



MUNISH KUMAR

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Department of Computational Sciences,
Maharaja Ranjit Singh Punjab Technical University,
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EDUCATION

- B.Sc. in Information Technology, IKG Punjab Technical University, Jalandhar, Punjab, India
- M.E. in Computer Science & Engineering, Thapar University, Patiala, Punjab, India
- Ph.D. in Computer Science, Thapar University, Patiala, Punjab, India
Thesis: Offline Handwritten Gurmukhi Script Recognition (Supervisor: Prof. R. K. Sharma and Prof. M. K. Jindal)
- UGC-NET in Computer Science & Applications (Dec 2006)
- GATE-2007 in Computer Science & Engineering
- GATE-2008 in Information Technology

EMPLOYMENT (16+Years)

- Associate Professor in Computational Sciences,
*Maharaja Ranjit Singh Punjab Technical University,
Bathinda, Punjab, India.
Aug 2023- till date*
- Assistant Professor (Senior Scale) in Computational Sciences,
*Maharaja Ranjit Singh Punjab Technical University,
Bathinda, Punjab, India.
Period: Aug, 2020- July 2023*
- Assistant Professor in Computational Sciences,
*Maharaja Ranjit Singh Punjab Technical University,
Bathinda, Punjab, India.
Period: Aug, 2016- July 2020*
- Assistant Professor in Computer Science
*Panjab University Rural Centre, Kauni,
Sri Muktsar Sahib, Punjab, India.
Period: Aug, 2011- July 2016*
- Assistant Professor in Computer Applications
*Guru Gobind Singh College for Women
Sec-26 Chandigarh, India.
Period: Aug 2010 – July 2011*
- Assistant Professor in Computer Science
*Punjabi University Neighbourhood Campus,
Jaito, Faridkot, Punjab, India.
Period: Oct, 2008 – July 2010*

RESEARCH INTERESTS

Document Analysis and Recognition; Image Processing; Machine Learning; Pattern Recognition

AWARDS

- IETE Biman Bihari Sen Memorial Award 2024 (<https://iete.org/files/IETE-AWARDS-2024-WINNERS.pdf>)
- Panjab University Shiv Nath Rai Kohli Mid-Career Best Scientist Award 2023 (<https://sites.google.com/site/snrkohliaward/awardee-of-the-year-2023>)

RESEARCH GUIDANCE (8 Ph.D.)

- Harmandeep Kaur (Main Supervisor)
Title: Development of Offline Handwritten Gurumukhi Word Recognition System for Postal Automation
University: Maharaja Ranjit Singh Punjab Technical University, Bathinda, India
- Shaveta Dargan (Main Supervisor)
Title: Development of Gender Classification and Writer Identification Systems for Offline Handwritten Gurumukhi Text
University: Maharaja Ranjit Singh Punjab Technical University, Bathinda, India
- Ashu Kumar (Co-Supervisor)
Title: Development of Face Detection Algorithm for Still Images in Presence of Occlusion and Non-Uniform Illumination
University: Punjabi University, Patiala, India
- Rupinder Pal Kaur (Co-Supervisor)
Title: Technique for Recognition of Old Newspaper in Gurumukhi Script
University: Panjab University, Chandigarh, India
- Monika Bansal (Co-Supervisor)
Title: Development of Efficient Techniques for 2D Object Recognition in Still Images
University: Punjabi University, Patiala, India
- Amanpreet Kaur (Co-Supervisor)
Title: Development of Efficient Framework for Cattle Identification Using Machine Learning Models
University: Panjab University, Chandigarh, India
- Monika Sethi (Co-Supervisor)
Title: Writer Identification and Gender Classification Framework for Forensic Handwriting Analysis in Devanagari Script
University: Panjab University, Chandigarh, India
- Syed Tufeal Nabi (Co-Supervisor)
Title: Development of Technique for the writer identification and Gender Classification based on offline Handwritten text in Urdu Script
University: Maharaja Ranjit Singh Punjab Technical University, Bathinda, India

RESEARCH QUALITY CITATION INDEX

- Google Scholar Citations 9693
- Google Scholar h-index 48
- Google Scholar i10-index 122
- Scopus Citations 6657
- Scopus h-index 41
- WoS Citations 5602
- Cross Reference Citations 2276

Google Scholar: <https://scholar.google.co.in/citations?user=MaZLd1gAAAAJ>
Scopus: <https://www.scopus.com/authid/detail.uri?authorId=26633172500>
ORCID ID: 0000-0003-0115-1620
Research ID: <https://publons.com/researcher/1873512/munish-kumar/>
DBLP: <https://dblp.org/pid/124/3780.html>

PATENTS (5)

- “Agricultural Fertilizer Spreading Apparatus and Method Thereof” Application No. TEMP/E-1/26636/2019-DEL
- “Real Time Object Recognition Method” Application No. 2020103520 (Australian Government, IP Australia) Granted
- “A Method to Word Recognition for The Postal Automation and A System Thereof” Application No. 2021100089 (Australian Government, IP Australia) Granted
- “A System and Method for Automatic Playlist Generation by Analysing Human Emotions Through Physiological Signals” Application No. 2021101097 (Australian Government, IP Australia) Granted
- “A Method for Gender Classification Based On Offline Handwriting and A System Thereof” Application No. 2021101078 (Australian Government, IP Australia) Granted

COPY RIGHTS (3)

- UHWID - Urdu Handwriting Writer Identification Dataset (823/2025-Co/L)
- UHGCD - Urdu Handwriting Gender Classification Dataset (825/2025-Co/L)
- Obesity and Neuropsychological Assessments Using AI based Advanced Models (L-147090/2024)

DATASET PUBLISHED (3)

- Offline Handwritten Gurmukhi Benchmark Data Set
<https://sites.google.com/view/gurmukhi-benchmark>
- Postal Automation: Benchmark Gurmukhi Data Set
<https://sites.google.com/view/gurmukhi-benchmark/home/word-level-gurmukhi-dataset?authuser=0>
- Handwritten Urdu Characters Data Set
<https://www.kaggle.com/surindersinghkhurana/handwritten-urdu-characters-dataset>

BOOKS PUBLISHED (4)

- UGC-NET/JRF/SET Computer Science & Applications (PAPER-II),
D.P.S. Publishing House, New Delhi, 2021. ISBN No. 9789390157204.
- Machine Learning in Image Analysis and Pattern Recognition,
MDPI, 2021, ISSN No. 2306-5729.
- Data Science Using Python
D.P.S. Publishing House, New Delhi, 2022.
- Beginners to Pro Programming in Python

BOOK CHAPTERS (7)

- Dargan, S., & Kumar, M. (2021). Research Metrics. In *Research and Publication Ethics* (pp. 183–211). DPS Publication House.
- Dargan, S., & Kumar, M. (2021). Databases and research metrics online databases for research: Citation and indexing. In *Research and Publication Ethics* (pp. 150–182). DPS Publication House.
- Kaur, R. P., Jindal, M. K., & Kumar, M. (2021). Newspaper text recognition printed in Gurumukhi script: SVM versus MLP. In *Data Driven Approach Towards Disruptive Technologies: Proceedings of MIDAS 2020* (pp. 23–37). Springer Nature.
- Kaur, H., & Kumar, M. (2021). Performance evaluation of various feature selection techniques for offline handwritten Gurumukhi place name recognition. In *Data Driven Approach Towards Disruptive Technologies* (pp. 559–571). Springer, Singapore.
- Kaur, R., Kumar, M., & Jindal, M. K. (2021). TxtLineSeg: Text line segmentation of unconstrained printed text in Devanagari script. In *International Conference on Computational Methods and Data Engineering (ICMDE 2020, Vol. 1257, pp. 85–100)*.
- Singh, H., Sharma, R. K., Kumar, R., Verma, K., Kumar, R., & Kumar, M. (2020). A benchmark dataset of online handwritten Gurmukhi script words and numerals. In *Computer Vision and Image Processing* (pp. 457–466).
- Kumar, M., Sharma, R. K., & Jindal, M. K. (2011). SVM based offline handwritten Gurmukhi character recognition. In *SCAKD Proceedings*, 758, 51–62.

RESEARCH GRANTS

- **AI-Enabled Handheld Device for Quick Detection of Anemia and Nutritional Deficiencies Using Cutaneous Cues – Co-PI**
Funded by Department of Science and Technology, Government of India | Grant: ₹19,96,919
- **Application of Large Language Models (LLMs) in Radiology for Report Generation – Co-PI**
Funded by King Abdulaziz University (KAU), Jeddah, Saudi Arabia | Grant: USD 1,500

PUBLICATIONS

Journals (142):

- Rani, M., & Kumar, M. (2025, June). Efficient human activity recognition using a hybrid MobileNetV2-CNN model. *National Academy Science Letters*. <https://doi.org/10.1007/s40009-025-01720-4>
- Sethi, M., Kumar, M., & Jindal, M. K. (2025, January). Forensic handwriting analysis: A hybrid classification framework for writer identification in Devanagari script. *Multimedia Tools and Applications*, 84(27), 33183–33194. <https://doi.org/10.1007/s11042-024-20574-4>
- Kaur, H., Rani, V., & Kumar, M. (2024, July). Human activity recognition: A comprehensive review. *Expert Systems*, 41(11). <https://doi.org/10.1111/exsy.13680>
- Kaur, M., & Kumar, M. (2024, June). Facial emotion recognition: A comprehensive review. *Expert Systems*, 41(10). <https://doi.org/10.1111/exsy.13670>

- Rani, V., & Kumar, M. (2024, September). Transfer learning for human gait recognition using VGG19: CASIA-A dataset. *Multimedia Tools and Applications*, 84(22), 25981–25995. <https://doi.org/10.1007/s11042-024-20132-y>
- Nabi, S. T., Kumar, M., & Singh, P. (2024, August). Correction to: A convolution deep architecture for gender classification of Urdu handwritten characters. *Multimedia Tools and Applications*, 83(29), 72195–72195. <https://doi.org/10.1007/s11042-024-20020-5>
- Dargan, S., & Kumar, M. (2024, March). Gender classification system based on the behavioral biometric modality: Application of handwritten text. *ACM Transactions on Asian and Low-Resource Language Information Processing*, 23(3), 1–21. <https://doi.org/10.1145/3626236>
- Singh, S., Garg, N. K., & Kumar, M. (2024, February). VGG16: Offline handwritten Devanagari word recognition using transfer learning. *Multimedia Tools and Applications*, 83(29), 72561–72594. <https://doi.org/10.1007/s11042-024-18394-7>
- Nabi, S. T., Kumar, M., & Singh, P. (2024, January). A convolution deep architecture for gender classification of Urdu handwritten characters. *Multimedia Tools and Applications*, 83(29), 72179–72194. <https://doi.org/10.1007/s11042-024-18415-5>
- Shaheed, K., Abbas, Q., & Kumar, M. (2024, January). Automatic diagnosis of CoV-19 in CXR images using Haar-like feature and XGBoost classifier. *Multimedia Tools and Applications*, 83(26), 67723–67745. <https://doi.org/10.1007/s11042-024-18330-9>
- Singla, C., Maini, R., & Kumar, M. (2024, February). Age, gender and handedness prediction using handwritten text: A comprehensive survey. *Engineering Applications of Artificial Intelligence*, 128, 107432. <https://doi.org/10.1016/j.engappai.2023.107432>
- Kaur, H., Bansal, S., Kumar, M., Mittal, A., & Kumar, K. (2023, May). WordDeepNet: Handwritten Gurumukhi word recognition using convolutional neural network. *Multimedia Tools and Applications*, 82(30), 46763–46788. <https://doi.org/10.1007/s11042-023-15527-2>
- Kaur, H., Kumar, M., Gupta, A., Sachdeva, M., Mittal, A., & Kumar, K. (2023, July). Bagging: An ensemble approach for recognition of handwritten place names in Gurumukhi script. *ACM Transactions on Asian and Low-Resource Language Information Processing*, 22(7), 1–25. <https://doi.org/10.1145/3593024>
- Mohiuddin, S., Malakar, S., Kumar, M., & Sarkar, R. (2023). A comprehensive survey on state-of-the-art video forgery detection techniques. *Multimedia Tools and Applications*, 1–41.
- Kumar, M., Jindal, M. K., & Kumar, M. (2023). An efficient technique for breaking of coloured Hindi CAPTCHA. *Soft Computing*, 1–26.
- Singh, A., Kukreja, V., & Kumar, M. (2023). An empirical study to design an effective agile knowledge management framework. *Multimedia Tools and Applications*, 82(8), 12191–12209. <https://doi.org/10.1007/s11042-023-XXXXX>
- Dargan, S., Bansal, S., Kumar, M., Mittal, A., & Kumar, K. (2023). Augmented reality: A comprehensive review. *Archives of Computational Methods in Engineering*, 30, 1057–1080.
- Kaur, A., Kumar, M., & Jindal, M. K. (2023). Cattle identification system: A comparative analysis of SIFT, SURF and ORB feature descriptors. *Multimedia Tools and Applications*, 1–23.
- Nabi, S. T., Kumar, M., & Singh, P. (2023). DeepNet-WI: A deep-net model for offline Urdu writer identification. *Evolving Systems*, 1–11.
- Singh, S., Garg, N. K., & Kumar, M. (2023). Feature extraction and classification techniques for handwritten Devanagari text recognition: A survey. *Multimedia Tools and Applications*, 82(1), 747–775.
- Kaur, H., Rani, V., Kumar, M., Sachdeva, M., Mittal, A., & Kumar, K. (2023, November). Federated learning: A comprehensive review of recent advances and applications. *Multimedia Tools and*

Applications, 83(18), 54165–54188. <https://doi.org/10.1007/s11042-023-17737-0>

- Sethi, M., Kumar, M., & Jindal, M. K. (2023). Gender prediction system through behavioral biometric handwriting: A comprehensive review. *Soft Computing*, 1–21.
- Rani, V., & Kumar, M. (2023). Human gait recognition: A systematic review. *Multimedia Tools and Applications*, 1–35.
- Kaur, G., Singh, N., & Kumar, M. (2023). Image forgery techniques: A review. *Artificial Intelligence Review*, 56(2), 1577–1625. <https://doi.org/10.1007/s10462-022-10368-x>
- Misgar, M. M., Mushtaq, F., Khurana, S. S., & Kumar, M. (2023). Recognition of offline handwritten Urdu characters using RNN and LSTM models. *Multimedia Tools and Applications*, 82(2), 2053–2076.
- Rani, V., Nabi, S. T., Kumar, M., Mittal, A., & Kumar, K. (2023). Self-supervised learning: A succinct review. *Archives of Computational Methods in Engineering*, 30, 2761–2775.
- Dhalla, S., Maqbool, J., Mann, T. S., Gupta, A., Mittal, A., Aggarwal, P., Saluja, K., Kumar, M., & Saini, S. S. (2023). Semantic segmentation of palpebral conjunctiva using predefined deep neural architectures for anemia detection. *Procedia Computer Science*, 218, 328–337. <https://doi.org/10.1016/j.procs.2023.01.038>
- Kaur, H., & Kumar, M. (2023). Signature identification and verification techniques: State-of-the-art work. *Journal of Ambient Intelligence and Humanized Computing*, 14(2), 1027–1045.
- Walia, S., Kumar, K., & Kumar, M. (2023). Unveiling digital image forgeries using Markov based quaternions in frequency domain and fusion of machine learning algorithms. *Multimedia Tools and Applications*, 82(3), 4517–4532.
- Nabi, S. T., Kumar, M., Singh, P., Aggarwal, N., & Kumar, K. (2022). A comprehensive survey of image and video forgery techniques: Variants, challenges, and future directions. *Multimedia Systems*, 28(3), 939–992.
- Jyotiyana, M., Kesswani, N., & Kumar, M. (2022, July). A deep learning approach for classification and diagnosis of Parkinson's disease. *Soft Computing*, 26(18), 9155–9165. <https://doi.org/10.1007/s00500-022-07275-6>
- Kumar, M., Jindal, M. K., & Kumar, M. (2022). A systematic survey on CAPTCHA recognition: Types, creation and breaking techniques. *Archives of Computational Methods in Engineering*, 29(2), 1107–1136.
- Koul, S., Kumar, M., Khurana, S. S., Mushtaq, F., & Kumar, K. (2022). An efficient approach for copy-move image forgery detection using convolutional neural network. *Multimedia Tools and Applications*, 81(8), 11259–11277.
- Rani, V., Kumar, M., Mittal, A., & Kumar, K. (2022). Artificial intelligence for cybersecurity: Recent advancements, challenges and opportunities. *Robotics and AI for Cybersecurity and Critical Infrastructure in Smart Cities*, 73–88.
- Arora, N., Kumar, Y., Karkra, R., & Kumar, M. (2022). Automatic vehicle detection system in different environment conditions using fast R-CNN. *Multimedia Tools and Applications*, 81(13), 18715–18735.
- Ahuja, U., Singh, S., Kumar, M., Kumar, K., & Sachdeva, M. (2022). COVID-19: Social distancing monitoring using faster-RCNN and YOLOv3 algorithms. *Multimedia Tools and Applications*, 1–14.
- Kaur, A., Kumar, M., & Jindal, M. K. (2022). Cattle identification with muzzle pattern using computer vision technology: A critical review and prospective. *Soft Computing*, 26(10), 4771–4795.
- Singh, A., Kaur, N., Kukreja, V., Kadyan, V., & Kumar, M. (2022). Computational intelligence in processing of speech acoustics: A survey. *Complex & Intelligent Systems*, 8(3), 2623–2661.

- Shaheed, K., Mao, A., Qureshi, I., Kumar, M., Hussain, S., Ullah, I., & Zhang, X. (2022). DS-CNN: A pre-trained Xception model based on depth-wise separable convolutional neural network for finger vein recognition. *Expert Systems with Applications*, 191, 116288. <https://doi.org/10.1016/j.eswa.2021.116288>
- Singh, N., Kumar, M., Singh, B., & Singh, J. (2022). DeepSpacy-NER: An efficient deep learning model for named entity recognition for Punjabi language. *Evolving Systems*, 1–11.
- Kumar, M., Jindal, M. K., & Kumar, M. (2022). Design of innovative CAPTCHA for Hindi language. *Neural Computing and Applications*, 34, 4957–4992.
- Kumar, M., Jindal, M. K., & Kumar, M. (2022). Distortion, rotation and scale invariant recognition of hollow Hindi characters. *Sādhanā*, 47(2), 92.
- Shaheed, K., Mao, A., Qureshi, I., Abbas, Q., Kumar, M., & Zhang, X. (2022). Finger-vein presentation attack detection using depthwise separable convolution neural network. *Expert Systems with Applications*, 198, 116786. <https://doi.org/10.1016/j.eswa.2022.116786>
- Dhiman, B., Kumar, Y., & Kumar, M. (2022). Fruit quality evaluation using machine learning techniques: Review, motivation and future perspectives. *Multimedia Tools and Applications*, 81(12), 16255–16277.
- Maity, S., Bhattacharyya, A., Singh, P. K., Kumar, M., & Sarkar, R. (2022). Last decade in vehicle detection and classification: A comprehensive survey. *Archives of Computational Methods in Engineering*, 1–38.
- Chaturvedi, V., Kaur, A. B., Varshney, V., Garg, A., Chhabra, G. S., & Kumar, M. (2022). Music mood and human emotion recognition based on physiological signals: A systematic review. *Multimedia Systems*, 28(1), 21–44.
- Bathla, A. K., Bansal, S., & Kumar, M. (2022). OKC classifier: An efficient approach for classification of imbalanced dataset using hybrid methodology. *Soft Computing*, 26(21), 11497–11503.
- Singh, S., Garg, N. K., & Kumar, M. (2022). On the performance analysis of various features and classifiers for handwritten Devanagari word recognition. *Neural Computing and Applications*, 1–19.
- Kaur, R. P., Kumar, M., & Jindal, M. K. (2022). Performance evaluation of different features and classifiers for Gurumukhi newspaper text recognition. *Journal of Ambient Intelligence and Humanized Computing*, 1–17.
- Shaheed, K., Mao, A., Qureshi, I., Kumar, M., Hussain, S., & Zhang, X. (2022). Recent advancements in finger vein recognition technology: Methodology, challenges and opportunities. *Information Fusion*, 79, 84–109. <https://doi.org/10.1016/j.inffus.2021.09.010>
- Rani, S., Kaur, M., & Kumar, M. (2022). Recommender system: Prediction/diagnosis of breast cancer using hybrid machine learning algorithm. *Multimedia Tools and Applications*, 81(7), 9939–9948.
- Jan, T. G., Khurana, S. S., & Kumar, M. (2022). Semi-supervised labeling: A proposed methodology for labeling the Twitter datasets. *Multimedia Tools and Applications*, 81, 7669–7683.
- Kaur, A., Kumar, M., & Jindal, M. K. (2022). Shi-Tomasi corner detector for cattle identification from muzzle print image pattern. *Ecological Informatics*, 68, 101549. <https://doi.org/10.1016/j.ecoinf.2022.101549>
- Bansal, M., Kumar, M., & Kumar, M. (2020). 2D object recognition techniques: State-of-the-art work. *Archives of Computational Methods in Engineering*, 28(3), 1147–1161. <https://doi.org/10.1007/s11831-020-09409-1>
- Bansal, M., Kumar, M., & Kumar, M. (2021). 2D object recognition: A comparative analysis of SIFT, SURF and ORB feature descriptors. *Multimedia Tools and Applications*, 80, 18839–18857.

- Gupta, S., Thakur, K., & Kumar, M. (2020). 2D-human face recognition using SIFT and SURF descriptors of face's feature regions. *The Visual Computer*, 37(3), 447–456. <https://doi.org/10.1007/s00371-020-01814-8>
- Kumar, M., Jindal, M. K., & Kumar, M. (2021). A novel attack on monochrome and greyscale Devanagari CAPTCHAs. *Transactions on Asian and Low-Resource Language Information Processing*, 20(4), 1–30.
- Gupta, S., Mohan, N., & Kumar, M. (2021). A study on source device attribution using still images. *Archives of Computational Methods in Engineering*, 28, 2209–2223.
- Bawa, S., Kumar, M., & others. (2021). A comprehensive survey on machine translation for English, Hindi and Sanskrit languages. *Journal of Ambient Intelligence and Humanized Computing*, 1–34.
- Shaheed, K., Mao, A., Qureshi, I., Kumar, M., Abbas, Q., Ullah, I., & Zhang, X. (2021). A systematic review on physiological-based biometric recognition systems: Current and future trends. *Archives of Computational Methods in Engineering*, 1–44.
- Goyal, L. M., Mittal, M., Kumar, M., Kaur, B., Sharma, M., Verma, A., & Kaur, I. (2021). An efficient method of multicolor detection using global optimum thresholding for image analysis. *Multimedia Tools and Applications*, 80, 18969–18991.
- Bansal, M., Kumar, M., Kumar, M., & Kumar, K. (2021). An efficient technique for object recognition using Shi-Tomasi corner detection algorithm. *Soft Computing*, 25, 4423–4432.
- Arora, M., & Kumar, M. (2021). AutoFER: PCA and PSO based automatic facial emotion recognition. *Multimedia Tools and Applications*, 80(2), 3039–3049.
- Kumar, Y., Singh, N., Kumar, M., & Singh, A. (2021). AutoSSR: An efficient approach for automatic spontaneous speech recognition model for the Punjabi language. *Soft Computing*, 25(2), 1617–1630.
- Narang, S. R., Kumar, M., & Jindal, M. K. (2021). DeepNetDevanagari: A deep learning model for Devanagari ancient character recognition. *Multimedia Tools and Applications*, 80, 20671–20686.
- Rani, S., Kaur, M., Kumar, M., Ravi, V., Ghosh, U., & Mohanty, J. R. (2021). Detection of shilling attack in recommender system for YouTube video statistics using machine learning techniques. *Soft Computing*, 1–13.
- Mittal, M., Kumar, M., Verma, A., Kaur, I., Kaur, B., Sharma, M., & Goyal, L. M. (2021). FEMT: A computational approach for fog elimination using multiple thresholds. *Multimedia Tools and Applications*, 80, 227–241.
- Kumar, A., Kumar, M., & Kaur, A. (2021). Face detection in still images under occlusion and non-uniform illumination. *Multimedia Tools and Applications*, 80, 14565–14590.
- Singh, S., Ahuja, U., Kumar, M., Kumar, K., & Sachdeva, M. (2021). Face mask detection using YOLOv3 and faster R-CNN models: COVID-19 environment. *Multimedia Tools and Applications*, 80, 19753–19768.
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- Kumar, M., Singh, N., Kumar, R., Goel, S., & Kumar, K. (2021). Gait recognition based on vision systems: A systematic survey. *Journal of Visual Communication and Image Representation*, 75, 103052. <https://doi.org/10.1016/j.jvcir.2021.103052>
- Kapoor, K., Rani, S., Kumar, M., Chopra, V., & Brar, G. S. (2021). Hybrid local phase quantization and grey wolf optimization based SVM for finger vein recognition. *Multimedia Tools and Applications*, 80, 15233–15271.
- Kumar, M., Jindal, M. K., Sharma, R. K., Jindal, S. R., & Singh, H. (2021). Improved recognition

results of offline handwritten Gurumukhi characters using hybrid features and adaptive boosting. *Soft Computing*, 25, 11589–11601.

- Ayyagari, M. R., Kesswani, N., Kumar, M., & Kumar, K. (2021). Intrusion detection techniques in network environment: A systematic review. *Wireless Networks*, 27, 1269–1285.
- Kaur, R. P., Jindal, M. K., Kumar, M., Jindal, S. R., & Tuteja, S. (2021). LineSeg: Line segmentation of scanned newspaper documents. *Pattern Analysis and Applications*, 25, 189–208.
- Kaur, H., & Kumar, M. (2021). Offline handwritten Gurumukhi word recognition using eXtreme Gradient Boosting methodology. *Soft Computing*, 25, 4451–4464.
- Kaur, H., & Kumar, M. (2021). On the recognition of offline handwritten word using holistic approach and AdaBoost methodology. *Multimedia Tools and Applications*, 80, 11155–11175.
- Dargan, S., & Kumar, M., Tuteja, S. (2021). PCA-based gender classification system using hybridization of features and classification techniques. *Soft Computing*, 25(24), 15281–15295.
- Rani, S., & Kumar, M. (2021). Prediction of the mortality rate and framework for remote monitoring of pregnant women based on IoT. *Multimedia Tools and Applications*, 80, 24555–24571.
- Singh, H., Sharma, R. K., Singh, V. P., & Kumar, M. (2021). Recognition of online handwritten Gurmukhi characters using recurrent neural network classifier. *Soft Computing*, 25, 6329–6338.
- Kaur, R. P., Jindal, M. K., & Kumar, M. (2021). Text and graphics segmentation of newspapers printed in Gurmukhi script: A hybrid approach. *The Visual Computer*, 37, 1637–1659.
- Ghosh, K. K., Begum, S., Sardar, A., Adhikary, S., Ghosh, M., Kumar, M., & Sarkar, R. (2021). Theoretical and empirical analysis of filter ranking methods: Experimental study on benchmark DNA microarray data. *Expert Systems with Applications*, 169, 114485. <https://doi.org/10.1016/j.eswa.2020.114485>
- Bansal, M., Kumar, M., Sachdeva, M., & Mittal, A. (2021). Transfer learning for image classification using VGG19: Caltech-101 image data set. *Journal of Ambient Intelligence and Humanized Computing*,
- Mushtaq, F., Misgar, M. M., Kumar, M., & Khurana, S. S. (2021). UrduDeepNet: Offline handwritten Urdu character recognition using deep neural network. *Neural Computing and Applications*, 33(22), 15229–15252.
- Dargan, S., & Kumar, M. (2020). A comprehensive survey on the biometric recognition systems based on physiological and behavioral modalities. *Expert Systems with Applications*, 143, 113114. <https://doi.org/10.1016/j.eswa.2019.113114>
- Kumar, M., & Jindal, S. R. (2020). A study on recognition of pre-segmented handwritten multi-lingual characters. *Archives of Computational Methods in Engineering*, 27(2), 577–589.
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ADMINISTRATIVE EXPERIENCE

- Associate Dean, IT Enabled Services, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Ph.D. Coordinator, Department of Computational Sciences, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member, Faculty of Sciences, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member, Administrative, Academic and Technical Committees of Department of Computational Sciences, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member, Department Research Board, Department of Computational Sciences, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member of Admission Committee 2017-18, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member of Admission Committee 2018-19, 2019-20, 2020-21 at Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member of Maharaja Ranjit Singh Punjab Technical University, Bathinda Youth Festival Committee 2017
- Placement Coordinator, Department of Computer Applications, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Day Scholar Warden, Maharaja Ranjit Singh Punjab Technical University, Bathinda
- Member, Inspection Committees for granting courses affiliation to various colleges of Maharaja Ranjit Singh Punjab Technical University Bathinda
- In-charge at Punjabi University Neighbourhood Campus, Jaito (Faridkot) from Oct, 2008 to Aug, 2010.
- Member, Board of Studies for Post-Graduate/Under-Graduate Computer Courses [MCA, BCA, M.Sc. (IT), BA/BSc (IT, Computer Science, Computer Applications), at Maharaja Ranjit Singh Punjab Technical University, Bathinda

CONFERENCE/SEMINAR/SHORT TERM COURSES/FACULTY DEVELOPMENT PROGRAM ATTENDED

- Microsoft Sponsored Faculty Development Program on “Microsoft Office” from 18th-19th Sep, 2017.
- NITTTR Sponsored Short Term Course on “Data Mining and Business Intelligence”, from 04th-08th Sep, 2017.
- NITTTR Sponsored Short Term Course on “SciLab Programming”, from 21st-25th Aug, 2017.
- NITTTR Sponsored Short Term Course on “Wireless Networks”, from 22nd-26th May, 2017.
- NITTTR Sponsored Short Term Course on “Artificial Neural Network and Fuzzy Logic”, from 24th-28th April, 2017.
- Google Sponsored Faculty Development Program on “Android Applications Development” from 09th-13th Jan, 2017.
- NITTTR Sponsored Short Term Course on “Open-Source Technologies Through ICT”, from 29th Aug-02nd Sep, 2016
- National Workshop on Multilingual Technologies 2013 at Punjabi University, Patiala from 11th-17th Nov, 2013
- QIP on “Society and Web”, at IIT Guwahati (1 week)
- Faculty Development Program at MSIT, New Delhi on 22nd May, 2010
- Role of IT in Technical Education at MIMIT, Malout (2 weeks)
- Seminar on RAFIP-2010 at Punjabi University, Patiala on 30th March, 2010
- National Conference on RAFIT-2009 at Punjabi University, Patiala on 9th-10th April, 2009.

CONFERENCE/SEMINAR/SHORT TERM COURSES ORGANIZED

- Short Term Course on “Artificial Neural Network and Fuzzy Logic”, at GZS Campus College of Engineering & Technology, Bathinda from 24th-28th April, 2017.

OTHER RESPONSIBILITIES

- Associate Editor, Soft Computing Journal (SCI Indexed)
- Associate Editor, ACM Transactions on TALLIP Journal (SCI Indexed)
- Reviewer of Proceedings of the National Academy of Sciences- Physical Science- A (SCI Indexed Journal)
- Reviewer of IETE Journal of Research Journal (SCI Indexed Journal)
- Reviewer of Information Processing and Management Journal (SCI Indexed Journal)
- Reviewer of Artificial Intelligence Review Journal (SCI Indexed Journal)
- Reviewer of IEEE Access Journal (SCI Indexed Journal)
- Reviewer of Expert Systems with Applications Journal (SCI Indexed Journal)
- Reviewer of Optik Journal (SCI Indexed Journal)
- Member of International Association of Computer Science and Information technology (IACSIT), Singapore.
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