DR. SANJEEV KUMAR

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Education

PhD in Applied Mathematics; Indian Institute of Technology Roorkee Thesis area: Computational Image Processing	September 2008
M.Sc. in Applied Mathematics; Indian Institute of Technology Roorkee	July 2003

Area of Expertise:
Image Processing (PDE-based Image Restoration; Encryption and Visual Secret Sharing; Quantum Imaging; Computational inverse problems in imaging)
Computer Vision (Optical Flow Estimation; 3-D Reconstruction; Epipolar Geometry)
Machine Learning (Neural Networks; Generative Models; Mathematical theory)

Professional Experience:

- Associate Professor, Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (April'16 -Ongoing)
- Assistant Professor, Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (November'10 –April'16)
- Postdoctoral Fellow, Department of Mathematics and Computer Science, University of Udine, ITALY (September'08-November'10)

Thesis Supervised:

	Completed	Ongoing
Ph.D.	06	07
Masters (IMSc. Applied Mathematics)/B.Tech.	26	06
Masters (Two year M.Sc. in Applied Maths)/MCA/M.Tech.	18	01

Sponsored Research Grants:

Sponsored Research Projects**:**

S. No.	**Title of the Project**	**Sponsoring Agency**	**Financial layout (INR)**	**Investigators**	**Status**
1.	3D reconstruction and software development for city model generation from satellite images	ISRO: RESPOND Scheme	**7.73 lacs**	Co-PI	Completed (2012-2015)

2.	Study and Development of Multi-Spectral Active Stereo Vision for Video Surveillance	SERB: Fast-track Young Scientist Scheme	**5.30 lacs**	Principal Investigator	Completed (2013-2016)
3.	Optical flow-based prediction of Visual storms from satellite image sequences	ISRO: RESPOND Scheme	**16.80 lacs**	Principal Investigator	Completed (2017-19)
4.	Development of Advanced Computational Algorithms for Evaluating Post-Surgery Rehabilitation	DST: Indo-Czech research cooperation	**32.03 lacs**	Principal Investigator	**Ongoing** (2020-23)
5.	Development of Encryption and Secret Sharing Schemes for Quantum Images	SERB: Core Research Grant	**20.53 lacs**	Principal Investigator	**Ongoing** (2021-24)
6.	Deep Learning-based Analysis and App Development for US-Stock Market	SmartAlpha Hyderabad	**32.0 lacs**	Co-Principal Investigator	**Ongoing** (2023-24)
6.	NURBS based 3D Reconstruction of Curves and Surfaces for Object Modeling	IIT Roorkee: FIG Scheme	**1.5 lacs**	Principal Investigator	Completed (2011-13)

Awards:

- Outstanding Teachers Award 2019 with citation and cash award of Rs. 100,000/- awarded by Indian Institute of Technology Roorkee (on Teachers Day)
- Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR) postdoctoral fellowship at university of udine Italy (2008-2010)
- CSIR Research Fellowship during PhD at IIT Roorkee during (2004-2008)

List of Selected Journal Publications (in last five years)

1. A. Puri and S. Kumar, An iterative algorithm for computing gradient directions for white matter fascicles detection in brain MRI, Phys. Eng. Sci. Med. 46(1):165-178 (2023)
2. A. Puri and S. Kumar, A generalized order mixture model for tracing connectivity of white matter fascicles complexity in brain from diffusion MRI, Math. Med. and Biol. (2023)
3. D. Rathi and S. Kumar, A d-level quantum secret sharing scheme with cheat-detection (t,m) threshold, Quantum Information processing (2023)
4. M. Lakra and S. Kumar, Solving a generalized order improved diffusion equation of image denoising using a CeNN-based scheme. Multimed Tools Appl (2022). https://doi.org/10.1007/s11042-022-12998-7
5. A. Puri and S. Kumar, An OMP-TV2 Algorithm for Detecting White Matter Fibers in Brain MRI, Psychiatry Research: Neuroimaging, 2022
6. F. Musanna, D. Dangwal & S. Kumar, Novel Image Encryption Algorithm using Fractional Chaos and Cellular Neural Network, J Ambient Intell Human Comput (2021) https://doi.org/10.1007/s12652-021-02982-8
7. Puri, S. Shakya, and S. Kumar, An Enhanced Multi-Fiber Reconstruction Technique using Adaptive Gradient Directions coupled with MoNCW Model in Diffusion MRI, Journal of Magnetic Resonance, 325 (2021), 106931
8. M. Lakra, S. Kumar, A fractional-order PDE-based contour detection model with CeNN scheme for medical images. J Real-Time Image Proc (2021). https://doi.org/10.1007/s11554-021-01172-1
9. M. Lakra, S. Kumar, Disparity computation through PDE and data-driven CeNN technique. Traitement du Signal, (2021):38(4): 1051-1059 https://doi.org/10.18280/ts.380415

10. Musanna and S. Kumar, A Novel Three Party Quantum Secret Sharing Scheme based on Bell State Sequential Measurements with Applications in Quantum Image Sharing, Quantum Inf Process (2020)19, 348 Impact Factor: 2.349
11. F. Musanna and S. Kumar, Image encryption using Quantum 3-D Baker map and Generalized Gray code coupled with fractional Chen's chaotic system, Quantum Inf Process (2020) 19:220 Impact Factor: 2.349
12. F. Musanna and S. Kumar, Novel Image Encryption Algorithm using Chaotic Compressive Sensing and Nonlinear Exponential Function, Journal of Information Security and Applications (2020), 54:102560 Impact Factor: 3.872
13. F. Musanna and S. Kumar, Generating Visually Coherent Encrypted Images with Reversible Data Hiding in Wavelet Doamin by Fusing Chaos and Pairing Functions, Computer Communications (2020), 162: 12-30 Impact Factor: 3.167
14. Bala, A. Rani, S. Kumar, An Illumination Insensitive Normalization Approach to Face Recognition Using Locality Sensitive Discriminant Analysis, Traitement du Signal (2020), 37(3):451-460 Impact Factor: 2.589
15. M. Lakra and S. Kumar, A CNN-based computational algorithm for nonlinear image diffusion problem. Multimed Tools Appl (2020), 79: 23887–23908 Impact Factor: 2.757
16. S. Shakya, S. Kumar and M. Goswami, Deep Learning Algorithm for satellite imaging-based cyclone detection, IEEE Journal of Selected Topics in Applied earth observations and Remote Sensing (2020), 13(1): 827-839 Impact Factor: 3.784
17. F. Musanna, D. Dangwal, S. Kumar and V. Malik, A Chaos Based Image Encryption Algorithm based on Multiresolution Singular Value Decomposition and a Symmetric Attractor, The Imaging Science Journal (Royal Photographic Society) (2020), 68(1): 24-40 Impact Factor: 0.871
18. F. Musanna, D. Dangwal and S. Kumar, A novel chaos-based approach in conjunction with MR-SVD and pairing function for generating visually meaningful cipher images. Multimed Tools Appl (2020), 79: 25115–2514 Impact Factor: 2.757
19. Deepika Saini and Sanjeev Kumar, Quantization Error in Stereo Imaging System with Noise Distributions, June 2020, International Journal of Modeling Simulation and Scientific Computing 11(05), 10.1142/S1793962320500427
20. S. Nandal and S. Kumar, Fractional order anisotropic diffusion for defogging of RGB images, Int. Journal of Image and Graphics, 20(1), 2050001 (20 pages), 2020
21. S. Shakya and S. Kumar , Characterizing and predicting the movement of clouds using fractional-order optical flow, IET Image Processing, 13(8):1375 – 1381, 2019 Impact Factor: 2.373
22. S. Nandal and S. Kumar, Single image fog removal algorithm in spatial domain using fractional order anisotropic diffusion. Multimed Tools Appl (2019) 78:10717–10732 Impact Factor: 2.757
23. F. Musanna and S. Kumar, A Novel Fractional-order Chaos-based Image Encryption using Fisher-Yates Algorithm and 3-D Cat Map, Multimed Tools Appl (2019) 78(11): 14867-14895, 2018 Impact Factor: 2.757
24. Deepika Saini, Sanjeev Kumar and T. R. Gulati, NURBS-based Geometric Inverse Reconstruction of Free-form Shaped Objects, JKSU-Computer and Information Sciences, (2017) 29(1):116-133 Impact Factor: 13.173

Full Length Papers published in Proceedings

25. Snehlata Shakya, Sanjeev Kumar, Comparison of Reconstruction Methods for Multi-compartmental Model in Diffusion Tensor Imaging. Proc. of 3rd Int. Conference on Computer Vision and Image Processing, AISC (Springer) 2018: 461-469, IIITDM Jabalpur, India
26. Savita Nandal and Sanjeev Kumar, Image Denoising using Fractional Quaternion Wavelet Transform, Proc. of 2nd Int. Conference on Computer Vision and Image Processing, AISC (Springer) 2017, 704: 301-313, GNEC IIT Roorkee, India
27. Farhan Musanna, Asha Rani, Sanjeev Kumar, Image Encryption Using Chaotic 3-D Arnold's Cat Map and Logistic Map, Proc. of 2nd Int. Conference on Computer Vision and Image Processing, AISC (Springer) 2017, 704: 301-313, GNEC IIT Roorkee, India

Book/Proceedings Edited:

28. B. B. Chaudhuri, Masaki Nakagawa, Pritee Khanna, Sanjeev Kumar, Proceedings of International Conference on Computer Vision and Image Processing: CVIP 2016, Volumes 1 and 2, Springer Advances in Intelligent Systems and Computing, Series Volumes 1022 and 1023, 2018.

29. Balasubramanian Raman, Sanjeev Kumar, Partha Pratim Roy and Debashis Sen, Proceedings of International Conference on Computer Vision and Image Processing: CVIP 2016, Volumes 1 and 2, Springer Advances in Intelligent Systems and Computing, Series Volumes 459 and 460, 2017.

Referees:

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