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Research Interests

Computer Vision; Document Analysis and System; Image Processing; Machine Learning and Pattern Recognition

Education

- M.C.A, I.K.G. 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
- UGC-NET in Computer Science & Applications (Dec 2006)
- GATE-2007 in Computer Science & Engineering
- GATE-2008 in Information Technology

Research Guidance

- M. Tech Students Guided 08
- Ph.D. Students Guiding 04
- Ph.D. Awarded (Rupinder Pal Kaur, Panjab University, Chandigarh) 01

Research Quality Citation Index

- Google Scholar Citations 647
- Google Scholar h-index 14
- Google Scholar i10-index 19
- Research Gate Citations 565

Google Scholar: <https://scholar.google.com/citations?hl=en&user=MaZLd1gAAAAJ>

ResearchGate: https://www.researchgate.net/profile/Munish_Kumar16

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=26633172500>

Research ID: <https://publons.com/researcher/1873512/munish-kumar/>

Teaching Experience (10+Years)

- Assistant Professor in Computational Sciences,
MRS Punjab Technical University, Bathinda, Punjab,
India.
Period: Aug, 2016- Till date

- **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: Aug, 2008 – July 2010

Selected Publications in SCI/SCI-E Journals (50)

(a) Published papers

- [1] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "A Novel Feature Extraction Technique for Offline Handwritten Gurmukhi Character Recognition", *IETE Journal of Research*, Vol. 59(6), pp. 687-692, 2013. **(SCI Indexed)**
<https://www.tandfonline.com/doi/abs/10.4103/0377-2063.126961>
- [2] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Efficient Feature Extraction Techniques for Offline Handwritten Gurmukhi Character Recognition", *National Academy Science Letters*, Vol. 37(4), pp. 381-391, 2014. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40009-014-0253-4>
- [3] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "A Novel Hierarchical Technique for Offline Handwritten Gurmukhi Character Recognition", *National Academy Science Letters*, Vol. 37(6), pp. 567-572, 2014. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40009-014-0280-1>
- [4] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "A Framework for Grading Writers using Offline Gurmukhi Characters", *Proceedings of the National Academy of Sciences-Physical Science- A*, Vol. 86(3), pp. 405-415, 2016. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40010-016-0277-x>

- [5] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Offline Handwritten Gurmukhi Character Recognition: Analytical Study of different Transformations", *Proceedings of the National Academy of Sciences- Physical Science- A*, Vol. 87(1), pp. 137-143, 2017. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40010-016-0284-y>
- [6] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "A Novel Technique for Line Segmentation in Offline Handwritten Gurmukhi Script Documents", *National Academy Science Letters*, Vol. 40(4), pp. 273-277, 2017. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40009-017-0558-1>
- [7] **Munish Kumar**, and S. R. Jindal, "Devanagari Handwritten Grading System Based on Curvature Features", *Computer Modeling in Engineering & Sciences*, Vol. 113 (2), pp. 201-209, 2017. **(SCI Indexed)**
<https://www.techscience.com/CMES/v113n2/27349>
- [8] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "A Novel Handwriting Grading System Using Gurmukhi Characters", *International Arab Journal of Information Technology*, Vol. 15 (6), pp. 945-950, 2018. **(SCI Indexed)**
http://iajit.org/index.php?option=com_content&task=view&id=1635&Itemid=25
- [9] **Munish Kumar**, M. K. Jindal, R. K. Sharma and S. R. Jindal, "Offline Handwritten Numeral Recognition using Combination of Different Feature Extraction Techniques", *National Academy Science Letters*, Vol. 41(1), pp. 29-33, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40009-017-0606-x>
- [10] Malika Arora, **Munish Kumar** and N. K. Garg, "Facial Emotion Recognition Based on PCA and Gradient Features", *National Academy Science Letters*, Vol. 41 (6), pp. 365-368, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40009-018-0694-2>
- [11] **Munish Kumar**, P. Chhabra and N. K. Garg, "An Efficient Content Based Image Retrieval System Using BayesNet and K-NN", *Multimedia Tools and Applications*, Vol. 77 (16), pp. 21557-21570, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-017-5587-8>

- [12] Diksha Garg, N. K. Garg and **Munish Kumar**, "Underwater Image Enhancement using Blending of CLAHE and Percentile Methodologies", *Multimedia Tools and Applications*, Vol. 77 (20), pp. 26545-26561, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-018-5878-8>
- [13] H. Kaur and **Munish Kumar**, "A Comprehensive Survey on Word Recognition for non-Indic and Indic Scripts", *Pattern Analysis and Applications*, Vol. 21(4), pp. 897-929, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10044-018-0731-2>
- [14] **Munish Kumar**, M. K. Jindal, R. K. Sharma and S. R. Jindal, "A Novel Framework for Writer Identification Based on Pre-Segmented Gurmukhi Characters", *SADHANA*, Vol. 43(12), pp. 197, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s12046-018-0966-z>
- [15] P. Chhabra, N. K. Garg and **Munish Kumar**, "Content-Based Image Retrieval System using ORB and SIFT Features", *Neural Computing and Applications*, pp. 1-9, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00521-018-3677-9>
- [16] **Munish Kumar**, M. K. Jindal, R. K. Sharma and S. R. Jindal, "Character and Numeral Recognition for Non-Indic and Indic Scripts: A Survey", *Artificial Intelligence Review*, Vol. 52(4), pp. 2235-2261, 2019. DOI: 10.1007/s10462-017-9607-x **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10462-017-9607-x>
- [17] A. Kumar, A. Kaur and **Munish Kumar**, "Face Detection Techniques: A Review", *Artificial Intelligence Review*, Vol. 52(2), pp. 927-948, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10462-018-9650-2>
- [18] **Munish Kumar** and S. R. Jindal, "Fusion of RGB and HSV Colour Space for Foggy Image Quality Enhancement", *Multimedia Tools and Applications*, Vol. 78(8), pp. 9791-9799, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-018-6599-8>

- [19] **Munish Kumar**, S. R. Jindal, M. K. Jindal and G. S. Lehal, "Improved Recognition Results of Medieval Handwritten Gurmukhi Manuscripts using Boosting and Bagging Methodologies", *Neural Processing Letters*, Vol. 50(1), pp. 43-56, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11063-018-9913-6>
- [20] S. Dargon and **Munish Kumar**, "Writer Identification System for Indic and Non-Indic Scripts: State-of-the-art Survey", *Archives of Computational Methods in Engineering*, Vol. 26(4), pp. 1283-1311, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11831-018-9278-z>
- [21] P. Kaur, R. Kumar and **Munish Kumar**, "A Healthcare Monitoring System using Random Forest and Internet of Things (IoT)", *Multimedia Tools and Applications*, Vol. 78(14), pp. 19905-19916, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-019-7327-8>
- [22] S. Goel, R. Kumar, **Munish Kumar** and V. Chopra, "An Efficient Page Ranking Approach Based on Vector Norms using sNorm (p) Algorithm", *Information Processing and Management*, Vol. 56(3), pp. 1053-1066, 2019. **(SCI Indexed)**
<https://www.sciencedirect.com/science/article/abs/pii/S0306457318305454>
- [23] **Munish Kumar** and S. R. Jindal, "A Study of Recognition of Pre-Segmented Handwritten Multi-lingual Characters", *Archives of Computational Methods in Engineering*, pp. 1-29, 2018. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11831-019-09332-0>
- [24] S. R. Narang, M. K. Jindal and **Munish Kumar**, "Devanagari Ancient Character Recognition using DCT Features with Adaptive Boosting and Bootstrap Aggregating", *Soft Computing*, pp. 1-12, 2019. **(SCI Indexed)**
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- [25] S. R. Narang, M. K. Jindal and **Munish Kumar**, "Devanagari Ancient Character Recognition using Statistical Feature Extraction Techniques", *SADHANA*, Vol. 44: 141, 2019. **(SCI Indexed)**
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- [26] S. R. Narang, M. K. Jindal and **Munish Kumar**, "Drop Flow Method: An Iterative Algorithm for Complete Segmentation of Devanagari Ancient Manuscripts", *Multimedia Tools and Applications*, Vol. 78(16), pp. 23255-23280, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-019-7620-6>
- [27] S. Dargan, **Munish Kumar**, M. R. Ayyagari, and G. Kumar, "A Survey of Deep Learning and Its Applications: A New Paradigm to Machine Learning", *Archives of Computational Methods in Engineering*, pp. 1-22, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11831-019-09344-w>
- [28] **Munish Kumar**, M. K. Jindal, R. K. Sharma, and S. R. Jindal, "Performance Evaluation of Classifiers for the Recognition of Offline Handwritten Gurumukhi Characters and Numerals: A Study", *Artificial Intelligence Review*, pp. 1-23, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10462-019-09727-2>
- [29] R. P. Kaur, M. K. Jindal and **Munish Kumar**, "Recognition of Newspaper Printed in Gurmukhi Script", *Journal of Central South University*, Vol. 26(9), pp. 2495-2503, 2019 **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11771-019-4189-1>
- [30] S. R. Narang, M. K. Jindal and **Munish Kumar**, "Line Segmentation of Devanagari Ancient Manuscript", *Proceedings of the National Academy of Sciences- Physical Science- A*, 2019. In press **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s40010-019-00627-2>
- [31] A. Singh, V. Kadyan, **Munish Kumar**, and N. Baggan "ASRoIL: a comprehensive survey for automatic speech recognition of Indian languages", *Artificial Intelligence Review*, pp. 1-32, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10462-019-09775-8>
- [32] S. Gupta and **Munish Kumar**, "Forensic document examination system using boosting and bagging methodologies", *Soft Computing*, pp. 1-18, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-019-04297-5>

- [33] S. Gupta, **Munish Kumar** and A. Garg, "Improved Object Recognition Results using SIFT and ORB Feature Detector", *Multimedia Tools and Applications*, pp. 1-15, 2019. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-019-08232-6>
- [34] **Munish Kumar**, Surbhi Gupta, Xiao-Zhi Gao, Amitoj Singh, "Plant Species Recognition Using Morphological Features and Adaptive Boosting Methodology", *IEEE Access*, Vol. 7, pp. 163912-163918, 2019. **(SCI Indexed)**
<https://ieeexplore.ieee.org/document/8894140>
- [35] S. Dargan and **Munish Kumar**, A. Garg and K. Thakur, "Writer Identification System for Pre-Segmented Offline Handwritten Devanagari Characters using k-NN and SVM", *Soft Computing*, pp. 1-12, 2019 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-019-04525-y>
- [36] R. P. Kaur, **Munish Kumar** and M. K. Jindal, "Newspaper Text Recognition of Gurumukhi Script Using Random Forest Classifier", *Multimedia Tools and Applications*, pp. 1-14, 2019 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11042-019-08365-8>
- [37] S. Dargan and **Munish Kumar**, "A comprehensive survey on the biometric recognition systems based on physiological and behavioral modalities", *Expert Systems with Applications*, 2020 (In Press). **(SCI Indexed)**
<https://www.sciencedirect.com/science/article/abs/pii/S0957417419308310>
- [38] **Munish Kumar**, S. Gupta and N. Mohan, "A Computational Approach for Printed Document Forensics using SURF and ORB Features" *Soft Computing*, Vol. 24, pp. 13197-13208, 2020 **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-020-04733-x>
- [39] S. Gupta, K. Thakur and **Munish Kumar**, "2D-Human Face Recognition Using SIFT and SURF descriptors of Face's Feature Regions" *The Visual Computer*, pp. 1-10, 2020 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00371-020-01814-8>

- [40] M. Bansal, **Munish Kumar**, and M. Kumar, "2D Object Recognition Techniques: State-of-the-Art Work", *Archives of Computational Methods in Engineering*, pp. 1-15, 2020 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11831-020-09409-1>
- [41] S. R. Narang, M. K. Jindal and **Munish Kumar**, "Ancient Text Recognition: A Review" *Artificial Intelligence Review*, 2020. DOI: 10.1007/s10462-020-09827-4 **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s10462-020-09827-4>
- [42] I. R. Parray, S. Singh and **Munish Kumar**, "Time Series Data Analysis of Stock Price Movement Using Machine Learning Techniques", *Soft Computing*, Vol. 24, pp. 16509-16517, 2020. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-020-04957-x>
- [43] S. R. Narang, M. K. Jindal, S. Ahuja, and **Munish Kumar**, "On the Recognition of Devanagari Ancient Handwritten Characters using SIFT and Gabor Features", *Soft Computing*, Vol. 24, pp. 17279-17289, 2020 **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-020-05018-z>
- [44] S. Gupta, N. Mohan and Munish Kumar, "A Study on Source Device Attribution using Still Images", *Archives of Computational Methods in Engineering*, 2020. **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s11831-020-09452-y>
- [45] R. P. Kaur, M. K. Jindal, and **Munish Kumar**, "Text and Graphics Segmentation of Newspaper Printed in Gurmukhi Script: A Hybrid Approach", *The Visual Computer*, 2020 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00371-020-01927-0>
- [46] Y. Kumar, N. Singh, **Munish Kumar**, and A. Singh "AutoSSR: an efficient approach for automatic spontaneous speech recognition model for the Punjabi Language", *Soft Computing*, 2020 (In Press), **(SCI Indexed)**
<https://link.springer.com/article/10.1007/s00500-020-05248-1>
- [47] M. Mittal, **Munish Kumar**, A. Verma, I. Kaur, B. Kaur, M. Sharma and L. M. Goyal, "FEMT: a computational approach for fog elimination using multiple thresholds", *Multimedia Tools and Applications*, 2020 (In Press), **(SCI Indexed)**.

<https://link.springer.com/article/10.1007/s11042-020-09657-0>

- [48] M. Arora and **Munish Kumar**, "AutoFER: PCA and PSO Based Automatic Facial Emotion Recognition", *Multimedia Tools and Applications*, 2020 (In Press), (**SCI Indexed**).

<https://link.springer.com/article/10.1007/s11042-020-09726-4>

- [49] H. Kaur and **Munish Kumar**, "Offline Handwritten Gurumukhi Word Recognition Using eXtreme Gradient Boosting Methodology", *Soft Computing*, 2020 (In Press), (**SCI Indexed**).

<https://link.springer.com/article/10.1007/s00500-020-05455-w>

- [50] M. Bansal, **Munish Kumar**, M. Kumar, K. Kumar "An Efficient Technique for Object Recognition Using Shi-Tomasi Corner Detection Algorithm", *Soft Computing*, 2020 (In Press), (**SCI Indexed**).

<https://link.springer.com/article/10.1007/s00500-020-05453-y>

Selected Publications in other Journals (06)

- [51] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Size of Training set vis-À-vis Recognition Accuracy of Handwritten Character Recognition System", *Journal of Emerging Technologies in Web Intelligence*, Vol. 5(4), pp. 380-384, 2013.

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- [53] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "MDP Feature Extraction Technique for Offline Handwritten Gurmukhi Character Recognition", *Smart Computing Review*, Vol. 3(6), pp. 397-404, 2013.

- [54] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Segmentation of Isolated and Touching Characters in Offline Handwritten Gurmukhi Script Recognition",

International Journal of Information Technology and Computer Science, Vol. 2, pp. 58-63, 2013.

<http://www.mecs-press.org/ijitcs/ijitcs-v6-n2/IJITCS-V6-N2-8.pdf>

- [55] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "PCA Based Offline Handwritten Gurmukhi Character Recognition System", *Smart Computing Review*, Vol. 3(5), pp. 346-357, 2013.

- [56] **Munish Kumar**, S. Gupta, K. Kumar and M. Sachdeva, "Spreading of Covid-19 in India, Italy, Japan, Spain, UK, US: A Prediction Using ARIMA and LSTM Model", *Digital Government: Research and Practice*, Article No. 24, 2020.

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Selected Publications in the Proceedings of International Conferences (16)

- [57] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Segmentation of Lines and Words in Handwritten Gurmukhi Script Documents", *Proceedings of the First International Conference on Intelligent Interactive Technologies and Multimedia*, Allahabad, pp. 28-30, 2010.

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- [58] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "k-Nearest Neighbour Based Offline Handwritten Gurmukhi Character Recognition", *Proceedings of International Conference on Image Information Processing*, Jaypee University of Information Technology, Wagnaghat (Shimla), pp. 1-4, 2011.

<https://ieeexplore.ieee.org/document/6108863>

- [59] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "Classification of Characters and Grading Writers in Offline Handwritten Gurmukhi Script", *Proceedings of International Conference on Image Information Processing*, Jaypee University of Information Technology, Wagnaghat (Shimla), pp. 1-4, 2011.

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- [60] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "Offline Handwritten Gurmukhi Character Recognition Using Curvature Feature", *Proceedings of International*

- Conference on Advances in Modeling, Optimization and Computing*, IIT Roorkee, pp. 981-989, 2011.
- [61] S. Gupta, Y. J. Singh and **Munish Kumar**, "Object Detection Using Multiple Shape-Based Features", *Proceedings of International Conference on Parallel, Distributed and Grid Computing (PDGC-2018)*, Jaypee University of Information Technology, Wagnaghat (Shimla), pp. 433-437, 2017.
- <https://ieeexplore.ieee.org/document/7913234>
- [62] M. Khatri, **Munish Kumar** and A. Jain, "Pulmonary Lesion Detection and Staging from CT Images Using Watershed Algorithm", *Proceedings of the 8th International Conference on Advance Computing Conference (IACC)*, Benett University, Noida, pp. 108-112, 2018.
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- [63] **Munish Kumar**, M. K. Jindal, R. K. Sharma and S. R. Jindal, "Performance Comparison of Several Feature Selection Techniques for Offline Handwritten Character Recognition", *Proceedings of International Conference on Research in Intelligent and Computing in Engineering*, pp. 1-6, 2018.
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- [64] R. P. Kaur, M. K. Jindal and **Munish Kumar**, "Zone Segmentation of a Text line Printed in Gurmukhi Script Newspaper", *Proceedings of 5th International Conference on Parallel, Distributed and Grid Computing (PDGC-2018)*, Jaypee University of Information Technology, Wagnaghat (Shimla), pp. 330-334, 2018.
- <https://ieeexplore.ieee.org/document/8745796>
- [65] H. Singh, R. K. Sharma and **Munish Kumar**, "A Benchmark Dataset of Online Handwritten Gurmukhi Script Words and Numerals", *Proceedings of the International Conference on Computer Vision and Image Processing*, Jaipur, India, 2019.
- https://link.springer.com/chapter/10.1007/978-981-15-4018-9_41
- [66] R. P. Kaur, M. K. Jindal and **Munish Kumar**, "Newspaper Text Recognition of Gurumukhi Script using Random Forest Classifier", *Proceedings of International Conference on Machine Intelligence and Data Science Applications (MIDAS-2020)*, 2020.

- [67] H. Kaur and **Munish Kumar**, "Offline Handwritten Gurumukhi Place Names Recognition using Curve Fitting Based Features", *Proceedings of International Conference on Robotics, Machine Learning and Artificial Intelligence*, 2020.
- [68] R. P. Kaur, M. K. Jindal and **Munish Kumar**, "TxtLineSeg: Text Line Segmentation of Unconstrained Printed Text in Devanagari Script", *Proceedings of International Conference on Computational Methods and Data Engineering*, pp. 85-100, 2020.
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- [69] M. Bansal, **Munish Kumar**, and M. Kumar "XGBoost: 2D-Object Recognition using Shape Descriptors and Extreme Gradient Boosting Classifier", *Proceedings of International Conference on Computational Methods and Data Engineering*, pp. 207-222, 2020.
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- [70] H. Kaur and **Munish Kumar**, "Feature Selection Techniques for Offline Handwritten Gurumukhi Place Name Recognition", *Proceedings of International Conference on Machine Intelligence and Data Science Applications (MIDAS-2020)*, 2020.
- [71] M. Bansal, **Munish Kumar**, and M. Kumar "2D-Object Recognition: Performance Comparison of Various Feature Extraction Techniques for Caltech-101 Image Dataset", *Proceedings of International Conference on Advances and Applications of Artificial Intelligence & Machine Learning*, pp. 207-222, 2020.
- [72] S. Dargan and **Munish Kumar**, "Writer Identification System Based on Offline handwritten Text in Gurumukhi Script", *Proceedings of International Conference on Parallel, Distributed and Grid Computing (PDGC-2020)*, 2020.

Book Chapters (07)

- [73] **Munish Kumar**, M. K. Jindal and R. K. Sharma, "Review on OCR for Handwritten Indian Scripts Character Recognition", *Proceedings of the First International Conference on Digital Image Processing and Pattern Recognition*, DPPR, Vol. 205, pp. 268-276, 2011.
https://link.springer.com/chapter/10.1007%2F978-3-642-24055-3_28
- [74] **Munish Kumar**, R. K. Sharma and M. K. Jindal, "SVM based Offline Handwritten Gurmukhi Character Recognition", *Proceedings of International Workshop on Soft*

- Computing Applications and Knowledge Discovery*, National Research University Higher School of Economics, Moscow (Russia), pp. 51-62, 2011.
- <https://www.semanticscholar.org/paper/SVM-Based-Offline-Handwritten-Gurmukhi-Character-Kumar-Jindal/9de4d1b45832c8f27730c0b6ae38d70f59c476a4>
- [75] **Munish Kumar**, M. K. Jindal and R. K. Sharma, “Weka based Offline Handwritten Gurmukhi Character Recognition”, *Proceedings of International Conference on Soft Computing for Problem Solving*, pp. 711-720, 2012.
- https://link.springer.com/chapter/10.1007/978-81-322-1602-5_76
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