

## DAFTAR PUSTAKA

- Abed-alguni, B.H., Alkhateeb, F., 2020. Intelligent hybrid cuckoo search and  $\beta$ -hill climbing algorithm. *J. King Saud Univ. - Comput. Inf. Sci.* 32, 159–173. <https://doi.org/10.1016/j.jksuci.2018.05.003>
- Abdullah, M.K., Suradi, N.R.M., Jamaludin, N., Mokhtar, A.S., Talib, A.R.A.T., Zainuddin, M.F., 2006. K-Chart: A Tool for Research Planning and Monitoring. *J. Qual. Meas. Anal.* 2, 123–129.
- Al-abaji, M.A., 2020. A Literature Review of Cuckoo Search Algorithm. *J. Educ. Pract.* 1–8. <https://doi.org/10.7176/jep/11-8-01>
- Alhussein, M., Aurangzeb, K., Haider, S.I., 2020. An unsupervised retinal vessel segmentation using hessian and intensity based approach. *IEEE Access* 8, 165056–165070. <https://doi.org/10.1109/ACCESS.2020.3022943>
- Alkhateeb, F., Abed-Alguni, B.H., 2021. A hybrid cuckoo search and simulated annealing algorithm. *J. Intell. Syst.* 28, 683–698. <https://doi.org/10.1515/jisys-2017-0268>
- Alnaggar, O.A.M.F., Jagadale, B.N., Naraya, S.H., 2022. MRI-Brain-Tumor-Detection-Using-Boosted-Crossbred-Random-Forests-and-Chimp-Optimization-Algorithm-Based-Convolutional-Neural-NetworksInternational-Journal-of-Intelligent-Engineering-and-Systems.pdf. *Int. J. Intell. Eng. Syst.* 15. <https://doi.org/10.22266/ijies2022.0430.04>
- Alwazzan, M.J., Ismael, M.A., Ahmed, A.N., 2021. A Hybrid Algorithm to Enhance Colour Retinal Fundus Images Using a Wiener Filter and CLAHE. *J. Digit. Imaging* 34, 750–759. <https://doi.org/10.1007/s10278-021-00447-0>
- Ammar, R., Abd El-Samie, F.E., El-Shafai, W., Ashiba, H., Elazm, A.A., El-Safrawey, A., 2020. Histogram Processing for Quality Enhancement of Industrial Videoscope Images, in: *Proceedings of the 8th International Japan-Africa Conference on Electronics, Communications and Computations, JAC-ECC 2020*. hal. 47–51. <https://doi.org/10.1109/JAC-ECC51597.2020.9355876>
- Amsini, P., Rani, R.U., 2020. Enhanced Type 2 Triangular Intuitionistic Fuzzy C Means Clustering Algorithm for Breast Cancer Histopathology Images, in: *Proceedings of the Fourth International Conference on Computing Methodologies and Communication (ICCMC 2020)*. hal. 589–594.
- Anilkumar, S., Dhanya, P.R., Balakrishnan, A.A., Supriya, M.H., 2019. Algorithm for Underwater Cable Tracking Using CLAHE based Enhancement. *Int. Symp. Ocean Electron. SYMPOL 2019-Decem*, 129–137. <https://doi.org/10.1109/SYMPOL48207.2019.9005273>
- Annavarapu, A., Borra, S., 2020. Development of magnetic resonance image denoising methodologies: A comprehensive overview of the state-of-the-art.

- Smart Heal. 18, 1–48. <https://doi.org/10.1016/j.smhl.2020.100138>
- APA, 2013. Diagnostic And Statistical Manual of Mental Disorders, Fifth Edition (DSM 5). American Psychiatric Association, United States of America. <https://doi.org/10.1176/appi.books.9780890425596>
- APA, 1994. Diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV). American Psychiatric Association, Washington, DC. <https://doi.org/10.3109/00048679509064964>
- Ashiba, H.I., 2021. Rib chest radiographs for detection of the cancer using double stage adaptive processing. *Multimed. Tools Appl.* 80, 21315–21337. <https://doi.org/10.1007/s11042-020-10214-y>
- Aslam, Y., Santhi, N., Ramasamy, N., Ramar, K., 2019. A modified adaptive thresholding method using cuckoo search algorithm for detecting surface defects. *Int. J. Adv. Comput. Sci. Appl.* 10, 214–220. <https://doi.org/10.14569/ijacsa.2019.0100528>
- Aurangzeb, K., Aslam, S., Alhussein, M., Naqvi, R.A., Arsalan, M., Haider, S.I., 2021. Contrast Enhancement of Fundus Images by Employing Modified PSO for Improving the Performance of Deep Learning Models. *IEEE Access* 9, 47930–47945. <https://doi.org/10.1109/ACCESS.2021.3068477>
- Båth, M., Månsson, L.G., 2007. Visual grading characteristics (VGC) analysis: A non-parametric rank-invariant statistical method for image quality evaluation. *Br. J. Radiol.* 80, 169–176. <https://doi.org/10.1259/bjr/35012658>
- Bahathiq, R.A., Banjar, H., Bamaga, A.K., Jarraya, S.K., 2022. Machine learning for autism spectrum disorder diagnosis using structural magnetic resonance imaging : Promising but challenging. <https://doi.org/10.3389/fninf.2022.949926>
- Barthelemy, P., Bertolotti, J., Wiersma, D.S., 2008. A Lévy flight for light. *Nature* 453, 495–498. <https://doi.org/10.1038/nature06948>
- Bhalerao, P.B., Bonde, S. V., 2021. Cuckoo search based multi-objective algorithm with decomposition for detection of masses in mammogram images. *Int. J. Inf. Technol.* 13, 2215–2226. <https://doi.org/10.1007/s41870-021-00805-9>
- Bhat, M., Tarun, P.M.S., 2014. Adaptive clip limit for contrast limited adaptive histogram equalization (CLAHE) of medical images using least mean square algorithm, in: *Proceedings of 2014 IEEE International Conference on Advanced Communication, Control and Computing Technologies, ICACCCT 2014.* IEEE, hal. 1259–1263. <https://doi.org/10.1109/ICACCCT.2014.7019300>
- Burger, W., Burge, M.J., 2009. *Principles of Digital Image Processing : Core Algorithms.* Springer, London. <https://doi.org/10.1007/978-1-84800-195-4>
- Campos, G.F.C., Mastelini, S.M., Aguiar, G.J., Mantovani, R.G., Melo, L.F. de, Barbon, S., 2019. Machine learning hyperparameter selection for Contrast

- Limited Adaptive Histogram Equalization. *Eurasip J. Image Video Process.* 2019, 1–18. <https://doi.org/10.1186/s13640-019-0445-4>
- CDC, C. for D.C. and P., 2024. Data and Statistics on Autism Spectrum Disorder [WWW Document]. *Data Stat. Autism Spectr. Disord.* URL [https://data.cdc.gov/Public-Health-Surveillance/autism-prevalence-studies/9mw4-6adp/data\\_preview](https://data.cdc.gov/Public-Health-Surveillance/autism-prevalence-studies/9mw4-6adp/data_preview) (diakses 2.15.25).
- Chandrashekar, L., Sreedevi, A., 2020a. A Multi-Objective Enhancement Technique for Poor Contrast Magnetic Resonance Images of Brain Glioblastomas. *Procedia Comput. Sci.* 171, 1770–1779. <https://doi.org/10.1016/j.procs.2020.04.190>
- Chandrashekar, L., Sreedevi, A., 2020b. A Two-Stage Multi-Objective Enhancement for Fused Magnetic Resonance Image and Computed Tomography Brain Images. *J. Inf. Syst. Telecommun.* 8, 93–104. <https://doi.org/10.29252/jist.8.30.93>
- Chang, Y., Jung, C., Ke, P., Song, H., Hwang, J., 2018. Automatic Contrast-Limited Adaptive Histogram Equalization with Dual Gamma Correction. *IEEE Access* 6, 11782–11792. <https://doi.org/10.1109/ACCESS.2018.2797872>
- Chen, L., 2022. Application of Cuckoo Search Algorithm in Cost Estimation of Building Energy Engineering. *Wirel. Commun. Mob. Comput.* 2022. <https://doi.org/10.1155/2022/7956751>
- Chen, L., Tang, C., Xu, M., Lei, Z., 2021. Enhancement and denoising method for low-quality MRI, CT images via the sequence decomposition Retinex model, and haze removal algorithm. *Med. Biol. Eng. Comput.* 59, 2433–2448. <https://doi.org/10.1007/s11517-021-02451-6>
- Civicioglu, P., Besdok, E., 2014. Comparative Analysis of the Cuckoo Search Algorithm, in: Yang, X. (Ed.), *Cuckoo Search and Firefly, Studies in Computational Intelligence*. Springer International Publishing, Switzerland, hal. 85–113. <https://doi.org/10.1007/978-3-319-02141-6>
- Civicioglu, P., Besdok, E., 2011. A conceptual comparison of the Cuckoo-search, particle swarm optimization, differential evolution and artificial bee colony algorithms. *Artif. Intell. Rev.* 39, 315–346. <https://doi.org/10.1007/s10462-011-9276-0>
- Dorigo, M., Stützle, T., 2004. *Ant Colony Optimization*, A Bradford Book The MIT Press Cambridge, Massachusetts London, England. A Bradford Book, The MIT Press, London.
- Dabass, J., Arora, S., Vig, R., Hanmandlu, M., 2019. Mammogram Image Enhancement Using Entropy and CLAHE Based Intuitionistic Fuzzy Method, in: *2019 6th International Conference on Signal Processing and Integrated Networks, SPIN 2019*. IEEE, hal. 24–29. <https://doi.org/10.1109/SPIN.2019.8711696>

- de Lacerda, M.G.P., Pessoa, L.F. de A., Neto, F.B. de L., Ludermit, T.B., Kuchen, H., 2021. A systematic literature review on general parameter control for evolutionary and swarm-based algorithms. *Swarm Evol. Comput.* 60, 100777. <https://doi.org/10.1016/j.swevo.2020.100777>
- Deperlioglu, O., Kose, U., 2019. Practical Method for the Underwater Image Enhancement with Adjusted CLAHE, in: 2018 International Conference on Artificial Intelligence and Data Processing, IDAP 2018. IEEE, hal. 16–21. <https://doi.org/10.1109/IDAP.2018.8620727>
- Dewi M, S.N., Santi, 2019. Improved oct image enhancement using clahe. *Int. J. Innov. Technol. Explor. Eng.* 8, 1351–1355. <https://doi.org/10.35940/ijitee.J9668.0981119>
- Dhal, K.G., Das, S., 2018. Colour Retinal Images Enhancement using Modified Histogram Equalisation Methods and Firefly Algorithm. *Int. J. Biomed. Eng. Technol.* 28, 160–184. <https://doi.org/10.1504/IJBET.2018.094725>
- Dhanya, P.R., Anilkumar, S., Balakrishnan, A.A., Supriya, M.H., 2019. L-CLAHE Intensification Filter (L-CIF) Algorithm for Underwater Image Enhancement and Colour Restoration. *Int. Symp. Ocean Electron. SYMPOL 2019-Decem*, 117–128. <https://doi.org/10.1109/SYMPOL48207.2019.9005278>
- dos Santos, J.C.M., Carrijo, G.A., de Fátima dos Santos Cardoso, C., Ferreira, J.C., Sousa, P.M., Patrocínio, A.C., 2020. Fundus image quality enhancement for blood vessel detection via a neural network using CLAHE and Wiener filter. *Res. Biomed. Eng.* 36, 107–119. <https://doi.org/10.1007/s42600-020-00046-y>
- Dorigo, M., Stützle, T., 2004. *Ant Colony Optimization*, A Bradford Book The MIT Press Cambridge, Massachusetts London, England. A Bradford Book, The MIT Press, London.
- Du, X., Wang, L., Zhao, J., He, Y., Sun, K., 2022. Power Dispatching of Multi-Microgrid Based on Improved CS Aiming at Economic Optimization on Source-Network-Load-Storage. *Electron.* 11. <https://doi.org/10.3390/electronics11172742>
- Dutta, M.K., Kaur, M., Sarkar, R.K., 2022. Image quality improvement of old and distorted artworks using fuzzy logic technique. *Optik (Stuttg)*. 249, 168252. <https://doi.org/10.1016/j.ijleo.2021.168252>
- Ebenezer, A.S., Kanmani, S.D., Sivakumar, M., Priya, S.J., 2021. Effect of image transformation on EfficientNet model for COVID-19 CT image classification. *Mater. Today Proc.* <https://doi.org/10.1016/j.matpr.2021.12.121>
- Eva, K.W., 2004. What every teacher needs to know about clinical reasoning. *Med. Educ.* 39, 98–106. <https://doi.org/10.1111/j.1365-2929.2004.01972.x>
- Fang, S., Xu, C., Feng, B., Zhu, Y., 2021. Color Endoscopic Image Enhancement Technology Based on Nonlinear Unsharp Mask and CLAHE, in: 6th International Conference on Signal and Image Processing. IEEE, hal. 234–

239.

- Fawcett, T., 2006. An introduction to ROC analysis. *Pattern Recognit. Lett.* 27, 861–874. <https://doi.org/10.1016/j.patrec.2005.10.010>
- Fawzi, A., Achuthan, A., Belaton, B., 2021. Adaptive Clip Limit Tile Size Histogram Equalization for Non-Homogenized Intensity Images. *IEEE Access* 9, 164466–164492. <https://doi.org/10.1109/ACCESS.2021.3134170>
- Fister, I., Yang, X.S., Fister, D., Fister, I., 2014. Cuckoo search: A brief literature review. *Stud. Comput. Intell.* 516, 49–62. [https://doi.org/10.1007/978-3-319-02141-6\\_3](https://doi.org/10.1007/978-3-319-02141-6_3)
- Foo, C.W., Tay, L.C., Lai, W.K., 2021. Adaptive Thresholding with Iterative Fuzzy Logic Based Image Enhancements for Wiper Arm Defect Detection, in: *ISMSIT 2021 - 5th International Symposium on Multidisciplinary Studies and Innovative Technologies, Proceedings. IEEE, Ankara, Turkey*, hal. 165–170. <https://doi.org/10.1109/ISMSIT52890.2021.9604740>
- Ganesan, T., Rajendran, A.J., Vellaiyan, P., 2019. An Efficient Finger Vein Image Enhancement and Pattern Extraction Using CLAHE and Repeated Line Tracking Algorithm, in: *Pandian, A.P., Ntalianis, K., Palanisamy, R. (Ed.), Advances in Intelligent Systems and Computing. Springer*, hal. 690–700. [https://doi.org/10.1007/978-3-030-30465-2\\_76](https://doi.org/10.1007/978-3-030-30465-2_76)
- Gao, C., Yun, L., Wang, K., Ye, Z., Li, H., 2019. Infrared Image Enhancement Method Based on Discrete stationary Wavelet Transform and CLAHE. *2019 IEEE Int. Conf. Comput. Sci. Educ. Informatiz. CSEI 2019* 191–194. <https://doi.org/10.1109/CSEI47661.2019.8938871>
- Gao, G.X., Lai, H.C., Liu, Y.Q., Wang, L.J., Jia, Z.H., 2021. Sandstorm image enhancement based on YUV space. *Optik (Stuttg.)* 226, 165659. <https://doi.org/10.1016/j.ijleo.2020.165659>
- Gao, S., Gao, Y., Zhang, Y., Li, T., 2021. Adaptive cuckoo algorithm with multiple search strategies. *Appl. Soft Comput.* 106, 107181. <https://doi.org/10.1016/j.asoc.2021.107181>
- García, J., Altimiras, F., Peña, A., Astorga, G., Peredo, O., 2018. A binary cuckoo search big data algorithm applied to large-scale crew scheduling problems. *Complexity* 2018. <https://doi.org/10.1155/2018/8395193>
- Garg, D., Garg, N.K., Kumar, M., 2018. Underwater image enhancement using blending of CLAHE and percentile methodologies. *Multimed. Tools Appl.* 77, 26545–26561. <https://doi.org/10.1007/s11042-018-5878-8>
- Ge, M., Hong, Q., Zhang, L., 2018. A hybrid DCT-CLAHE approach for brightness enhancement of uneven-illumination underwater images. *ACM Int. Conf. Proceeding Ser.* 123–127. <https://doi.org/10.1145/3301506.3301539>
- Georgescu, M.I., Ionescu, R.T., Verga, N., 2020. Convolutional Neural Networks with Intermediate Loss for 3D Super-Resolution of CT and MRI Scans. *IEEE*

- Access 8, 49112–49124. <https://doi.org/10.1109/ACCESS.2020.2980266>
- Gonzalez, R.C., Woods, R.E., 2018. Digital Image Processing : Global Edition, Fourth Edi. ed. Pearson Education, England.
- Grosvenor, L.P., Croen, L.A., Lynch, F.L., Marafino, B.J., Maye, M., Penfold, R.B., 2024. Autism Diagnosis Among US Children and Adults , 2011-2022 7, 2011–2022. <https://doi.org/10.1001/jamanetworkopen.2024.42218>
- Gonzalez, R.C., Woods, R.E., Eddins, S.L., 2010. Digital Image Processing Using MATLAB, Second Edi. ed. Tata McGraw-Hill, New Delhi.
- Grandin, T., Panek, R., 2013. The Autistic Brain-Thinking Accross the Spectrum, Angewandte Chemie International Edition, 6(11), 951–952. Houghton Mifflin Harcourt Publishing Company, New York.
- Gupta, N., Garg, H., Agarwal, R., 2021. A robust framework for glaucoma detection using CLAHE and EfficientNet. Vis. Comput. <https://doi.org/10.1007/s00371-021-02114-5>
- Hameed, F.A., Hasan, H.R., Ahmed, A.A., Amin, G.A.H., 2020. Using the Cuckoo Search for generating new particles in particle swarm optimization algorithm. J. Comput. Sci. 16, 430–438. <https://doi.org/10.3844/JCSP.2020.430.438>
- Hana, F.M., Maulida, I.D., 2021. Analysis of contrast limited adaptive histogram equalization (CLAHE) parameters on finger knuckle print identification. J. Phys. Conf. Ser. 1764. <https://doi.org/10.1088/1742-6596/1764/1/012049>
- Harish, S., Ali Ahammed, G.F., 2019. Integrated modelling approach for enhancing brain MRI with flexible pre-processing capability. Int. J. Electr. Comput. Eng. 9, 2416–2424. <https://doi.org/10.11591/ijece.v9i4.pp2416-2424>
- Health Physics Society, 2006. Radiation Exposure from Medical Diagnostic Imaging Procedures. Radiology 1–3.
- Hendrawan, A., Asmiatun, S., 2018. Identification of Picnosis Cells Using Contrast-Limited Adaptive Histogram Equalization (CLAHE) and K-means Algorithm. 1st Int. Conf. Comput. Appl. Inf. Secur. ICCAIS 2018 21–23. <https://doi.org/10.1109/CAIS.2018.8441978>
- Holland, J.H., 1992. Adaptation in Natural and Artificial Systems.
- Hughes, M.M., Shaw, K.A., DiRienzo, M., Durkin, M.S., Esler, A., Hall-Lande, J., Wiggins, L., Zahorodny, W., Singer, A., Maenner, M.J., 2023. The Prevalence and Characteristics of Children With Profound Autism , 15 Sites, United States, 2000-2016. Public Health Rep. 138, 9710. <https://doi.org/10.1177/00333549231163551>
- Hussein, R.R., Hamodi, Y.I., Sabri, R.A., 2019. Retinex theory for color image enhancement: A systematic review. Int. J. Electr. Comput. Eng. 9, 5560–5569. <https://doi.org/10.11591/ijece.v9i6.pp5560-5569>
- Islam, M.R., Nahiduzzaman, M., 2022. Complex features extraction with deep

- learning model for the detection of COVID19 from CT scan images using ensemble based machine learning approach. *Expert Syst. Appl.* 195, 116554. <https://doi.org/10.1016/j.eswa.2022.116554>
- Jaeschke, R., Guyatt, G.H., Sackett, D.L., 1994. Users' Guides to the Medical Literature: III. How to Use an Article About a Diagnostic Test B. What Are the Results and Will They Help Me in Caring for My Patients? *JAMA* 271, 703–707. <https://doi.org/10.1001/jama.1994.03510330081039>
- Jähne, B., 2005. *Digital Image Processing 6th revised and Extended Edition*. Springer Berlin Heidelberg.
- Jain, A.K., 1989. *Fundamentals of Digital Image Processing*. Prentice Hall, New Jersey.
- Jalab, H.A., Ibrahim, R.W., Hasan, A.M., Karim, F.K., Al-Shamasneh, A.R., Baleanu, D., 2021. A new medical image enhancement algorithm based on fractional calculus. *Comput. Mater. Contin.* 68, 1467–1483. <https://doi.org/10.32604/cmc.2021.016047>
- James, R.M., Sunyoto, A., 2020. Detection of CT-Scan Lungs COVID-19 Image Using Convolutional Neural Network and CLAHE, in: 3rd International Conference on Information and Communications Technology (ICOIACT). IEEE, Yogyakarta, hal. 302–307. <https://doi.org/10.1109/ICOIACT50329.2020.9332069>
- Jaya, S., Latha, M., 2019. Diagnosis of cervical cancer using CLAHE and SGLDM on RGB pap smear images through ANN. *Int. J. Innov. Technol. Explor. Eng.* 9, 530–534. <https://doi.org/10.35940/ijitee.K2456.119119>
- Jenifer, S., Parasuraman, S., Kadirvelu, A., 2016. Contrast enhancement and brightness preserving of digital mammograms using fuzzy clipped contrast-limited adaptive histogram equalization algorithm. *Appl. Soft Comput. J.* 42, 167–177. <https://doi.org/10.1016/j.asoc.2016.01.039>
- Jenifer, S., Parasuraman, S., Kadirvelu, A., 2015. Otsu's method for clip limiting histograms for contrast enhancement of digital mammograms. 2014 IEEE Int. Conf. Comput. Intell. Comput. Res. IEEE ICCIC 2014 1–4. <https://doi.org/10.1109/ICCIC.2014.7238493>
- Jiao, W., Chen, W., Zhang, J., 2021. An Improved Cuckoo Search Algorithm for Multithreshold Image Segmentation. *Security* 2021, 1–10. <https://doi.org/10.1155/2021/6036410>
- Joda, B., Dereboylu, Z., 2017. Digital mammogram enhancement based on automatic histogram clipping, in: *Proceedings - 9th International Conference on Computational Intelligence and Communication Networks, CICN 2017*. hal. 34–38. <https://doi.org/10.1109/CICN.2017.8319351>
- Joni, K., Alfita, R., Dewi, H.A., 2020. Misty Image Repair System with Dark Channel Prior and CLAHE, in: *International Conference on Science and*

- Technology 2019. <https://doi.org/10.1088/1742-6596/1569/3/032069>
- Joseph, J., Sivaraman, J., Periyasamy, R., Simi, V.R., 2017. An objective method to identify optimum clip-limit and histogram specification of contrast limited adaptive histogram equalization for MR images. *Biocybern. Biomed. Eng.* 37, 489–497. <https://doi.org/10.1016/j.bbe.2016.11.006>
- Joshi, A.S., Kulkarni, O., Kakandikar, G.M., Nandedkar, V.M., 2017. Cuckoo Search Optimization- A Review. *Mater. Today Proc.* 4, 7262–7269. <https://doi.org/10.1016/j.matpr.2017.07.055>
- Joshi, S., Karule, P.T., 2018. Review of Preprocessing Techniques for Fundus Image Analysis. *AMSE Journals-AMSE IIETA* 60, 593–612. [https://doi.org/10.18280/ama\\_b.600306](https://doi.org/10.18280/ama_b.600306)
- Jr, I.F., Fister, D., Fister, I., 2013. A comprehensive review of cuckoo search : variants and hybrids. *Int. J. Math. Model. Numer. Optim.* 4, 387–409.
- Jr, I.F., Fister, I., Brest, J., 2012. Memetic Firefly Algorithm for Combinatorial Optimization. *Bionspired Optim. Methods Their Appl.* 75–85. <https://doi.org/10.48550/arXiv.1204.5165>
- K.koonsanit, S.Thongvigittmanee, N.Pongnapang, P.T., 2017. IMAGE ENHANCEMENT ON DIGITAL X-RAY IMAGES USING N-CLAHE X-ray CT and Medical Imaging Laboratory ( CTI ) Biomedical Electronics and Systems Research Unit ( BESRU ) National Electronics and Computer Technology Center ( NECTEC ), Thailand Faculty of Medical, in: 2017 10th Biomedical Engineering International Conference (BMEiCON). IEEE, Hokkaido, Japan, hal. 1–4. <https://doi.org/10.1109/BMEiCON.2017.8229130>
- Kaur, M., Sarkar, R.K., Dutta, M.K., 2021. Investigation on quality enhancement of old and fragile artworks using non-linear filter and histogram equalization techniques. *Optik (Stuttg).* 244, 167564. <https://doi.org/10.1016/j.ijleo.2021.167564>
- Kaveh, A., Bakhspoori, T., 2011. Optimum design of steel frames using Cuckoo Search Algorithm with levy flights. *Struct. Des. Tall Spec. Build.* <https://doi.org/10.1002/tal>
- Kennedy, J., Eberhart, R., 1995. Particle Swarm Optimization, in: *Proceedings of ICNN'95 - International Conference on Neural Networks*. IEEE, Perth, WA, Australia, hal. 1942–1948. <https://doi.org/10.1109/ICNN.1995.488968>
- Khan, S.U., Rahim, M.K.A., Aminu-Baba, M., Khalil, A.E.K., Ali, S., 2018. Diagnosis of faulty elements in array antenna using nature inspired Cuckoo search algorithm. *Int. J. Electr. Comput. Eng.* 8, 1870–1874. <https://doi.org/10.11591/ijece.v8i3.pp1870-1874>
- Kharel, N., Alsadoon, A., Prasad, P.W.C., Elchouemi, A., 2017. Early diagnosis of breast cancer using contrast limited adaptive histogram equalization (CLAHE) and Morphology methods, in: 2017 8th International Conference on

- Information and Communication Systems, ICICS 2017. IEEE, hal. 120–124.  
<https://doi.org/10.1109/IACS.2017.7921957>
- Khodatars, M., Shoeibi, A., Sadeghi, D., Ghaasemi, N., Jafari, M., Moridian, P., Khadem, A., Alizadehsani, R., Zare, A., Kong, Y., Khosravi, A., Nahavandi, S., Hussain, S., Acharya, U.R., Berk, M., 2021. Deep learning for neuroimaging-based diagnosis and rehabilitation of Autism Spectrum Disorder: A review. *Comput. Biol. Med.* 139, 104949.  
<https://doi.org/10.1016/j.combiomed.2021.104949>
- Khrissi, L., Satori, H., Satori, K., El Akkad, N., 2021. An Efficient Image Clustering Technique based on Fuzzy C-means and Cuckoo Search Algorithm. *Int. J. Adv. Comput. Sci. Appl.* 12, 423–432.  
<https://doi.org/10.14569/IJACSA.2021.0120647>
- Kirkpatrick, S., Gelatt, C.D., Vecchi, M.P., 1983. Optimization by Simulated Annealing. *Sci. New Ser.* 220, 671–680. [https://doi.org/10.1007/978-981-99-2213-0\\_2](https://doi.org/10.1007/978-981-99-2213-0_2)
- Kokkonen, S.-M., Karttunen, A., Jartti, P., Katisko, J., PhilLic, Tervonen, O., 2006. Enhancement of Brain Tumors in 0.23-T Low-Field MRI : *Acad. Radiol.* 13, 885–892. <https://doi.org/10.1016/j.acra.2006.03.010>
- Kristiana, I.F., Widayanti, C.G., 2016. *Buku Ajar Psikologi Anak Berkebutuhan Khusus*. UNDIP Press, Semarang.
- Kotiyal, V., Singh, A., Sharma, S., Nagar, J., Lee, C.C., 2021. Ecs-nl: An enhanced cuckoo search algorithm for node localisation in wireless sensor networks. *Sensors* 21, 1–15. <https://doi.org/10.3390/s21113576>
- Kumar, Arun, Kumar, Anil, Vishwakarma, A., Lee, H.N., 2022. An improved segmentation technique for multilevel thresholding of crop image using cuckoo search algorithm based on recursive minimum cross entropy. *IET Signal Process.* 16, 630–649. <https://doi.org/10.1049/sil2.12148>
- Kumar, M., Suman, 2022. Hybrid cuckoo search algorithm for scheduling in cloud computing. *Comput. Mater. Contin.* 71, 1641–1660.  
<https://doi.org/10.32604/cmc.2022.021793>
- Kumar, U., Kumar, S., 2020. Optik Particle swarm optimized texture based histogram equalization ( PSOTHE ) for MRI brain image enhancement. *Optik (Stuttg)*. 224, 165760. <https://doi.org/10.1016/j.ijleo.2020.165760>
- Kumbhar, M.M., Godbole, B.B., 2020. Dehazing Effects on Image and Video using AHE, CLAHE and Dark Channel Prior. *Int. J. Eng. Adv. Technol.* 9, 119–125.  
<https://doi.org/10.35940/ijeat.c4833.029320>
- Kuran, U., Kuran, E.C., 2021. Parameter selection for CLAHE using multi-objective cuckoo search algorithm for image contrast enhancement. *Intell. Syst. with Appl.* 12, 1–13. <https://doi.org/10.1016/j.iswa.2021.200051>
- Kushwah, A., Gupta, K., Agrawal, A., Jain, G., Agrawal, G., 2017. A Comparative

- Study of Edge Detection Techniques. *Int. J. Adv. Res. Comput. Sci.* 8, 2528–2531. <https://doi.org/10.5120/17631-5949>
- Ladd, M.E., Bachert, P., Meyerspeer, M., Moser, E., Nagel, A.M., Norris, D.G., Schmitter, S., Speck, O., Straub, S., Zaiss, M., 2018. Pros and cons of ultra-high-field MRI/MRS for human application. *Prog. Nucl. Magn. Reson. Spectrosc.* 109, 1–50. <https://doi.org/10.1016/j.pnmrs.2018.06.001>
- Lakshminarayana, P., Sureshkumar, T. V., 2020. Automatic Generation and Optimization of Test case using Hybrid Cuckoo Search and Bee Colony Algorithm. *J. Intell. Syst.* 30, 59–72. <https://doi.org/10.1515/jisys-2019-0051>
- Latif, G., Awang Iskandar, D.N.F., Alghazo, J.M., Mohammad, N., 2019. Enhanced MR Image Classification Using Hybrid Statistical and Wavelets Features. *IEEE Access* 7, 9634–9644. <https://doi.org/10.1109/ACCESS.2018.2888488>
- Liu, C.J., Zhang, L., Sun, Y., Geng, L., Wang, R., Shi, K.M., Wan, J.X., 2023. Application of CT and MRI images based on an artificial intelligence algorithm for predicting lymph node metastasis in breast cancer patients: a meta-analysis. *BMC Cancer* 23, 1–15. <https://doi.org/10.1186/s12885-023-11638-z>
- Liu, J., Liu, Q.R., Wu, Z.M., Chen, Q.R., Chen, J., Wang, Y., Cao, X.L., Dai, M.X., Dong, C., Liu, Q., Zhu, J., Zhang, L.L., Li, Y., Wang, Y.F., Liu, L., Yang, B.R., 2023. Specific brain imaging alterations underlying autistic traits in children with attention-deficit/hyperactivity disorder. *Behav. Brain Funct.* 19, 1–12. <https://doi.org/10.1186/s12993-023-00222-x>
- Liu, H., Yan, B., Lv, M., Wang, J., Wang, X., Wang, W., 2018. Adaptive CLAHE image enhancement using imaging environment self-perception. *Lect. Notes Electr. Eng.* 456, 343–350. [https://doi.org/10.1007/978-981-10-6232-2\\_40](https://doi.org/10.1007/978-981-10-6232-2_40)
- Liu, X., Pedersen, M., Wang, R., 2022. Survey of natural image enhancement techniques: Classification, evaluation, challenges, and perspectives. *Digit. Signal Process. A Rev. J.* 127, 1–40. <https://doi.org/10.1016/j.dsp.2022.103547>
- Loh, H.W., Ooi, C.P., Barua, P.D., Palmer, E.E., Molinari, F., Acharya, Ur., 2022. Automated detection of ADHD: Current trends and future perspective. *Comput. Biol. Med.* 146, 105525. <https://doi.org/10.1016/j.combiomed.2022.105525>
- Loubna, B., Mohamed, S., Abdelaziz, E., Fatimaezzahra, M., 2017. A novel adaptive discrete cuckoo search algorithm for parameter optimization in computer vision. *Intel. Artif.* 20, 51–71. <https://doi.org/10.4114/intartif.vol20iss60pp51-71>
- Ludewig, E., Richter, A., Frame, M., 2010. Diagnostic imaging - Evaluating image quality using visual grading characteristic (VGC) analysis. *Vet. Res. Commun.* 34, 473–479. <https://doi.org/10.1007/s11259-010-9413-2>

- Magudeeswaran, V., Ravichandran, C.G., Thirumurugan, P., 2017. Brightness preserving bi-level fuzzy histogram equalization for MRI brain image contrast enhancement. *Int. J. Imaging Syst. Technol.* 27, 153–161. <https://doi.org/10.1002/ima.22219>
- Magudeeswaran, V., Singh, J.F., 2017. Contrast limited fuzzy adaptive histogram equalization for enhancement of brain images. *Int. J. Imaging Syst. Technol.* 27, 98–103. <https://doi.org/10.1002/ima.22214>
- Maier, H.R., Razavi, S., Kapelan, Z., Matott, L.S., Kasprzyk, J., Tolson, B.A., 2019. Introductory overview: Optimization using evolutionary algorithms and other metaheuristics. *Environ. Model. Softw.* 114, 195–213. <https://doi.org/10.1016/j.envsoft.2018.11.018>
- Majeed, S.H., Isa, N.A.M., 2021. Adaptive Entropy Index Histogram Equalization for Poor Contrast Images. *IEEE Access* 9, 6402–6437. <https://doi.org/10.1109/ACCESS.2020.3048148>
- Majeed, S.H., Isa, N.A.M., 2020. Iterated Adaptive Entropy-Clip Limit Histogram Equalization for Poor Contrast Images. *IEEE Access* 8, 144218–144245. <https://doi.org/10.1109/ACCESS.2020.3014453>
- Manju, R.A., Koshy, G., Simon, P., 2019. Improved Method for Enhancing Dark Images based on CLAHE and Morphological Reconstruction. *Procedia Comput. Sci.* 165, 391–398. <https://doi.org/10.1016/j.procs.2020.01.033>
- Marler, R.T., Arora, J.S., 2010. The weighted sum method for multi-objective optimization: New insights. *Struct. Multidiscip. Optim.* 41, 853–862. <https://doi.org/10.1007/s00158-009-0460-7>
- Marques, O., 2011. *Practical Image and Video Processing Using Matlab*. A John Wiley & Sons, Inc, Singapore.
- Mayathevar, K., Veluchamy, M., Subramani, B., 2020. Fuzzy color histogram equalization with weighted distribution for image enhancement. *Opt. Int. J. Light Electron Opt.* 216, 164927. <https://doi.org/10.1016/j.ijleo.2020.164927>
- Miao, Y., Song, D., Shi, W., Yang, H., Li, Y., Jiang, Z., He, W., Gu, W., 2018. Application of the CLAHE algorithm based on optimized bilinear interpolation in near infrared vein image enhancement, in: *ACM International Conference Proceeding Series (CSAE)*. ACM, China, hal. 1–6. <https://doi.org/10.1145/3207677.3277957>
- Min, B.S., Lim, D.K., Kim, S.J., Lee, J.H., 2013. A novel method of determining parameters of CLAHE based on image entropy. *Int. J. Softw. Eng. its Appl.* 7, 113–120. <https://doi.org/10.14257/ijseia.2013.7.5.11>
- Mishra, A., Gupta, M., Sharma, P., 2018. Enhancement of Underwater Images using Improved CLAHE. 2018 *Int. Conf. Adv. Comput. Telecommun. ICACAT 2018* 1–2. <https://doi.org/10.1109/ICACAT.2018.8933665>
- Mohan, M., Priya, L.T., Nair, L.S., 2020. Fuzzy c-means Segmentation on

- Enhanced Mammograms Using CLAHE and Fourth Order Complex Diffusion. Proc. 4th Int. Conf. Comput. Methodol. Commun. ICCMC 2020 647–651. <https://doi.org/10.1109/ICCMC48092.2020.ICCMC-000120>
- Mohan, S., Mahesh, T.R., 2013. Particle Swarm Optimization Based Contrast Limited Enhancement for Mammogram Images, in: 7th International Conference on Intelligent Systems and Control (ISCO 2013). IEEE, India, hal. 384–388. <https://doi.org/10.1109/ISCO.2013.6481185>
- Mohan, S., Simon, P., 2020. Underwater Image Enhancement based on Histogram Manipulation and Multiscale Fusion. Procedia Comput. Sci. 171, 941–950. <https://doi.org/10.1016/j.procs.2020.04.102>
- More, L.G.P. tuning of C. based on multi-objective optimization to achieve different contrast levels in medical images, Brizuela, M.A., Ayala, H.L., Pinto-Roa, D.P., Noguera, J.L.V., 2015. Parameter tuning of CLAHE based on multi-objective optimization to achieve different contrast levels in medical images. Proc. - Int. Conf. Image Process. ICIP 66–67. <https://doi.org/10.1109/ICIP.2015.7351687>
- Munadi, K., Muchtar, K., Maulina, N., Pradhan, B., 2020. Image Enhancement for Tuberculosis Detection Using Deep Learning. IEEE Access 8, 217897–217907. <https://doi.org/10.1109/ACCESS.2020.3041867>
- Murugan, K., Arunachalam, V.P., Karthik, S., 2019. Hybrid Filtering Approach for Retrieval of MRI Image. J. Med. Syst. 43, 1–8. <https://doi.org/10.1007/s10916-018-1124-1>
- Musa, P., Rafi, F. Al, Lamsani, M., 2018. A review: Contrast-limited adaptive histogram equalization (CLAHE) methods to help the application of face recognition. Proc. 3rd Int. Conf. Informatics Comput. ICIC 2018. <https://doi.org/10.1109/IAC.2018.8780492>
- Nahiduzzaman, M., Goni, M.O.F., Anower, M.S., Islam, Md Robiul, Ahsan, M., Haider, J., Gurusamy, S., Hassan, R., Islam, Md Rakibul, 2021a. A novel method for multivariant pneumonia classification based on hybrid CNN-PCA based feature extraction using extreme learning machine with CXR images. IEEE Access 9, 147512–147526. <https://doi.org/10.1109/ACCESS.2021.3123782>
- Nahiduzzaman, M., Islam, M.R., Islam, S.M.R., Goni, M.O.F., Anower, M.S., Kwak, K.S., 2021b. Hybrid CNN-SVD Based Prominent Feature Extraction and Selection for Grading Diabetic Retinopathy Using Extreme Learning Machine Algorithm. IEEE Access 9, 152261–152274. <https://doi.org/10.1109/ACCESS.2021.3125791>
- Napolitano, A., Schiavi, S., La Rosa, P., Rossi-Espagnet, M.C., Petrillo, S., Bottino, F., Tagliente, E., Longo, D., Lupi, E., Casula, L., Valeri, G., Piemonte, F., Trezza, V., Vicari, S., 2022. Sex Differences in Autism Spectrum Disorder:

- Diagnostic, Neurobiological, and Behavioral Features. *Front. Psychiatry* 13, 1–18. <https://doi.org/10.3389/fpsyt.2022.889636>
- Núñez, M.A.B., Rodriguez, L.G.M., Noguera, J.L.V., Ayala, H.L., Pinto-Roa, D.P., 2014. Particle Swarm Optimization applied to parameter tuning of CLAHE based on Entropy and Structural Similarity Index. *J. Comput. Interdiscip. Sci.* 5, 1.
- Othman, M.S., Kumaran, S.R., Yusuf, L.M., 2020. Gene selection using hybrid multi-objective cuckoo search algorithm with evolutionary operators for cancer microarray data. *IEEE Access* 8, 186348–186361. <https://doi.org/10.1109/ACCESS.2020.3029890>
- Palanisamy, G., Shankar, N.B., Ponnusamy, P., Gopi, V.P., 2020. A hybrid feature preservation technique based on luminosity and edge based contrast enhancement in color fundus images. *Biocybern. Biomed. Eng.* 40, 752–763. <https://doi.org/10.1016/j.bbe.2020.02.006>
- Pandiyan, N., Narayan, S., 2022. Cardiac Disease Detection using Cuckoo Search Enabled Deep Belief Network. *Intell. Syst. with Appl.* 16, 200131. <https://doi.org/10.1016/j.iswa.2022.200131>
- Parikh, R., Mathai, A., Parikh, S., Sekhar, G.C., Thomas, R., 2008. Understanding and using sensitivity, specificity and predictive values. *Indian J. Ophthalmol.* 56, 45–50. <https://doi.org/10.4103/0301-4738.41424>
- Park, S., Kim, K., Yu, S., Paik, J., 2018. Contrast enhancement for low-light image enhancement: A survey. *IEIE Trans. Smart Process. Comput.* 7, 36–48. <https://doi.org/10.5573/IEIESPC.2018.7.1.036>
- Patel, V.L., Arocha, J.F., Kaufman, D.R., 2001. A Primer on Aspects of Cognition for Medical Informatics. *J. Am. Medical Informatics Assoc.* 8, 324–343.
- Patil, P., Patil, H., 2020. X-Ray Imaging Based Pneumonia Classification using Deep Learning and Adaptive Clip Limit based CLAHE Algorithm, in: *IEEE 4th Conference on Information & Communication Technology (CICT)*. hal. 1–4. <https://doi.org/10.1109/CICT51604.2020.9312089>.
- Pawar, M., Talbar, S., 2021. Local entropy maximization based image fusion for contrast enhancement of mammogram. *J. King Saud Univ. - Comput. Inf. Sci.* 33, 150–160. <https://doi.org/10.1016/j.jksuci.2018.02.008>
- Pérez, I., Taito-Vicenti, I.Y., González-Xuriguera, C.G., Carvajal, C., Franco, J.V.A., Loézar, C., 2021. How to interpret diagnostic tests. *Medwave* 21, 1–12. <https://doi.org/10.5867/medwave.2021.07.8432>
- Pizer, S.M., Amburn, E.P., Austin, J.D., Cromartie, R., Geselowitz, A., Greer, T., Romeny, B.T.H., Zimmerman, J.B., Zuiderveld, K., 1987. Adaptive Histogram Equalization and Its Variations. *Comput. Vision, Graph. Image Process.* 39, 355–368. <https://doi.org/10.1016/j.icte.2021.05.002>
- Prajapati, P.P., Shah, M. V., 2018. Performance estimation of differential evolution,

- Particle Swarm Optimization and Cuckoo search algorithms. *Int. J. Intell. Syst. Appl.* 10, 59–67. <https://doi.org/10.5815/ijisa.2018.06.07>
- Pramunendar, R.A., Prabowo, D.P., Perigiwati, D., Sari, Y., Andono, P.N., Soeleman, M.A., 2020. New workflow for marine fish classification based on combination features and CLAHE enhancement technique. *Int. J. Intell. Eng. Syst.* 13, 293–304. <https://doi.org/10.22266/IJIES2020.0831.26>
- Pratt, William K., 2007. *Digital Image Processing : PIKS Scientific inside*, Fourth Ed. ed. A John Wiley & Sons, Inc, California.
- Precht, H., Hansson, J., Outzen, C., Hogg, P., Tingberg, A., 2019. Radiographers' perspectives' on Visual Grading Analysis as a scientific method to evaluate image quality. *Radiography* 25, S14–S18. <https://doi.org/10.1016/j.radi.2019.06.006>
- Qassim, H.M., Basheer, N.M., Farhan, M.N., 2019. Brightness preserving enhancement for dental digital x-ray images based on entropy and histogram analysis. *J. Appl. Sci. Eng.* 22, 187–194. [https://doi.org/10.6180/jase.201903\\_22\(1\).0019](https://doi.org/10.6180/jase.201903_22(1).0019)
- Qi, Y., Yang, Z., Sun, W., Lou, M., Lian, J., Zhao, W., Deng, X., Ma, Y., 2022. A Comprehensive Overview of Image Enhancement Techniques. *Arch. Comput. Methods Eng.* 29, 583–607. <https://doi.org/10.1007/s11831-021-09587-6>
- Qiu, S., Lu, Y., Li, Yan, Shi, J., Cui, H., Gu, Y., Li, Yong, Zhong, W., Zhu, X., Liu, Yunkai, Cheng, Y., Liu, Yawen, Qiao, Y., 2020. Prevalence of autism spectrum disorder in Asia: A systematic review and meta-analysis. *Psychiatry Res.* 284, 112679. <https://doi.org/10.1016/j.psychres.2019.112679>
- Radzi, S.F.M., Karim, M.K.A., Saripan, M.I., Rahman, M.A.A., Osman, N.H., Dalah, E.Z., Noor, N.M., 2020. Impact of Image Contrast Enhancement on Stability of Radiomics Feature Quantification on a 2D Mammogram Radiograph. *IEEE Access* 8, 127720–127731. <https://doi.org/10.1109/ACCESS.2020.3008927>
- Rahman, M.F., Sthevanie, F., Ramadhani, K.N., 2020. Face Recognition in Low Lighting Conditions Using Fisherface Method and CLAHE Techniques, in: *2020 8th International Conference on Information and Communication Technology, ICoICT 2020*. hal. 1–6. <https://doi.org/10.1109/ICoICT49345.2020.9166317>
- Rahman, T., Khandakar, A., Qiblawey, Y., Tahir, A., Kiranyaz, S., Abul Kashem, S. Bin, Islam, M.T., Al Maadeed, S., Zughaier, S.M., Khan, M.S., Chowdhury, M.E.H., 2021. Exploring the effect of image enhancement techniques on COVID-19 detection using chest X-ray images. *Comput. Biol. Med.* 132, 104319. <https://doi.org/10.1016/j.compbimed.2021.104319>
- Rao, B.S., 2020. Dynamic Histogram Equalization for contrast enhancement for digital images. *Appl. Soft Comput. J.* 89, 106114.

<https://doi.org/10.1016/j.asoc.2020.106114>

- Rao, K., Bansal, M., Kaur, G., 2022. Retinex-Centered Contrast Enhancement Method for Histopathology Images with Weighted CLAHE. Arab. J. Sci. Eng. <https://doi.org/10.1007/s13369-021-06421-w>
- Rathika, N., Sathya, N., 2021. Recognition of face CLAHEM based on using GPP-HM. J. Ambient Intell. Humaniz. Comput. 12, 6735–6739. <https://doi.org/10.1007/s12652-020-02297-0>
- Ravikumar, M., Shivaprasad, B.J., Guru, D.S., 2020. Enhancement of MRI Brain Images Using Fuzzy Logic Approach, in: Santosh, K., Gawali, B. (Ed.), Communications in Computer and Information Science: Recent Trend in Image Processing and Pattern Recogniton. Springer Nature Singapore Pte, India, hal. 34697–34699. <https://doi.org/10.1007/978-981-16-0493-5>
- Reda, A., Johanyák, Z.C., 2021. Survey on five nature-Inspired Optimization Algorithms. Gradus 8, 173–183. <https://doi.org/10.47833/2021.1.csc.001>
- Reilly, R.M., 2019. Magnetic Resonance Imaging (MRI) Technology, in: Reilly, R.M. (Ed.), Medical Imaging for Health Professionals: Technologies and Clinical Applications. John Wiley & Sons Inc, United States, hal. 87–106. <https://doi.org/10.1002/9781119537397>
- Rezaie, V., Parnianifard, A., 2022. A new intelligent system for diagnosing tumors with MR images using type-2 fuzzy neural network (T2FNN), Multimedia Tools and Applications. Springer US. <https://doi.org/10.1007/s11042-021-11221-3>
- Rinck, P.A., 2024. Magnetic Resonance in Medicine. The Basic Text-book of the European Magnetic Resonance Forum, 14th editi. ed. The Round Table Foundation (TRTF).
- Rizwan, M., Shabbir, A., Javed, A.R., Shabbir, M., Baker, T., Al-Jumeily Obe, D., 2022. Brain Tumor and Glioma Grade Classification Using Gaussian Convolutional Neural Network. IEEE Access 10, 29731–29740. <https://doi.org/10.1109/ACCESS.2022.3153108>
- Rommelse, N., Buitelaar, J.K., Hartman, C.A., 2017. Structural brain imaging correlates of ASD and ADHD across the lifespan: a hypothesis-generating review on developmental ASD-ADHD subtypes. J. Neural Transm. 124, 259–271. <https://doi.org/10.1007/s00702-016-1651-1>
- Roy, S., Chaudhuri, S.S., 2013. Cuckoo Search Algorithm using Lèvy Flight: A Review. Int. J. Mod. Educ. Comput. Sci. 5, 10–15. <https://doi.org/10.5815/ijmecs.2013.12.02>
- Saba, T., Rehman, A., Mehmood, Z., Kolivand, H., Sharif, M., 2018. Image Enhancement and Segmentation Techniques for Detection of Knee Joint Diseases: A Survey. Curr. Med. Imaging Rev. 14, 704–715.
- Sahnoun, M., Kallel, F., Dammak, M., Kammoun, O., Mhiri, C., Ben Mahfoudh,

- K., Ben Hamida, A., 2020. Spinal cord MRI contrast enhancement using adaptive gamma correction for patient with multiple sclerosis. *Signal, Image Video Process.* 14, 377–385. <https://doi.org/10.1007/s11760-019-01561-x>
- Sajeev, S., Bajger, M., Lee, G., 2015. Segmentation of Breast Masses in Local Dense Background using Adaptive Clip Limit-CLAHE, in: *International Conference on Digital Image Computing: Techniques and Applications, DICTA 2015.* IEEE, Adelaide, SA, Australia. <https://doi.org/10.1109/DICTA.2015.7371305>
- Salari, N., Rasoulpoor, Shabnam, Rasoulpoor, Shna, Shohaimi, S., Jafarpour, S., Abdoli, N., Khaledi-Paveh, B., Mohammadi, M., 2022. The global prevalence of autism spectrum disorder: a comprehensive systematic review and meta-analysis. *Ital. J. Pediatr.* 48. <https://doi.org/10.1186/s13052-022-01310-w>
- Samsheriya, N., Gandhi, D.K., 2021. Under Water Image Enhancement Using Gaussian Laplace Transform and CLAHE based Fusion Method, in: *Proceedings - 2nd International Conference on Smart Electronics and Communication, ICOSEC 2021.* IEEE, hal. 1748–1755. <https://doi.org/10.1109/ICOSEC51865.2021.9591705>
- Sanagavarapu, S., Sridhar, S., Gopal, T. V., 2021. COVID-19 Identification in CLAHE Enhanced CT scans with class imbalance using ensembled ResNets. *2021 IEEE Int. IOT, Electron. Mechatronics Conf. IEMTRONICS 2021 - Proc.* <https://doi.org/10.1109/IEMTRONICS52119.2021.9422556>
- Saputra, W.A., Fitri, R., Setiyo, A., Nugroho, B., Kustini, S., 2021. Integration CLAHE and Seeded Region Growing For Segmentation of Rubber Tree in HSI Color Space, in: *2021 4th International Seminar on Research of Information Technology and Intelligent Systems (ISRITI).* IEEE, Yogyakarta, hal. 334–338. <https://doi.org/10.1109/ISRITI54043.2021.9702812>
- Saravanan, S., Karthigaivel, R., 2020. A fuzzy and spline based dynamic histogram equalization for contrast enhancement of brain images. *Int. J. Imaging Syst. Technol.* 31, 1–26. <https://doi.org/10.1002/ima.22483>
- Sathiya, L., Palanisamy, V., 2018. Minor Finger Knuckle Print Image Enhancement Using CLAHE Technique, in: Smys, S., Iiiyasu, A.M., Bestak, R., Shi, F. (Ed.), *New Trends in Computational Vision and Bio-inspired Computing.* India, hal. 681–688. <https://doi.org/10.1007/978-3-030-41862-5>
- Setiawan, A.W., 2020. Effect of Color Enhancement on Early Detection of Skin Cancer using Convolutional Neural Network. *2020 IEEE Int. Conf. Informatics, IoT, Enabling Technol. ICIoT 2020* 100–103. <https://doi.org/10.1109/ICIoT48696.2020.9089631>
- Shalini, S., Srinivasan, N., 2021. Retinal image classification by glaucoma based on ANFIS classifier. *Mater. Today Proc.* <https://doi.org/10.1016/j.matpr.2020.12.1056>

- Sharma, A., Sharma, Abhishek, Chowdary, V., Srivastava, A., Joshi, P., 2021. Cuckoo search algorithm: A review of recent variants and engineering applications. *Stud. Comput. Intell.* 916, 177–194. [https://doi.org/10.1007/978-981-15-7571-6\\_8](https://doi.org/10.1007/978-981-15-7571-6_8)
- Sharma, K., Singh, S., Doriya, R., 2021. Optimized cuckoo search algorithm using tournament selection function for robot path planning. *Int. J. Adv. Robot. Syst.* 18, 1–11. <https://doi.org/10.1177/1729881421996136>
- Sheet, S.S.M., Tan, T.S., As'ari, M.A., Hitam, W.H.W., Sia, J.S.Y., 2021. Retinal disease identification using upgraded CLAHE filter and transfer convolution neural network. *ICT Express*. <https://doi.org/10.1016/j.icte.2021.05.002>
- Shehab, M., Khader, A.T., Al-Betar, M.A., 2017. A survey on applications and variants of the cuckoo search algorithm. *Appl. Soft Comput. J.* 61, 1041–1059. <https://doi.org/10.1016/j.asoc.2017.02.034>
- Singh, U., Choubey, M.K., 2021. A Review: Image Enhancement on MRI Images. 2021 5th Int. Conf. Inf. Syst. Comput. Networks, ISCON 2021 1–6. <https://doi.org/10.1109/ISCON52037.2021.9702464>
- Singh, N., Bhandari, A.K., 2021. Principal Component Analysis-Based Low-Light Image Enhancement Using Reflection Model. *IEEE Trans. Instrum. Meas.* 70. <https://doi.org/10.1109/TIM.2021.3096266>
- Singh, P., Mukundan, R., De Ryke, R., 2020. Feature Enhancement in Medical Ultrasound Videos Using Contrast-Limited Adaptive Histogram Equalization. *J. Digit. Imaging* 33, 273–285. <https://doi.org/10.1007/s10278-019-00211-5>
- Singh, S.K., Mohanty, A.M., 2022. New Movement Strategy of Cuckoo Search for achieving higher profit rate in milling operation. *Results Control Optim.* 7, 100105. <https://doi.org/10.1016/j.rico.2022.100105>
- Solomon, C., Breckon, T., 2011. *Fundamentals of Digital Image Processing : A Practical Approach With Examples in Matlab*. A John Wiley & Sons, Inc, United Kingdom. [https://doi.org/10.1007/978-981-10-7272-7\\_1](https://doi.org/10.1007/978-981-10-7272-7_1)
- Somasundaram, S., Gobinath, R., 2019. Early brain tumour prediction using an enhancement feature extraction technique and deep neural networks. *Int. J. Innov. Technol. Explor. Eng.* 8, 170–174. <https://doi.org/10.35940/ijitee.J1031.08810S19>
- Sonali, Sahu, S., Singh, A.K., Ghrera, S.P., Elhoseny, M., 2019. An approach for de-noising and contrast enhancement of retinal fundus image using CLAHE. *Opt. Laser Technol.* 110, 87–98. <https://doi.org/10.1016/j.optlastec.2018.06.061>
- Soni, B., Mathur, P., 2020. An improved image dehazing technique using CLAHE and guided filter, in: 2020 7th International Conference on Signal Processing and Integrated Networks, SPIN 2020. hal. 902–907. <https://doi.org/10.1109/SPIN48934.2020.9071296>

- Soomro, T.A., Afifi, A.J., Ali Shah, A., Soomro, S., Baloch, G.A., Zheng, L., Yin, M., Gao, J., 2019. Impact of Image Enhancement Technique on CNN Model for Retinal Blood Vessels Segmentation. *IEEE Access* 7, 158183–158197. <https://doi.org/10.1109/ACCESS.2019.2950228>
- Souza, R., Beauferris, Y., Loos, W., Lebel, R.M., Frayne, R., 2020. Enhanced deep-learning-based magnetic resonance image reconstruction by leveraging prior subject-specific brain imaging: Proof-of-concept using a cohort of presumed normal subjects. *IEEE J. Sel. Top. Signal Process.* 14, 1126–1136. <https://doi.org/10.1109/JSTSP.2020.3001525>
- Sriramakrishnan, P., Kalaiselvi, T., Thirumalaiselvi, M., Padmapriya, S.T., Ramkumar, S., 2019. A Role of Medical Imaging Techniques in Human Brain Tumor Treatment. *Int. J. Recent Technol. Eng.* 8, 565–568. <https://doi.org/10.35940/ijrte.d1105.1284s219>
- Subhashini, D., Srilatha Indira Dutt, V.B.S., 2021. An innovative hybrid technique for road extraction from noisy satellite images, in: *Materials Today: Proceedings*. Elsevier Ltd. <https://doi.org/10.1016/j.matpr.2021.08.114>
- Subramani, B., Veluchamy, M., 2020. Fuzzy Gray Level Difference Histogram Equalization for Medical Image Enhancement. *J. Med. Syst.* 44. <https://doi.org/10.1007/s10916-020-01568-9>
- Subramani, B., Veluchamy, M., 2019. Fuzzy contextual inference system for medical image enhancement. *Meas. J. Int. Meas. Confed.* 148, 106967. <https://doi.org/10.1016/j.measurement.2019.106967>
- Subramani, B., Veluchamy, M., 2018. MRI brain image enhancement using brightness preserving adaptive fuzzy histogram equalization. *Int. J. Imaging Syst. Technol.* 1–6. <https://doi.org/10.1002/ima.22272>
- Suharyanto, Hasibuan, Z.A., Andono, P.N., Pujiono, D., Setiadi, R.I.M., 2021. Contrast Limited Adaptive Histogram Equalization for Underwater Image Matching Optimization use SURF. *J. Phys. Conf. Ser.* 1803. <https://doi.org/10.1088/1742-6596/1803/1/012008>
- Sulistiyan, S.R., Setyawan, F.A., Komarudin, M., 2016. *Pengolahan Citra Dasar dan Contoh Penerapannya*, Edisi Pert. ed. Treknosain, Yogyakarta.
- Suradi, S.H., Abdullah, K.A., Isa, N.A.M., 2021. Improvement of image enhancement for mammogram images using Fuzzy Anisotropic Diffusion Histogram Equalisation Contrast Adaptive Limited (FADHECAL). *Comput. Methods Biomech. Biomed. Eng. Imaging Vis.* 00, 1–9. <https://doi.org/10.1080/21681163.2021.1972344>
- Susilo, D., Wahyono, 2023. An Analysis of Image Enhancement Effects on Convolutional Neural Network-based Pulmonary Tuberculosis Detection, in: *E3S Web of Conferences (ICIMECE 2023)*. <https://doi.org/10.1051/e3sconf/202346502054>

- Symms, M., Jäger, H.R., Schmierer, K., Yousry, T.A., 2004. A review of structural magnetic resonance neuroimaging. *J. Neurol. Neurosurg. Psychiatry* 75, 1235–1244. <https://doi.org/10.1136/jnnp.2003.032714>
- Tahir, A.B.T., Khan, M.A., Alhaisoni, M., Khan, J.A., Nam, Y., Wang, S.H., Javed, K., 2021. Deep Learning and Improved Particle Swarm Optimization Based Multimodal Brain Tumor Classification. *Comput. Mater. Contin.* 68, 1099–1116. <https://doi.org/10.32604/cmc.2021.015154>
- Thakur, R.S., Yadav, R.N., Gupta, L., 2019. State-of-art analysis of image denoising methods using convolutional neural networks. *IET Image Process.* 13, 2367–2380. <https://doi.org/10.1049/iet-ipr.2019.0157>
- Tiwari, L., Raja, R., Awasthi, V., Miri, R., Sinha, G.R., Alkinani, M.H., Polat, K., 2021. Detection of lung nodule and cancer using novel Mask-3 FCM and TWEDLNN algorithms. *Meas. J. Int. Meas. Confed.* 172, 108882. <https://doi.org/10.1016/j.measurement.2020.108882>
- Tripathy, S., Swarnkar, T., 2020. Unified Preprocessing and Enhancement Technique for Mammogram Images. *Procedia Comput. Sci.* 167, 285–292. <https://doi.org/10.1016/j.procs.2020.03.223>
- Tung, T.C., Fuh, C.S., 2021. ICEBIN: Image Contrast Enhancement Based on Induced Norm and Local Patch Approaches. *IEEE Access* 9, 23737–23750. <https://doi.org/10.1109/ACCESS.2021.3056244>
- Ullah, Z., Lee, S.H., An, D., 2020. Histogram equalization based enhancement and MR brain image skull stripping using mathematical morphology. *Int. J. Adv. Comput. Sci. Appl.* 11, 569–577. <https://doi.org/10.14569/ijacsa.2020.0110372>
- Ullah, Z., Umar, M., Lee, S., An, D., 2020b. A hybrid image enhancement based brain MRI images classification technique. *Med. Hypotheses* 143, 109922. <https://doi.org/10.1016/j.mehy.2020.109922>
- Ulutas, G., Ustubioglu, B., 2021. Underwater image enhancement using contrast limited adaptive histogram equalization and layered difference representation. *Multimed. Tools Appl.* 80, 15067–15091. <https://doi.org/10.1007/s11042-020-10426-2>
- Umri, B.K., Utami, E., Kurniawan, M.P., 2021. Comparative Analysis of CLAHE and AHE on Application of CNN Algorithm in the Detection of Covid-19 Patients, in: 4th International Conference on Information and Communications Technology (ICOIACT). IEEE, hal. 203–208. <https://doi.org/10.1109/icoiact53268.2021.9563980>
- Umri, B.K., Wafa Akhyari, M., Kusri, K., 2020. Detection of COVID-19 in Chest X-ray Image using CLAHE and Convolutional Neural Network, in: 2020 2nd International Conference on Cybernetics and Intelligent System, ICORIS 2020. hal. 1–5. <https://doi.org/10.1109/ICORIS50180.2020.9320806>

- Utaminigrum, F., Sarosa, S.J.A., Karim, C., Gapsari, F., Wihandika, R.C., 2021. The combination of gray level co-occurrence matrix and back propagation neural network for classifying stairs descent and floor. *ICT Express* 0–9. <https://doi.org/10.1016/j.ict.2021.05.010>
- Vidhyalakshmi, A., Priya, C., 2020. Image Enhancement of Metastasis And Acrometastasis Images Using Clahe With Weiner Filter, in: 2020 International Conference on Computer Science, Engineering and Applications (ICCSEA). IEEE, Gunupur, India, hal. 1–8. <https://doi.org/10.1109/ICCSEA49143.2020.9132947>
- Vidya, B.S., Chandra, E., 2019. Triangular Fuzzy Membership-Contrast Limited Adaptive Histogram Equalization (TFM-CLAHE) for Enhancement of Multimodal Biometric Images. *Wirel. Pers. Commun.* 106, 651–680. <https://doi.org/10.1007/s11277-019-06184-6>
- Vidyarathi, A., Shad, J., Sharma, S., Agarwal, P., 2019. Classification of Breast Microscopic Imaging using Hybrid CLAHE-CNN Deep Architecture, in: 2019 12th International Conference on Contemporary Computing, IC3 2019. IEEE. <https://doi.org/10.1109/IC3.2019.8844937>
- Wadhwa, T., Kakkar, D., 2021. Social cognition and functional brain network in autism spectrum disorder: Insights from EEG graph-theoretic measures. *Biomed. Signal Process. Control* 67, 102556. <https://doi.org/10.1016/j.bspc.2021.102556>
- Wahyono, 2023. Analysis of Image Enhancement Effect on the X-Ray Image-Based COVID-19 Detection (in Bahasa Indonesia). *Techno.Com* 22, 186–194. <https://doi.org/10.33633/tc.v22i1.7195>
- Wang F., He X.S., Wang Y., Y.S.M., 2012. Markov model and convergence analysis based on cuckoo search algorithm. *Comput. Eng.* 38, 180–185. <https://doi.org/10.3969/j.issn.1000-3428.2012.11.055>
- Wang, Y., Wang, F., Zhu, Y., Liu, Y., Zhao, C., 2021. Optimization strategy of wireless charger node deployment based on improved cuckoo search algorithm. *Eurasip J. Wirel. Commun. Netw.* 2021, 1–18. <https://doi.org/10.1186/s13638-021-01951-1>
- Wang, H., Sheng, B., Lu, Q., Luo, R., Fu, G., 2020. A multi-objective cuckoo search algorithm based on the record matrix for a mixed-model assembly line car-sequencing problem. *IEEE Access* 8, 76453–76470. <https://doi.org/10.1109/ACCESS.2020.2989627>
- Weber, C.F., Lake, E.M.R., Haider, S.P., Mozayan, A., Bobba, P.S., Mukherjee, P., Scheinost, D., Constable, R.T., Ment, L., Payabvash, S., 2023. Autism spectrum disorder-specific changes in white matter connectome edge density based on functionally defined nodes. *Front. Neurosci.* 17, 1–12. <https://doi.org/10.3389/fnins.2023.1285396>

- Weichao, H., Zhi, Y., Shangbin, J., Ding, L.I.U., 2020. Research on Color Image Defogging Algorithm based on MSR and CLAHE. Proc. - 2020 Chinese Autom. Congr. CAC 2020 7301–7306. <https://doi.org/10.1109/CAC51589.2020.9327670>
- Westbrook, C., 2008. Handbook of MRI Technique, Third Ed. ed. A John Wiley & Sons, Ltd, United States of America.
- Wu, G.-H., Cheng, C.-Y., Pourhejazy, P., Fang, B.-L., 2022. Variable neighborhood-based Cuckoo Search for production routing with time window and setup times. Appl. Soft Comput. 125, 109191. <https://doi.org/10.1016/j.asoc.2022.109191>
- Xin, Y., Jia, Z., Yang, J., Kasabov, N.K., 2021. Specular Reflection Image Enhancement Based on a Dark Channel Prior. IEEE Photonics J. 13. <https://doi.org/10.1109/JPHOT.2021.3053906>
- Yan, L., Liu, D., Xiang, Q., Luo, Y., Wang, T., Wu, D., Chen, H., Zhang, Y., Li, Q., 2021. PSP net-based automatic segmentation network model for prostate magnetic resonance imaging. Comput. Methods Programs Biomed. 207, 106211. <https://doi.org/10.1016/j.cmpb.2021.106211>
- Yang, X., 2010. Nature-Inspired Metaheuristic Algorithms, Second Edi. ed. Luniver Press, United Kingdom.
- Yang, X., Zhang, N., Schrader, P., 2022. A study of brain networks for autism spectrum disorder classification using resting-state functional connectivity. Mach. Learn. with Appl. 8, 1–18. <https://doi.org/10.1016/j.mlwa.2022.100290>
- Yang, X., 2014. Nature-Inspired Optimization Algorithms. Elsevier Inc, London.
- Yang, X.S., 2009. Firefly algorithms for multimodal optimization. Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics) 5792, 169–178. [https://doi.org/10.1007/978-3-642-04944-6\\_14](https://doi.org/10.1007/978-3-642-04944-6_14)
- Yang, X.S., Deb, S., 2014. Cuckoo search: Recent advances and applications. Neural Comput. Appl. 24, 169–174. <https://doi.org/10.1007/s00521-013-1367-1>
- Yang, X.S., Deb, S., 2009. Cuckoo search via Lévy flights, in: 2009 World Congress on Nature and Biologically Inspired Computing, NABIC 2009 - Proceedings. IEEE, Coimbatore, India, hal. 210–214. <https://doi.org/10.1109/NABIC.2009.5393690>
- Yang, X.S., Deb, S., 2013. Multiobjective cuckoo search for design optimization. Comput. Oper. Res. 40, 1616–1624. <https://doi.org/10.1016/j.cor.2011.09.026>
- Zhang, W., Han, G., Wang, J., Liu, Y., 2019. A BP Neural Network Prediction Model Based on Dynamic Cuckoo Search Optimization Algorithm for Industrial Equipment Fault Prediction. IEEE Access 7, 11736–11746. <https://doi.org/10.1109/ACCESS.2019.2892729>

- Zhang, Weidong, Dong, L., Pan, X., Zou, P., Qin, L., Xu, W., 2019. A Survey of Restoration and Enhancement for Underwater Images. *IEEE Access* 7, 182259–182279. <https://doi.org/10.1109/ACCESS.2019.2959560>
- Zheng, H., Peng, Y., Guo, J., Chen, Y.-C., 2022. Course scheduling algorithm based on improved binary cuckoo search. *J. Supercomput.* 78, 11895–11920. <https://doi.org/10.1007/s11227-022-04341-6>
- Zheng, R., Guo, Q., Gao, C., Yu, M.A., 2019. A hybrid contrast limited adaptive histogram equalization (clahe) for parathyroid ultrasonic image enhancement. *Chinese Control Conf. CCC* 2019-July, 3577–3582. <https://doi.org/10.23919/ChiCC.2019.8866479>
- Zhou, M., Jin, K., Wang, S., Ye, J., Qian, D., 2018. Color Retinal Image Enhancement Based on Luminosity and Contrast Adjustment. *IEEE Trans. Biomed. Eng.* 65, 521–527. <https://doi.org/10.1109/TBME.2017.2700627>
- Zuiderveld, K., 1994. Contrast Limited Adaptive Histogram Equalization, in: Herkbert, P.S. (Ed.), *Graphics Gems IV*. Academic Press Professional, Inc., San Diego, CA, USA, hal. 474–485. <https://doi.org/10.1016/b978-0-12-336156-1.50061-6>
-