ensemble methods in classification tasks: A review and annotated bibliography”, Computational Statistics & Data Analysis, Vol. 53, No. 12, pp. 4046 – 4072.
[33] A. Mccallum & K. Nigam (1998) “A Comparison of Event Models for Naive Bayes Text Classification”, Proceedings of the 15th National Conference on Artificial Intelligence (AAAI-98)-Workshop on Learning for Text Categorization, pp. 41-48.
[34] V. Vapnik (1995) The Nature of Statistical Learning Theory, Springer-Verlag, ISBN:0-387- 94559-8, 138-167.
[35] Y. EL-Manzalawy (2005) “WLSVM: Integrating libsvm into WEKA environment”. Software available at http://www.cs.iastate.edu/~yasser/wlsvm/.
[36] R. Collobert & S. Bengio (2004) “Links between Perceptron’s, MLPs and SVMs” Proceedings of International Conference on Machine Learning (ICML), pp. 23-30.
[37] P. V. Yee & S. Haykin (2001) Regularized Radial Basis Function Networks: Theory and Applications, John Wiley. ISBN 0-471-35349-3.
[38] P. S. Bishnu & V. Bhattacherjee (2012) “Software Fault Prediction Using Quad Tree-Based K-Means Clustering Algorithm”, IEEE Transactions on knowledge and data engineering, Vol. 24, No. 6, pp. 1146-1150.
[39] G. Boetticher, T. Menzies & T. Ostrand (2007) PROMISE Repository of Empirical Software Engineering Data, http://promisedata.org/, West Virginia University, Department of Computer Science.
[40] WEKA, http://www.cs.waikato.ac.nz/~ml/weka, accessed on December 13th, 2013.
[41] A. B Nassif, L. F. Capretz & D. Ho (2011) “Estimating software effort based on use case point model using Sugeno fuzzy inference system”, 23rd IEEE International Conference on Tools with Artificial Intelligence, Boca Raton, FL, pp. 393-398.
[42] B. Nassif, L. F. Capretz, D. Ho & M.A. Azzeh (2012) “Treeboost model for software effort estimation based on sse case points”, 11th IEEE International Conference on Machine Learning and Applications, Boca Raton, FL, pp. 314-319.
[43] B. Nassif, L. F. Capretz & D. Ho (2010) “Enhancing use case points estimation method using soft computing techniques”, Journal of Global Research in Computer Science, Vol. 1, No. 4, pp. 12-21.
[44] L. F. Capretz & V. A. Marza (2009) “Improving effort estimation by voting software estimation models”, Journal of Advances in Software Engineering, Vol. 2009, pp. 1-8.
[45] F. Ahmed, L. F. Capretz & J. Samarabandu (2008) “Fuzzy inference system for software product family process evaluation”, Information Sciences, Vol. 178, No. 13, pp. 2780-2793.
[46] F. Ahmed & L. F. Capretz (2011) “An architecture process maturity model of software product line engineering”, Innovations in Systems and Software Engineering, Vol. 7, No. 3,
pp. 191-207.
[47] F. Ahmed, L. F. Capretz & S. Sheikh (2007) “Institutionalization of software product line: An empirical investigation of key organizational factors”, Journal of Systems and Software, Vol. 80, No. 6, pp. 836-849.
[48] H. F. El Yamany, M. A. M. Capretz & L. F. Capretz (2006) "A multi-agent framework for testing

distributed systems, 30th IEEE International Computer Software and Applications Conference (COMPSAC), Vol. II, pp. 151-156.

AUTHORS

Saiqa Aleem received her MS in Computer Science (2004) from University of Central Punjab, Pakistan and MS in Information Technology (2013) from UAEU, United Arab Emirates. Currently, she is pursuing her PhD. in software engineering from University of Western Ontario, Canada. She had many years of academic and industrial experience holding various technical positions. She is Microsoft, CompTIA, and CISCO certified professional with MCSE, MCDBA, A+ and CCNA certifications.

Dr. Luiz Fernando Capretz has vast experience in the software engineering field as practitioner, manager and educator. Before joining the University of Western Ontario (Canada), he worked at both technical and managerial levels, taught and did research on the engineering of software in Brazil, Argentina, England, Japan and the United Arab Emirates since 1981. He is currently a professor of Software Engineering and Assistant Dean (IT and e-Learning), and former Director of the Software Engineering Program at Western. His current research interests are software engineering, human aspects of software engineering, software analytics, and software engineering education. Dr. Capretz received his Ph.D. from the University of Newcastle upon Tyne (U.K.), M.Sc. from the National Institute for Space Research (INPE-Brazil), and B.Sc. from UNICAMP (Brazil). He is a senior member of IEEE, a distinguished member of the ACM, a MBTI Certified Practitioner, and a Certified Professional Engineer in Canada (P.Eng.). He can be contacted at lcapretz@uwo.ca; further information can be found at: http://www.eng.uwo.ca/people/lcapretz/

Dr. Faheem Ahmed received his MS (2004) and Ph.D. (2006) in Software Engineering from the Western University, London, Canada. Currently he is Associate Professor and Chair at Thompson Rivers University, Canada. Ahmed had many years of industrial experience holding various technical positions in software development organizations. During his professional career he has been actively involved in the life cycle of software development process including requirements management, system analysis and design, software development, testing, delivery and maintenance. Ahmed has authored and coauthored many peer-reviewed research articles in leading journals and conference proceedings in the area of software engineering. He is a senior member of IEEE.

CODE QUALITY EVALUATION METHODOLOGY USING THE ISO/IEC 9126 STANDARD

Yiannis Kanellopoulos[1], Panos Antonellis[2], Dimitris Antoniou[2], Christos Makris[2], Evangelos Theodoridis[2], Christos Tjortjis[*3,4], and Nikos Tsirakis[2]

[1]University of Manchester, U.K [2]University Of Patras, Greece [3]Univ. of Ioannina Greece
[4]University of W. Macedonia, Greece

ABSTRACT

This work proposes a methodology for source code quality and static behaviour evaluation of a software system, based on the standard ISO/IEC-9126. It uses elements automatically derived from source code enhanced with expert knowledge in the form of quality characteristic rankings, allowing software engineers to assign weights to source code attributes. It is flexible in terms of the set of metrics and source code attributes employed, even in terms of the ISO/IEC-9126 characteristics to be assessed. We applied the methodology to two case studies, involving five open source and one proprietary system. Results demonstrated that the methodology can capture software quality trends and express expert perceptions concerning system quality in a quantitative and systematic manner.

KEYWORDS

Software Quality Management, Static Analysis, Software Metrics, ISO/IEC 9126

For More Details : **https://airccse.org/journal/ijsea/papers/0710ijsea2.pdf**
Volume Link : **https://www.airccse.org/journal/ijsea/vol1.html**

REFERENCES

[1] Tian, J. (2004) "Quality-Evaluation Models and Measurements". IEEE Software, 21: 84-91.
[2] ISO/IEC 9126, (2003) Software Engineering – Product Quality Int'l Standard.
[3] Jung, H.W., Kim, S. and Chung, C. (2004) "Measuring Software Product Quality: A Survey of ISO/IEC 9126". IEEE Software, 21: 88-92.
[4] Saaty, T. (1990) Multicriteria Decision Making: The Analytic Hierarchy Process, RWS Publications.
[5] Chidamber, S.R. and Kemerer C.F. (1994) "A Metrics Suite for Object Oriented Design", IEEE Transactions on Software Engineering, 20: 476-493.
[6] Wakil, M.E., Bastawissi, A.E., Boshra, M. and Fahmy, A. (2004) "Object Oriented Design Quality Models – A Survey and Comparison". 2 nd Int'l Conf. on Informatics and Systems.
[7] Hyatt, L.E. and Rosenberg, L.H. (1997) "Software Metrics Program for Risk Assessment", Elsevier Acta Astronautica, 40: 223-233.
[8] Bansiya, J. and Davis, C.G. (2002) "A Hierarchical Model for Object-Oriented Design Quality Assessment", IEEE Transactions on Software Engineering, 28: 4-19.
[9] Cote, M.A, Syryn, W., Martin, A.R. and Laport, Y.C. (2004) "Evolving a Corporate Software Quality Assessment Exercise: A Migration Path to ISO/IEC-9126", SQP, 6: 4-17.
[10] Al Kilidar, H., Cox, K. and Kitchenham B. (2005) "The use and usefulness of the ISO/IEC 9126 quality standard." IEEE Int'l Symposium on Empirical Software Engineering, pp. 126- 132.
[11] Heitlager I., Kuipers T., and Visser J. (2007) "A Practical Model for Measuring Maintainability", Proc. 6th IEEE Int'l Conf. Quality of Information and Communications Technology, pp. 30-39.
[12] Plösch R., Gruber H., Hentschel A., Körner C., Pomberger G., Schiffer S., Saft M., Storck S., (2007) "The EMISQ Method - Expert Based Evaluation of Internal Software Quality", Proc. 3rd IEEE Systems and Software Week, pp. 99-108.
[13] Pressman, S.R. (2005) Software Engineering, A Practitioner's Approach", McGraw - Hill.
[14] Whitmire S.A. (1997) Object – Oriented Design Measurement, New York: John Wiley & Sons Inc.
[15] Ambler, S.W. (2004) The Object Primer: Agile Model-Driven Development with UML 2.0, Cambridge University Press.
[16] Lehman, M.M. (1980) "Programs, Life Cycles, and Laws of Software Evolution", Proc. IEEE, 68:9, 1060-1076.
[17] Kanellopoulos Y. and Tjortjis C., (2004) "Data Mining Source Code to Facilitate Program Comprehension: Experiments on Clustering Data Retrieved from C++ Programs", Proc. IEEE 12th Int'l Workshop Program Comprehension, pp. 214-223.
[18] Antonellis P., Antoniou D., Kanellopoulos Y., Makris C., Theodoridis E., Tjortjis C., Tsirakis N., (2009) "Code4Thought Project: Employing the ISO/IEC-9126 standard for Software Engineering - Product Quality Assessment", Proc. IEEE 13th European Conf. Software Maintenance and Reengineering, pp. 297-300.
[19] Tjortjis C., Sinos L. and Layzell P.J., (2003) "Facilitating Program Comprehension by Mining Association Rules from Source Code", Proc. IEEE 11th Int'l Workshop Program Comprehension, pp. 125-132.
[20] Spinellis, D. (2006) Code Quality: The Open Source Perspective, Addison-Wesley.
[21] Lehman, M.M. and Belady, L.A. (1985) Program Evolution – Processes of Software Change, Acad. Press.
[22] Geronimo, 2010, http://geronimo.apache.org/
[23] JBoss, 2009, http://www.jboss.com/downloads/
[24] McCabe, T.J. (1976) "A Complexity Measure", IEEE Trans. on Software Engineering, 2: 308- 320.
[25] Apache, 2010, http://cwiki.apache.org/GMOxDOC11/release-notes-11txt.html
[26] JBoss, 2010, jira.jboss.org/secure/ReleaseNote.jspa?version=12310655&styleName=Html&projectId=10030&Create=Create
[27] Wengo, 2009, http://www.openwengo.org/, http://www.qutecom.org/

AUTHORS

Yiannis Kanellopoulos is a senior consultant at SIG, based in the Netherlands. He is responsible for carrying out software quality and risk assessments for corporate and public clients. He holds an MSc in Information Systems Engineering and a PhD from University of Manchester, School of Computer Science. His PhD Thesis was related to the application of data mining techniques for supporting software systems maintenance. He has ample experience in managing software implementation projects.

Panos Antonellis is a Computer Engineer and a PhD student at the Dept. of Computer Engineering and Informatics, School of Engineering, Univ. of Patras.

Dimitris Antoniou is a Computer Engineer and Researcher in the Dept. of Computer Engineering and Informatics at the University of Patras. He has obtained his diploma from the Department in 2004 and his MSc in 2006. Since 2006, he has been a Ph.D. student at the same Dept. His research interests focus on Data Structures, Information Retrieval, String algorithmics, and bioinformatics, Software Quality Assessment, Web Technologies and GIS. He has scientific work published in int'l journals and conferences.

Christos Makris was born in Greece, in 1971. He graduated from the Dept. of Computer Engineering and Informatics, University of Patras, in December 1993. He received his Ph.D. degree from the Dept. of Computer Engineering and Informatics, in 1997. He is now an Assistant Professor in the same Department. His research interests include Data Structures, Web Algorithmics, Computational Geometry, Data Bases and Information Retrieval. He has published over 60 papers in scientific journals and refereed conferences.

Evangelos Theodoridis was born in Greece, in 1978. He graduated from the Dept. of Computer Engineering and Informatics, School of Engineering, University of Patras, in December 2002. He received his MSc. and a PhD degree from the same Dept. His research interests include Data Structures, Web Algorithmics, Data Bases and Information Retrieval and Bioinformatics.

Christos Tjortjis is an adjunct Senior Lecturer at the University of Ioannina, Dept. of Computer Science and the University of W. Macedonia, Dept. of Engineering Informatics and Telecoms' and an hon. Lecturer at the University of Manchester, School of Computer Science. He holds an MEng in Computer Engineering and Informatics from Patras, a BA in Law from Thrace, an MPhil in Computation from UMIST and a PhD in Informatics from Manchester. His research interests are in data mining, software comprehension and maintenance.

Nikos Tsirakis is a Computer Engineer and Researcher at the Dept. of Computer Engineering and Informatics at the University of Patras. He obtained his B.Eng. from the Dept. in 2004 and an MSc in 2006. Since 2006 he is a PhD student at the same Dept. His research focuses on String algorithmics and data structures, Hypertext modelling and searching, Software Quality Assessment, Web Technologies and GIS. He has scientific work published in int'l journals and conferences, and he co-authored books & encyclopaedia chapters.

THREATS AND OPPORTUNITIES WITH AI-BASED CYBER SECURITY INTRUSION DETECTION: A REVIEW

Bibhu Dash, Meraj Farheen Ansari, Pawankumar Sharma and Azad Ali

University of the Cumberlands, USA

ABSTRACT

Internet usage has increased quickly, particularly in the previous decade. With the widespread use of the internet, cybercrime is growing at an alarming rate in our daily lives. However, with the growth of artificial intelligence (AI), businesses are concentrating more on preventing cybercrime. AI is becoming an essential component of every business, affecting individuals worldwide. Cybercrime is one of the most prominent domains where AI has begun demonstrating valuable inputs. As a result, AI is being deployed as the first line of defense in most firms' systems. Because AI can detect new assaults faster than humans, it is the best alternative for constructing better protection against cybercrime. AI technologies also offer more significant potential in the development of such technology. This paper discusses recent cyber intrusions and how the AI-enabled industry is preparing to defend itself in the long run.

KEYWORDS

AI, cybercrime, cyberattacks, machine learning, cybersecurity, security analytics, classification.

For More Details : **https://aircconline.com/ijsea/V13N5/13522ijsea02.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol13.html**

REFERENCES

[1] Shindo, T., Kimura, T., & Hiraguri, T. (2021). Defense against DoS attacks by multipath routing using the ACO algorithm. IEICE Communications Express.

[2] Bruschi, D., & Diomede, N. (2022). A framework for assessing AI ethics with applications to cybersecurity. AI and Ethics, 1-8.

[3] Papp, D., Krausz, B., & Gyuranecz, F. (2022). The AI is now in session – The impact of digitalisation on courts. Cybersecurity and Law, 7(1), 272–296. https://doi.org/10.35467/cal/151833

[4] S. Lee, (2021). AI-based Cybersecurity: Benefits and Limitations. Robotics & AI Ethics, 6(1), 18-28.

[5] Kim, J., & Park, N. (2020). Blockchain-based data-preserving ai learning environment model for ai cybersecurity systems in IoT service environments. Applied Sciences, 10(14), 4718.

[6] Mengidis, N., Tsikrika, T., Vrochidis, S., & Kompatsiaris, I. (2019). Blockchain and AI for the next generation energy grids: cybersecurity challenges and opportunities. Information & Security, 43(1), 21-33.

[7] Furqan, M. (2021, April 25). The Most Common Types of Cyber Crime. Lifeboat Foundation Safeguarding Humanity. Retrieved July 24, 2022, from https://lifeboat.com/blog/2021/04/the-mostcommon-types-of-cyber-crime

[8] Sharma, P., Dash, B., & Ansari, M. F. (2022). Anti-phishing techniques – a review of Cyber Defense Mechanisms. IJARCCE, 11(7). https://doi.org/10.17148/ijarcce.2022.11728

[9] Dymicka, A. (2022). Cybersecurity from the perspective of a new technology user. Cybersecurity and Law, 7(1), 27–36. https://doi.org/10.35467/cal/151810

[10] Qumer, S. M., & Ikrama, S. (2022). Poppy Gustafsson: redefining cybersecurity through AI. The Case for Women, 1-38. https://doi.org/10.1108/cfw.2022.000001.

[11] Tagarev, T., Stoianov, N., Sharkov, G., & Yanakiev, Y. (2021). AI-driven Cybersecurity Solutions, Cyber Ranges for Education & Training, and ICT Applications for Military Purposes. Information & Security, 50(1), 5-8. https://doi.org/10.11610/isij.5000.

[12] Biasin, E., & Kamenjašević, E. (2022). Cybersecurity of medical devices: new challenges arising from the AI Act and NIS 2 Directive proposals. International Cybersecurity Law Review, 1-18.

[13] Senouci, S. M., Sedjelmaci, H., Liu, J., Rehmani, M. H., & Bou-Harb, E. (2020). Ai- driven cybersecurity threats to future networks [from the guest editors]. IEEE Vehicular Technology Magazine, 15(3), 5-6.

[14] Liu, X. M., & Murphy, D. (2020). A Multi-Faceted Approach for Trustworthy AI in Cybersecurity. Journal of Strategic Innovation & Sustainability, 15(6).

[15] Stevens, T. (2020). Knowledge in the grey zone: AI and cybersecurity. Digital War, 1(1), 164-170. https://doi.org/10.1057/s42984-020-00007-w.

[16] Puthal, D., & Mohanty, S. P. (2021). Cybersecurity issues in AI. IEEE Consumer Electronics Magazine, 10(4), 33-35.

[17] Hamilton, T. (2022, June 25). What is response time testing? how to measure for API, Tools. Guru99. Retrieved July 30, 2022, from https://www.guru99.com/response- time-testing.html.

[18] Dash, B. (2021). A hybrid solution for extracting information from unstructured data using optical character recognition (OCR) with natural language processing (NLP).

[19] Tsvilii, O. (2021). Cyber Security Regulation: Cyber Security Certification of Operational Technologies. Technology audit and production reserves, 1(2), 57.

[20] Timmers, P. (2019). Ethics of AI and cybersecurity when sovereignty is at stake. Minds and Machines, 29(4), 635-645.

[21] Wang, X. (2020, April). Criminal law protection of cybersecurity considering AI- based cybercrime. In Journal of Physics: Conference Series (Vol. 1533, No. 3, p. 032014). IOP Publishing.

[22] Bowman, B., & Huang, H. H. (2021). Towards Next-Generation Cybersecurity with Graph AI. ACM SIGOPS Operating Systems Review, 55(1), 61-67.

[23] Grochmalski, P. (2021). Nowy Paradygmat Bezpieczeństwa A AI. Cybersecurity and Law, 1(1), 93–113. https://doi.org/10.35467/cal/133772

[24] Ansari, M. F., Sharma, P. K., & Dash, B. (2022). Prevention of Phishing Attacks Using AI-Based Cybersecurity Awareness Training. Prevention. https://doi.org/10.47893/IJSSAN.2022.1221

[25] Grabosky, P. (2016). The evolution of cybercrime, 2006–2016. In cybercrime through an interdisciplinary lens (pp. 29-50). Routledge.

[26] Dash, B., & Ansari, M. F. (2022). An Effective Cybersecurity Awareness Training Model: First Defense of an Organizational Security Strategy.
[27] Dash, B., Sharma, P., & Ali, A.(2022). FEDERATED LEARNING FOR PRIVACY- PRESERVING: A REVIEW OF PII DATA ANALYSIS IN FINTECH.

AUTHORS

Bibbu Dash is an Architect-Data and Analytics in a Fortune 100 financial organization at Madision, WI. He is currently a Ph.D. student in Information Technology at the University of the Cumberlands, Kentucky. Bibhu has completed his Master of Engineering in Electronics and Communication Engg., and MBA from Illinois State University, Normal, IL. Bibhu's research interests are in the areas of AI, Cloud Computing, Big Data and Blockchain technologies.

Pawankumar Sharma is a Senior Product Manager for Walmart at San Bruno, California. He is currently on his Ph.D. in Information Technology at the University of the Cumberlands, Kentucky. Pawankumar Sharma has completed his Master of Science in Management Information Systems from the University of Nebraska at Omaha in 2015. He also holds another Master of Science in Information Systems Security from the University of the Cumber lands, Kentucky and graduated in 2020. His research interests are in the areas of Cyber security, Artificial Intelligence, Cloud Computing, Neural Networks, Information Systems, Big Data Analytics, Intrusion Detection and Prevention.

Azad Ali, D.Sc., Professor of Information Technology, has more than 30 years of combined experience in the areas of financial and information systems. He holds a bachelor's degree in Business Administration from the University of Baghdad, an MBA from the Indiana University of Pennsylvania, an MPA from the University of Pittsburgh, and a Doctor of Science in Communications and Information Systems from Robert Morris University. Dr. Ali's research interests include service-learning projects, web design tools, dealing with isolation in doctoral programs, and curriculum development. Azad has been involved in mentoring doctoral students to complete their doctoral dissertations and has so far mentored five students to complete their dissertations.

FEDERATED LEARNING FOR PRIVACY-PRESERVING: A REVIEW OF PII DATA ANALYSIS IN FINTECH

Bibhu Dash, Pawankumar Sharma and Azad Ali

University of the Cumberlands, USA

ABSTRACT

There has been tremendous growth in the field of AI and machine learning. The developments across these fields have resulted in a considerable increase in other FinTech fields. Cyber security has been described as an essential part of the developments associated with technology. Increased cyber security ensures that people remain protected, and that data remains safe. New methods have been integrated into developing AI that achieves cyber security. The data analysis capabilities of AI and its cyber security functions have ensured that privacy has increased significantly. The ethical concept associated with data privacy has also been advocated across most FinTech regulations. These concepts and considerations have all been engaged with the need to achieve the required ethical requirements. The concept of federated learning is a recently developed measure that achieves the abovementioned concept. It ensured the development of AI and machine learning while keeping privacy in data analysis. The research paper effectively describes the issue of federated learning for confidentiality. It describes the overall process associated with its development and some of the contributions it has achieved. The widespread application of federated learning in FinTech is showcased, and why federated learning is essential for overall growth in FinTech.

KEYWORDS

FinTech, AI, federated learning, machine learning, cyber security, data privacy, PII data, differential privacy.

For More Details : **https://aircconline.com/ijsea/V13N4/13422ijsea01.pdf**

Volume Link : **https://www.airccse.org/journal/ijsea/vol13.html**

REFERENCES

1. Bonawitz Kallista, Peter Kairouz, Brendan McMahan, and Daniel Ramage. Federated Learning and Privacy: Building privacy-preserving systems for machine learning and data science on decentralized data. https://queue.acm.org/detail.cfm?id=3501293
2. Cheng Yong, Yang Liu, Tianjian Chen, Qiang Yang. 2020. Federated Learning for PrivacyPreserving AI. CACM. https://cacm.acm.org/magazines/2020/12/248796-federated- learning-forprivacy preserving-ai/fulltext
3. Bonawitz, K. et al. Practical secure aggregation for privacy-preserving machine learning. In Proceedings of ACM SIGSAC CCS'17 (Nov. 2017).
4. DLA Piper. Data protection laws of the world: Full handbook (Jan. 2020); https://bit.ly/354nDiC
5. Kairouz, P. et al. Advances and open problems in federated learning. (Dec. 2019); arXiv preprint arXiv:1912.04977
6. Liu, Y., Chen, T., and Yang, Q. Secure federated transfer learning. In Proceedings of IJCAI'19 (Aug. 2019).
7. McMahan, H.B., Moore, E., Ramage, D., and y Arcas, B.A. Communication-efficient learning of deep networks from decentralized data. In Proceedings of AISTATS'17 (Apr. 2017).
8. Richardson, A., Filos-Ratsikas, A., and Faltings, B. Rewarding high-quality data via influence functions. (Aug. 2019); arXiv preprint arXiv:1908.11598
9. Yang, Q. et al. Federated machine learning: Concept and applications. ACM Trans. Intell. Syst. Technol. (TIST) (Feb. 2019).
10. Yang, Q. et al. Federated Learning. Morgan & Claypool, Dec. 2019.
11. H. Zheng, H. Hu and Z. Han, "Preserving User Privacy for Machine Learning: Local DifferentialPrivacy or Federated Machine Learning?", IEEE Intelligent Systems, vol. 35, no. 4, pp. 5-14, 2020. Available: 10.1109/mis.2020.3010335.
12. M. Kim and J. Lee, "Information-theoretic privacy in federated submodel learning", ICT Express, 2022. Available: 10.1016/j.icte.2022.02.008.
13. H. Fang and Q. Qian, "Privacy Preserving Machine Learning with Homomorphic Encryption and Federated Learning", Future Internet, vol. 13, no. 4, p. 94, 2021. Available: 10.3390/fi13040094.
14. Woubie, Abraham, and Tom Backstrom. "Federated Learning For Privacy-Preserving Speaker Recognition". IEEE Access, vol 9, 2021, pp. 149477-149485. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/access.2021.3124029.
15. Park, Jaehyoung, and Hyuk Lim. "Privacy-Preserving Federated Learning Using Homomorphic Encryption". Applied Sciences, vol 12, no. 2, 2022, p. 734. MDPI AG, doi:10.3390/app12020734.
16. Śmietanka, Małgorzata et al. "Federated Learning For Privacy-Preserving Data Access". SSRN Electronic Journal, 2020. Elsevier BV, doi:10.2139/ssrn.3696609.
17. Jere, Malhar S. et al. "A Taxonomy Of Attacks On Federated Learning". IEEE Security &Amp; Privacy, vol 19, no. 2, 2021, pp. 20-28. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/msec.2020.3039941.
18. Jiang, Xue et al. "Comprehensive Analysis Of Privacy Leakage In Vertical Federated Learning During Prediction". Proceedings On Privacy Enhancing Technologies, vol 2022, no. 2, 2022, pp. 263-281. Walter De Gruyter Gmbh, doi:10.2478/popets-2022-0045.
19. Bonawitz, Kallista et al. "Federated Learning And Privacy". Queue, vol 19, no. 5, 2021, pp. 87- 114. Association For Computing Machinery (ACM), doi:10.1145/3494834.3500240.
20. Gálvez, Rafa et al. "Less Is More: A Privacy-Respecting Android Malware Classifier Using Federated Learning". Proceedings On Privacy Enhancing Technologies, vol 2021, no. 4, 2021, pp. 96-116. Walter De Gruyter Gmbh, doi:10.2478/popets-2021-0062.
21. Treleaven, Philip et al. "Federated Learning: The Pioneering Distributed Machine Learning And Privacy-Preserving Data Technology". Computer, vol 55, no. 4, 2022, pp. 20-29. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/mc.2021.3052390.
22. Chamikara, M.A.P. et al. "Privacy Preserving Distributed Machine Learning With Federated Learning". Computer Communications, vol 171, 2021, pp. 112-125. Elsevier BV, doi:10.1016/j.comcom.2021.02.014.
23. Qin, YangJie et al. "Privacy-Preserving Federated Learning Framework In Multimedia Courses

Recommendation". Wireless Networks, 2022. Springer Science And Business Media LLC, doi:10.1007/s11276-021-02854-1.

24. Ouadrhiri, Ahmed El, and Ahmed Abdelhadi. "Differential Privacy For Deep And Federated Learning: A Survey". IEEE Access, vol 10, 2022, pp. 22359-22380. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/access.2022.3151670.
25. Mahmood, Zeba, and Vacius Jusas. "Blockchain-Enabled: Multi-Layered Security Federated Learning Platform For Preserving Data Privacy". Electronics, vol 11, no. 10, 2022, p. 1624. MDPI AG, doi:10.3390/electronics11101624.
26. Kim, Sungwook. "Incentive Design And Differential Privacy Based Federated Learning: A Mechanism Design Perspective". IEEE Access, vol 8, 2020, pp. 187317-187325. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/access.2020.3030888.
27. Zhang, Wu Ming et al. "Privacy-Preserving Federated Learning With Collusion-Resistance In Mobile Crowdsensing". SSRN Electronic Journal, 2022. Elsevier BV, doi:10.2139/ssrn.4104451.
28. Asad, Muhammad et al. "A Critical Evaluation Of Privacy And Security Threats In Federated Learning". Sensors, vol 20, no. 24, 2020, p. 7182. MDPI AG, doi:10.3390/s20247182.
29. Jiang, Changsong et al. "PFLM: Privacy-Preserving Federated Learning With Membership Proof". Information Sciences, vol 576, 2021, pp. 288-311. Elsevier BV, doi:10.1016/j.ins.2021.05.077.
30. Kim, Kyongjin, and Sengphil Hong. "The Data Processing Approach For Preserving Personal Data InFintech-Driven Paradigm". International Journal Of Security And Its Applications, vol 10, no. 10, 2016, pp. 341-350. NADIA, doi:10.14257/ijsia.2016.10.10.30.
31. Macpherson, Martina et al. "Artificial Intelligence And Fintech Technologies For ESG Data And Analysis". SSRN Electronic Journal, 2021. Elsevier BV, doi:10.2139/ssrn.3790774.
32. Arner, Douglas W. et al. "Fintech And Regtech: Enabling Innovation While Preserving Financial Stability". SSRN Electronic Journal, 2017. Elsevier BV, doi:10.2139/ssrn.3211708.
33. Kantarcioglu, Murat, and Wei Jiang. "Incentive Compatible Privacy-Preserving Data Analysis". IEEE Transactions On Knowledge And Data Engineering, vol 25, no. 6, 2013, pp. 1323-1335. Institute Of Electrical And Electronics Engineers (IEEE), doi:10.1109/tkde.2012.61.
34. Wang, J. Christina, and Charles B. Perkins. "How Magic A Bullet Is Machine Learning For Credit Analysis? An Exploration With Fintech Lending Data". SSRN Electronic Journal, 2019. Elsevier BV, doi:10.2139/ssrn.3928076.
35. Zhai, Yimeng. "Analysis Of Fintech Regulation Based On G-Sibs Fintech Index". Journal Of Finance Research, vol 4, no. 1, 2020, p. 69. Synergy Publishing Pte. Ltd., doi:10.26549/jfr.v4i1.3250.
36. Sevilmiş, Fehmi, and Hulusi Karaca. "Performance Analysis Of SRF-PLL And DDSRF-PLL Algorithms For Grid Interactive Inverters". International Advanced Researches And Engineering Journal, 2019, pp. 116-122. International Advanced Researches And Engineering Journal, doi:10.35860/iarej.412250.
37. Najaf, Khakan et al. "Var And Market Value Of Fintech Companies: An Analysis And Evidence From Global Data". Managerial finance, vol 47, no. 7, 2020, pp. 915-936. Emerald, doi:10.1108/mf04-2020-0169.
38. Dash, B., & Ansari, M. F. (2022). An Effective Cybersecurity Awareness Training Model: First Defense of an Organizational Security Strategy.
39. B., Kirti, and B. M. "New Approach To Reduce The Data Loss In Privacy Preserving Data Analysis". International Journal Of Computer Applications, vol 155, no. 12, 2016, pp. 21- 24. Foundation Of Computer Science, doi:10.5120/ijca2016912504.
40. Ligade Maheshwar (2020). Federated machine learning for fintech. https://medium.com/techwasti/federated-machine-learning-for-fintech-b875b918c5fe
41. Estevez Eric. (2020). Financial Technology – Fintech. What Is Financial Technology – Fintech? https://www.investopedia.com/terms/f/fintech.asp

42. Ferdinand, Al-Lawati, Draper, Nokleby, 2020 N. Ferdinand, H. Al-Lawati, S.C. Draper, M. Nokleby Anytime minibatch: exploiting stragglers in online distributed optimizationarXiv preprint arXiv:2006.05752 (2020)
43. Al-Rubaie, M., and Chang, J.M. Privacy-preserving machine learning: Threats and solutions. IEEE Security and Privacy (Apr. 2019).

44. Shi, Yuan, and Xianze Xu. "Deep Federated Adaptation: An Adaptative Residential Load Forecasting Approach With Federated Learning". Sensors, vol 22, no. 9, 2022, p. 3264. MDPI AG, doi:10.3390/s22093264.
45. Nayak, Sanjib Kumar et al. "Modeling And Forecasting Cryptocurrency Closing Prices With Rao Algorithm-Based Artificial Neural Networks: A Machine Learning Approach". Fintech, vol 1, no. 1, 2021, pp. 47-62. MDPI AG, doi:10.3390/fintech1010004.
46. Ghimire, Bimal, and Danda B. Rawat. "Recent Advances On Federated Learning For Cybersecurity And Cybersecurity For Federated Learning For Internet Of Things". IEEE Internet Of Things Journal, vol 9, no. 11, 2022, pp. 8229-8249. Institute Of Electrical And Electronics Engineers (IEEE),doi:10.1109/jiot.2022.3150363.
47. Bao, Hong, and David Roubaud. "Recent Development In Fintech: Non-Fungible Token". Fintech, vol 1, no. 1, 2021, pp. 44-46. MDPI AG, doi:10.3390/fintech1010003.
48. Fang, Haokun, and Quan Qian. "Privacy Preserving Machine Learning With Homomorphic Encryption And Federated Learning". Future Internet, vol 13, no. 4, 2021, p. 94. MDPI AG, doi:10.3390/fi13040094.
49. Bazarbash, Majid. "Fintech In Financial Inclusion: Machine Learning Applications In AssessingCredit Risk". SSRN Electronic Journal, 2019. Elsevier BV, doi:10.2139/ssrn.3404066.
50. Brendan McMahan, H., Ramage, D., Talwar, K., & Zhang, L. (2017). Learning differentially privaterecurrent language models. ArXiv e-prints, arXiv-1710.
51. Loh, Leonard Kin Yung et al. "An Ensembling Architecture Incorporating Machine Learning Modelsand Genetic Algorithm Optimization for Forex Trading". Fintech, vol 1, no. 2, 2022, pp. 100-124. MDPI AG, doi:10.3390/fintech1020008.
52. Dash, B. (2021). A hybrid solution for extracting information from unstructured data using opticalcharacter recognition (OCR) with natural language processing (NLP).
53. Sharma, P., & Dash, B. THE DIGITAL CARBON FOOTPRINT: THREAT TO ANENVIRONMENTALLY SUSTAINABLE FUTURE. IJCSIT, doi: 10.5121/ijcsit.2022.14302.
54. Aytaç, K., & Korçak, Ö. (2021). IoT based intelligence for proactive waste management in QuickService Restaurants. Journal of Cleaner Production, 284, 125401.
55. Li, T., Sahu, A. K., Talwalkar, A., & Smith, V. (2020). Federated learning: Challenges, methods, andfuture directions. IEEE Signal Processing Magazine, 37(3), 50-60.

AUTHORS

Bibbu Dash is an Architect-Data and Analytics in a Fortune 100 financial organization at Madision, WI. He is currently a Ph.D. student in Information Technology at the University of the Cumberlands, Kentucky. Bibhu has completed his Master of Engineering in Electronics and Communication Engg., and MBA from Illinois State University, Normal, IL. Bibhu's research interests are in the areas of AI, Cloud Computing, Big Data and Blockchain technologies.

Pawankumar Sharma is a Senior Product Manager for Walmart at San Bruno, California. He is currently on his Ph.D. in Information Technology at the University of the Cumberlands, Kentucky. Pawankumar Sharma has completed his Master of Science in Management Information Systems from the University of Nebraska at Omaha in 2015. He also holds another Master of Science in Information Systems Security from the University of the Cumber lands, Kentucky and graduated in 2020. His research interests are in the areas of Cyber security, Artificial Intelligence, Cloud Computing, Neural Networks, Information Systems, Big Data Analytics, Intrusion Detection and Prevention.

Azad Ali, D.Sc., Professor of Information Technology, has more than 30 years of combined experience in the areas of financial and information systems. He holds a bachelor's degree in Business Administration from the University of Baghdad, an MBA from the Indiana University of Pennsylvania, an MPA from the University of Pittsburgh, and a Doctor of Science in Communications and Information Systems from Robert Morris University. Dr. Ali's research

interests include service-learning projects, web design tools, dealing with isolation in doctoral programs, and curriculum development. Azad has been involved in mentoring doctoral students to complete their doctoral dissertations and has so far mentored five students to complete their dissertations.