

REFERENCES

- Afoudi, Y., Lazaar, M., & Al Achhab, M. (2021). Hybrid recommendation system combined content-based filtering and collaborative prediction using artificial neural network. *Simulation Modelling Practice and Theory*, 113, 102375. <https://doi.org/10.1016/j.simpat.2021.102375>
- Akinsola, J. E. T., Ogunbanwo, A. S., Okesola, O. J., Odun-Ayo, I. J., Ayegbusi, F. D., & Adebisi, A. A. (2020). Comparative Analysis of Software Development Life Cycle Models (SDLC). In R. Silhavy (Ed.), *Intelligent Algorithms in Software Engineering* (pp. 310–322). Springer International Publishing.
- Alvi, M. A., Misra, A., Srivastava, A., & Singh, K. K. (2024). StudyNotion: MERN based Ed-Tech Platform. 2024 Second International Conference Computational and Characterization Techniques in Engineering & Sciences (IC3TES), 1–6. <https://doi.org/10.1109/IC3TES62412.2024.10877658>
- Anwar, T., Uma, V., Hussain, Md. I., & Pantula, M. (2022). Collaborative filtering and kNN based recommendation to overcome cold start and sparsity issues: A comparative analysis. *Multimedia Tools and Applications*, 81(25), 35693–35711. <https://doi.org/10.1007/s11042-021-11883-z>
- Athirah, R. N., Norasma, C. Y. N., & Ismail, M. R. (2020). Development of an Android Application for Smart Farming in Crop Management. *IOP Conference Series: Earth and Environmental Science*, 540(1). <https://doi.org/10.1088/1755-1315/540/1/012074>
- Baharum, A., Amirul, S., Yusop, N., Halamy, S., Fabeil, N., & Ramli, R. (2017). Development of Questionnaire to Measure User Acceptance Towards User Interface Design. https://doi.org/10.1007/978-3-319-70010-6_49

- Bangor, A., Kortum, P., & Miller, J. (2009). Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale. *J. Usability Stud.*, 4, 114–123.
- BEAM Exchange. (2021, December). Youth as a key to building resilient agricultural markets in Indonesia. PRISMA. <https://beamexchange.org/resources/1559/>
- Bhatt, S., Jain, A., & Dev, A. (2020). Acoustic Modeling in Speech Recognition: A Systematic Review. *International Journal of Advanced Computer Science and Applications*, 11. <https://api.semanticscholar.org/CorpusID:219069163>
- Bhuvaneswari, C., Pokhariya, H. S., Yarde, P., Vekariya, V., Patil, H., & L, N. (2024). Implementing AI-Powered Chatbots in Agriculture for Optimization and Efficiency. 2024 2nd International Conference on Intelligent Data Communication Technologies and Internet of Things (IDCIoT), 1–7. <https://doi.org/10.1109/IDCIoT59759.2024.10467644>
- BPS-Statistics Indonesia Jawa Barat Province. (2024, January 5). The Number of Farmers Aged 19-39 years and/or Utilizing Digital Technology by Regency/Municipality, and Criteria in Jawa Barat Province (people), 2023. BPS-Statistics Indonesia Jawa Barat Province. <https://jabar.bps.go.id/en/statistics-table/1/Njg4IzE=/the-number-of-farmers-aged-19-39-years-and-or-utilizing-digital-technology-by-regency-municipality--and-criteria-in-jawa-barat-province--people--2023.html>
- Brooke, J. (1996). SUS-A quick and dirty usability scale. *Usability Evaluation in Industry*, 189(194), 4–7.
- Carolan, M. (2018). Lands changing hands: Experiences of succession and farm (knowledge) acquisition among first-generation, multigenerational, and aspiring farmers. *Land Use Policy*, 79, 179–189. <https://doi.org/10.1016/j.landusepol.2018.08.011>
- Casheekar, A., Lahiri, A., Rath, K., Prabhakar, K. S., & Srinivasan, K. (2024). A contemporary review on chatbots, AI-powered virtual

- conversational agents, ChatGPT: Applications, open challenges and future research directions. *Computer Science Review*, 52, 100632. <https://doi.org/https://doi.org/10.1016/j.cosrev.2024.100632>
- Chakraborty Rajkumar and Hasija, Y. (2024). Python for Biologists. In K. and C. G. and G. K. Anjoy Priyanka and Kumar (Ed.), *Genomics Data Analysis for Crop Improvement* (pp. 33–61). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-6913-5_2
- Christanto, H. J., Sutresno, S. A., Lim, R. J., Angkur, L. V. G., Charmelita, P., Valentina, V., & Dewi, C. (2023). Design and Development of the Mobile-Based Hydroponic Planting Machine Application MyHydro. *Journal of Information Systems and Informatics*, 5(4), 1321–1339. <https://doi.org/10.51519/journalisi.v5i4.581>
- Dongmo, C. (2024). A Review of Non-Functional Requirements Analysis Throughout the SDLC. *Computers*, 13(12). <https://doi.org/10.3390/computers13120308>
- Dwiarrahman, A. (2025, March 13). Brewing the Future: How Young Farmers in Tabanan, Bali, Are Redefining the Coffee Industry. *Kopernik*. https://kopernik.info/en/news-events/blog/brewing-the-future-how-young-farmers-in-tabanan,-bali,-are-redefining-the-coffee-industry?utm_source=chatgpt.com
- Epstein, Z., Hertzmann, A., the Investigators of Human Creativity, Akten, M., Farid, H., Fjeld, J., Frank, M. R., Groh, M., Herman, L., Leach, N., Mahari, R., Pentland, A. “Sandy,” Russakovsky, O., Schroeder, H., & Smith, A. (2023). Art and the science of generative AI. *Science*, 380(6650), 1110–1111. <https://doi.org/10.1126/science.adh4451>
- Ersoy, E., Bagriyanik, S., & Sozer, H. (2024). On the Accuracy of Effort Estimations based on COSMIC Functional Size Measurement: A Case Study. *Proceedings of the 18th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement*, 528–537. <https://doi.org/10.1145/3674805.3695402>
- Fareez, M. M. M., Thangarajah, V., & Saabith, S. (2020). POPULAR PYTHON LIBRARIES AND THEIR APPLICATION DOMAINS.

- Feuerriegel, S., Hartmann, J., Janiesch, C., & Zschech, P. (2024). Generative AI. *Business and Information Systems Engineering*, 66(1), 111–126. <https://doi.org/10.1007/s12599-023-00834-7>
- Ficko, M. M., Kosar, T., Pliberšek, T., Močnik, D., Držanič, I. L., & Kožuh, I. (2025). The GreenTouch Digital Tool Web Development Planning: Comparative Analysis of Mental Health-Focused Web Solutions. 2025 24th International Symposium INFOTEH-JAHORINA (INFOTEH), 1–6. <https://doi.org/10.1109/INFOTEH64129.2025.10959214>
- Hasan, M. M., Rahman, T., Uddin, A. F. M. S., Galib, S. M., Akhond, M. R., Uddin, M. J., & Hossain, M. A. (2023). Enhancing Rice Crop Management: Disease Classification Using Convolutional Neural Networks and Mobile Application Integration. *Agriculture (Switzerland)*, 13(8). <https://doi.org/10.3390/agriculture13081549>
- Hassan, M. D., Nasret, A. N., Baker, M. R., & ... (2021). Enhancement automatic speech recognition by deep neural networks. ... of Engineering and <http://pen.ius.edu.ba/index.php/pen/article/view/2450>
- Henry, N. (2024). CRUD-Capable Mobile Apps with R and shinyMobile: a Case Study in Rapid Prototyping. <https://arxiv.org/abs/2409.00582>
- Herczeg, M. (2024). Ambient Learning Spaces (ALS): Interactive Learning Environments and Knowledge Media Machines for Post-Constructivist Teaching and Learning in the 21 st Century.
- Hyzy, M., Bond, R., Mulvenna, M., Bai, L., Dix, A., Leigh, S., & Hunt, S. (2022). System Usability Scale Benchmarking for Digital Health Apps: Meta-analysis. *JMIR Mhealth Uhealth*, 10(8), e37290. <https://doi.org/10.2196/37290>
- Jaiswal, A., & Dwivedi, A. (2021). Python: The Versatile Language - Recent Trends in Programming Languages. 08, 2021. <https://doi.org/10.37591/RTPL>
- Javed, U., Shaukat, K., Hameed, I. A., Iqbal, F., Alam, T. M., & Luo, S. (2021). A Review of Content-Based and Context-Based Recommendation

- Systems. *International Journal of Emerging Technologies in Learning*, 16(3), 274–306. <https://doi.org/10.3991/ijet.v16i03.18851>
- Khan, Qaisar, Hickie, Ian B, Loblay, Victoria, Ekambareshwar, Mahalakshmi, Zahed, Iqthyer Uddin Md, Naderbagi, Aila, Song, Yun J C, & LaMonica, Haley M. (2025). Psychometric evaluation of the System Usability Scale in the context of a childrearing app co-designed for low- and middle-income countries. *DIGITAL HEALTH*, 11, 20552076251335412. <https://doi.org/10.1177/20552076251335413>
- Kocoń, J., Cichecki, I., Kaszyca, O., Kochanek, M., Szydło, D., Baran, J., Bielaniewicz, J., Gruza, M., Janz, A., Kanclerz, K., Kocoń, A., Koptyra, B., Mieleszczenko-Kowszewicz, W., Miłkowski, P., Oleksy, M., Piasecki, M., Radliński, Ł., Wojtasik, K., Woźniak, S., & Kazienko, P. (2023). ChatGPT: Jack of all trades, master of none. *Information Fusion*, 99, 101861. <https://doi.org/https://doi.org/10.1016/j.inffus.2023.101861>
- Koren Yehuda and Rendle, S. and B. R. (2022). Advances in Collaborative Filtering. In L. and S. B. Ricci Francesco and Rokach (Ed.), *Recommender Systems Handbook* (pp. 91–142). Springer US. https://doi.org/10.1007/978-1-0716-2197-4_3
- Kornienko, D. V, Mishina, S. V, Shcherbatykh, S. V, & Melnikov, M. O. (2021). Principles of securing RESTful API web services developed with python frameworks. *Journal of Physics: Conference Series*, 2094(3), 032016. <https://doi.org/10.1088/1742-6596/2094/3/032016>
- Kudryavtsev, N. D., Bardasova, K. A., & Khoruzhaya, A. N. (2023). Speech recognition technology in radiology. *Digital Diagnostics*, 4(2), 185–196. <https://doi.org/10.17816/DD321420>
- Kumar, P., & Thakur, R. (2018). Recommendation system techniques and related issues: a survey. *International Journal of Information Technology*, 10(4), 495–501. <https://doi.org/10.1007/s41870-018-0138-8>

- Kumar, R. (2023). Farmers' Use of the Mobile Phone for Accessing Agricultural Information in Haryana: An Analytical Study. *Open Information Science*, 7(1). <https://doi.org/10.1515/opis-2022-0145>
- Kurniawan, D., Ningrum, S., & Widianingsih, I. (2023). Baseline Indicator for Program Evaluation: Case Study of Millennial Farmer Program in West Java Province. *Jurnal Public Policy*, 9, 270. <https://doi.org/10.35308/jpp.v9i4.7832>
- Kusumawati, Y. A., Huda, M. N., Dirgantara, S., & Carvenoriega, O. A. (2021). Architecture Design of Agriculture Marketing Mobile Apps during Pandemic Era. *IOP Conference Series: Earth and Environmental Science*, 794(1). <https://doi.org/10.1088/1755-1315/794/1/012126>
- Lewis, J. R. (1994). Sample sizes for usability studies: additional considerations. *Human Factors*, 36(2), 368–378. <https://doi.org/10.1177/001872089403600215>
- Lewis, J., & Sauro, J. (2018). Item Benchmarks for the System Usability Scale. 13, 158–167.
- Loubser, N. (2021). Creating a RESTful API: Flask. In N. Loubser (Ed.), *Software Engineering for Absolute Beginners: Your Guide to Creating Software Products* (pp. 193–233). Apress. https://doi.org/10.1007/978-1-4842-6622-9_7
- Lu, G., Qu, S., & Chen, Y. (2025). Understanding user experience for mobile applications: a systematic literature review. *Discover Applied Sciences*, 7(6), 587. <https://doi.org/10.1007/s42452-025-07170-3>
- Lu, J., Wu, D., Mao, M., Wang, W., & Zhang, G. (2015). Recommender system application developments: A survey. *Decision Support Systems*, 74, 12–32. <https://doi.org/https://doi.org/10.1016/j.dss.2015.03.008>
- Mantoo, S., Arora, S., Gupta, S., Vaishno, S. M., & Mata Vaishno, S. (2022). A Systematic Review Of The Different Techniques Used For Speech Recognition. *Journal of Pharmaceutical Negative Results* |, 13. <https://doi.org/10.47750/pnr.2022.13.S10.812>

- Mardiyanto, A. (2023). HASIL PENCACAHAN LENGKAP SENSUS PERTANIAN 2023 Tahap I. <https://web-api.bps.go.id/download.php?f=EmrjaUESWoI82zTRLTJbrmFaanR1UVFpaG9sT0taSmZqQXRWVl6V3BNc1NocW9UUkhNaXJW M2NlcVBRNWtaRG05cmx6QUJFN2ErK3dVeno4MktxM3RuK3FmRm9kRXpEOUN1TjJtMFIxbHI3SVByNDlPd3pNRSsvUzdGaDkvZVJaMVBEeGVKSjAzckkrN1BBZGhodXRHaysrUkFtbkIrcGNORkhMTU51b01hRXRJZzcveHBUNW5ZSENqNjZRL0ZhRIJNKzBjdW1TNDV4S2NGdA==>
- Mehare Hussam Bin and Anilkumar, J. P. and U. N. A. (2023). The Python Programming Language. In M. ``Sufian’’ Badar (Ed.), A Guide to Applied Machine Learning for Biologists (pp. 27–60). Springer International Publishing. https://doi.org/10.1007/978-3-031-22206-1_2
- Mohamed, S. I., Mostafa, M., Assaly, J., & Shalabi, A. S. (2024). ABACS: Attribute-Based Access Control System using digital keys. In Research Square.
- Moore, R. K., & Skidmore, L. (2019). On the Use/Misuse of the Term “Phoneme.” <http://arxiv.org/abs/1907.11640>
- Murugesh, T. S., Vasudevan, S. K., & Pulari, S. R. (2024). Python: A Practical Learning Approach. CRC Press. <https://books.google.co.id/books?id=dQoSEQAAQBAJ>
- Mushtaq, F., Azam, F., & Anwar, M. W. (2024). Performance Comparison of Single Code Base Development Tools: Flutter, React Native, and Xamarin. 2024 14th International Conference on Software Technology and Engineering (ICSTE), 17–23. <https://doi.org/10.1109/ICSTE63875.2024.00011>
- Nasir, M. A., Ismiasih, & Jamhari. (2021). Digital extension and the development of agricultural performance in Indonesia. IOP Conference Series: Earth and Environmental Science, 883(1). <https://doi.org/10.1088/1755-1315/883/1/012040>

- Nassif, A. B., Shahin, I., Attili, I., Azzeh, M., & Shaalan, K. (2019). Speech Recognition Using Deep Neural Networks: A Systematic Review. *IEEE Access*, 7, 19143–19165. <https://doi.org/10.1109/ACCESS.2019.2896880>
- Nazir, A., & Wang, Z. (2023). A comprehensive survey of ChatGPT: Advancements, applications, prospects, and challenges. *Meta-Radiology*, 1(2), 100022. <https://doi.org/https://doi.org/10.1016/j.metrad.2023.100022>
- Nielsen, J., & Landauer, T. K. (1993). A mathematical model of the finding of usability problems. *Proceedings of the INTERACT '93 and CHI '93 Conference on Human Factors in Computing Systems*, 206–213. <https://doi.org/10.1145/169059.169166>
- OpenAI Whisper - GeeksforGeeks. (n.d.). Retrieved April 26, 2024, from <https://www.geeksforgeeks.org/openai-whisper/>
- O'Shaughnessy, D. (2024). Trends and developments in automatic speech recognition research. *Computer Speech & Language*, 83, 101538. <https://doi.org/https://doi.org/10.1016/j.csl.2023.101538>
- Pangarkar, T. (2025, January 14). Ai in Agriculture Statistics and facts (2025). <https://scoop.market.us/Ai-in-Agriculture-Statistics/>. <https://scoop.market.us/ai-in-agriculture-statistics/>
- Patil, T. H., V, V., Madiwalar, V., Hundekar, V. P., & Kumar, P. (2024). A Review Paper on Voice Recognition and Response (VRR). 2024 2nd International Conference on Intelligent Data Communication Technologies and Internet of Things (IDCIoT), 1086–1094. <https://doi.org/10.1109/IDCIoT59759.2024.10467431>
- Peres, S. C., Pham, T., & Phillips, R. (2013). Validation of the system usability scale (SUS) SUS in the wild. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 57(1), 192–196.
- Pérez Serrano, D. E. (2024). Energy efficiency: recommender system for appliance usage. <https://oa.upm.es/82824/>
- Pressman, R. S. (2005). *Software engineering: a practitioner's approach*. Palgrave macmillan.

- Rashmitha, S., Sanjay, H. A., Shastry, K. A., & Jayaa Shree Laxmi, K. (2022). FarmFund - A Blockchain based Crowdfunding App for Farmers. 2022 7th International Conference on Communication and Electronics Systems (ICCES), 682–689. <https://doi.org/10.1109/ICCES54183.2022.9835829>
- Rawas, S. (2024). ChatGPT: Empowering lifelong learning in the digital age of higher education. *Education and Information Technologies*, 29(6), 6895–6908. <https://doi.org/10.1007/s10639-023-12114-8>
- Relan, K. (2019). Beginning with Flask. In K. Relan (Ed.), *Building REST APIs with Flask: Create Python Web Services with MySQL* (pp. 1–26). Apress. https://doi.org/10.1007/978-1-4842-5022-8_1
- Roumeliotis, K. I., & Tselikas, N. D. (2023). ChatGPT and Open-AI Models: A Preliminary Review. *Future Internet*, 15(6). <https://doi.org/10.3390/fi15060192>
- Ruslan, K., & Prasetyo, O. (2021). Determinan Demografi Penggunaan Internet Petani Padi di Indonesia dan Kaitannya Dengan Produktivitas. *Seminar Nasional Official Statistics*, 2021, 166–175. <https://doi.org/10.34123/semnasoffstat.v2021i1.807>
- Sauro, J. (2012, October 16). 10 benchmarks for user experience metrics. *MeasuringU*. <https://measuringu.com/ux-benchmarks/>
- Sauro, J., & Dumas, J. S. (2009). Comparison of three one-question, post-task usability questionnaires. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1599–1608. <https://doi.org/10.1145/1518701.1518946>
- Sharma, S., Singh, P., Sain, J., Shrivastava, V., & Pandey, A. (2024). Modern Backend Development Technologies: A Comparative Review and Case Study. In V. S. Rathore, J. Manuel R. S. Tavares, E. Tuba, & V. Devedzic (Eds.), *Emerging Trends in Expert Applications and Security* (pp. 139–151). Springer Nature Singapore.
- Sommerville, Ian. (2016). *Software engineering*. Pearson.

- Team, T., Katz, M., Moore, K. D., Ngo, V., & Guzzi, V. (2021). Flutter Apprentice: Learn to Build Cross-Platform Apps. Publisher: Razeware LLC,.
- Tullis, T., & Albert, B. (2013). Chapter 1 - Introduction. In T. Tullis & B. Albert (Eds.), *Measuring the User Experience* (Second Edition) (pp. 1–14). Morgan Kaufmann.
[https://doi.org/https://doi.org/10.1016/B978-0-12-415781-1.00001-7](https://doi.org/10.1016/B978-0-12-415781-1.00001-7)
- Wu, T., He, S., Liu, J., Sun, S., Liu, K., Han, Q.-L., & Tang, Y. (2023). A Brief Overview of ChatGPT: The History, Status Quo and Potential Future Development. *IEEE/CAA Journal of Automatica Sinica*, 10(5), 1122–1136. <https://doi.org/10.1109/JAS.2023.123618>
- Nielsen, J. (2012, June 3). How Many Test Users in a Usability Study? Nielsen Norman Group. <https://www.nngroup.com/articles/how-many-test-users/>