

Puneet Kumar

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OBJECTIVE

I am a Postdoctoral Researcher at the Center for Machine Vision and Signal Analysis, University of Oulu, Finland advised by [Prof. Xiaobai Li](#). I did my Ph.D. at the Machine Intelligence Lab, Indian Institute of Technology Roorkee, India, under the supervision of [Prof. R. Balasubramanian](#). My research interests include Multimodal Emotion Analysis and Affective Feedback Synthesis.

EDUCATION

- Ph.D.**, Computer Science, CGPA: 9.00/10 Jul 2018 - Aug 2022
Indian Institute of Technology, Roorkee, Uttarakhand, India.
Thesis Area: *Multimodal Emotion Analysis Using Deep Learning Techniques*
Supervisor: Prof. R. Balasubramanian
- M.E.**, Computer Science (**Institute Gold Medal**), CGPA: 9.38/10 Jul 2016 - Jul 2018
Thapar Institute of Engineering & Technology, Thapar University, Patiala, Punjab, India.
Thesis Topic: *Meta-heuristic based Optimization of Deep Neural Networks*
Supervisor: Dr. Shalini Batra
- B.E.**, Computer Science, CGPA: 7.47/10 Jul 2010 - May 2014
Manipal Institute of Technology, Manipal University, Manipal, Karnataka, India.

RESEARCH INTERESTS

- Affective Computing and Cognitive Science
- Multimodal Emotion Analysis
- Machine Learning and Deep Learning
- Interpretable and Explainable AI
- Learning Analytics and Education

PUBLICATIONS

Journals

- [J-1] **P. Kumar**, S. Malik, B. Raman, 'Interpretable Multimodal Emotion Recognition using Hybrid Fusion of Speech and Image Data', *Multimedia Tools and Applications* ([Springer](#)). (**Status: Accepted, IF: 3.6, Quartile: Q2**).
- [J-2] **P. Kumar**, G. Bhatt, O. Ingle, D. Goyal, B. Raman, 'Affective Feedback Synthesis Towards Multimodal Text and Image Data', *ACM Transactions on Multimedia Computing, Communications, and Applications* **vol. 19**, no. 6, pp. 1-23, 2023. (**Status: Published, IF: 4.094, Quartile: Q1**)
- [J-3] **P. Kumar**, B. Raman, 'A BERT Based Dual-Channel Explainable Text Emotion Recognition System', *Neural Networks* ([Elsevier](#)) **vol. 150**, no. 13, pp. 392-407, 2022. (**Status: Published, IF: 9.657, Quartile: Q1**)

- [J-4] **P. Kumar**, K. Pathania, B. Raman, ‘Zero-shot learning based cross-lingual sentiment analysis for Sanskrit text with insufficient labeled data’, *Applied Intelligence* (Springer) DOI: doi.org/10.1007/s10489-022-04046-6, 2022. (**Status: Published, IF: 5.019, Quartile: Q2**)
- [J-5] **P. Kumar**, S. Batra and B. Raman, ‘Deep Neural Network Hyper-parameter Tuning Through Two Fold Genetic Approach’, *Soft Computing* (Springer) vol. 25, no. 13, pp. 8747-8771, 2021. (**Status: Published, IF: 3.732, Quartile: Q2**)
- [J-6] A. Sharma, **P. Kumar**, M. Vikas, M. Nagasai, K. Kishore, K. Sriram, B. Raman and PP Roy. ‘Fast Griffin Lim based Waveform Generation Strategy for Text-to-Speech Synthesis.’ *Multimedia Tools and Applications* (Springer) vol. 79, pp. 30205-30237, 2020. (**Status: Published, IF: 2.577, Quartile: Q2**)
- [J-7] **P. Kumar**, S. Garg, A. Singh, S. Batra, N. Kumar and I. You. ‘MVO-Based 2-D Path Planning Scheme for Providing Quality of Service in UAV Environment.’ *IEEE Internet of Things Journal*, vol. 5, no. 3, pp. 30205-30237, 2018. [**SCI, Q1, IF = 10.238**]

Conferences

- [C-1] **P. Kumar** and X. Li. ‘Interpretable Multimodal Emotion Recognition using Facial Features and Physiological Signals.’ *Third RBCDSAI Conference on Deployable AI (DAI 2023)* [**Best Paper Award: third position**].
- [C-2] P. Goyal, A. Raj, **P. Kumar**, and KB Nampalle. ‘Automatic Evaluation of Machine Generated Feedback For Text and Image Data.’ *Proceedings of the 5th IEEE International Conference on Multimedia Information Processing and Retrieval Workshop on Multimedia Computing for Automated Urban Intelligent Systems (MIPRw 2022)*, virtual event.
- [C-3] S. Malik, **P. Kumar**, and B. Raman. ‘Towards Interpretable Facial Emotion Recognition.’ *Proceedings of the 12th Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP 2021)*, Article No.: 14, pp. 1-9, DOI: doi.org/10.1145/3490035.3490271, December 19-22, 2021, Jodhpur, INDIA. [**IAPR Endorsed**].
- [C-4] **P. Kumar**, V. Kaushik and B. Raman. ‘Towards the explainability of Multimodal Speech Emotion Recognition.’ *Proceedings of the 22nd Annual Conference of the International Speech Communication Association (Interspeech 2021)*, pp. 1748-1752, 30 August - 3 September, 2021, Brno, CZECH REPUBLIC. [**CORE A|Qualis A1**].
- [C-5] **P. Kumar**, V. Khokher, Y. Gupta and B. Raman. ‘Hybrid Fusion Based Approach for Multimodal Emotion Recognition with Insufficient Labelled Data.’ *Proceedings of 28th IEEE International Conference on Image Processing (ICIP 2021)*, pp. 314-318, September 19-22, 2021, Anchorage, Alaska, USA. [**CORE B|Qualis A1**].
- [C-6] **P. Kumar** and B. Raman. ‘Domain Adaptation based Technique for Image Emotion Recognition using Image Captions.’ *Proceedings of the 5th IAPR International Conference on Computer Vision and Image Processing (CVIP 2020)*, pp. 394-406, December 4-6, 2020, Prayagraj, INDIA. [**IAPR Endorsed|Best Paper Award**].
- [C-7] **P. Kumar**, S. Jain, B. Raman, PP Roy and M. Iwamura. ‘End-to-end Triplet Loss based Emotion Embedding for Speech Emotion Recognition.’ *Proceedings of the 25th IEEE International Conference on Pattern Recognition (ICPR 2020)*, pp. 8766-8773, January 10-15, 2021, Milan, ITALY. [**CORE B|Qualis A1**].
- [C-8] S. Sahoo, **P. Kumar**, B. Raman and PP Roy. ‘A Segment Level Approach to Speech Emotion Recognition using Transfer Learning.’ *Proceedings of the Asian Conference on Pattern Recognition (ACPR 2019)*, pp. 435-448, November 25-29, 2019, Auckland, NEW ZEALAND. [**IAPR Endorsed**].

- [C-9] J. Jaiswal, A. Chaubey, B. Reddy, S. Kashyap, **P. Kumar**, B. Raman and PP Roy. ‘A Generative Adversarial Network based Ensemble Technique for Automatic Evaluation of Machine Synthesized Speech.’ Proceedings of *the Asian Conference on Pattern Recognition (ACPR 2019)*, pp. 580-593, November 25-29, 2019, Auckland, NEW ZEALAND. [**IAPR Endorsed**].

Under Review/Pre-prints

- [R-1] **P. Kumar**, S. Malik, and B. Raman. ‘Hybrid Fusion Based Interpretable Multimodal Emotion Recognition with Insufficient Labelled Data’, *Pattern Recognition (Elsevier)*. (**Status: Under Review, IF: 7.196, Quartile: Q1**) Pre-print: arxiv.org/abs/2208.11450.
- [R-2] **P. Kumar**, B. Raman, ‘Domain Adaptation based Technique for Image Emotion Recognition using Pre-trained Facial Expression Recognition Models’, *ACM Transactions on Multimedia Computing, Communications, and Applications*. (**Status: Under Review, IF:3.144, Quartile: Q1**). Pre-print: arxiv.org/abs/2011.08388.

PATENTS & COPYRIGHTS

1. **Copyright** entitled ‘Deep Neural Network Explainability Technique with Application in Multimodal Emotion Recognition’, Puneet Kumar, Vishesh Kaushik, and Balasubramanian Raman. (Status: **Filed**, Dairy No. 13305/2021-CO/SW & 13261/2021-CO/L).

TECHNICAL SKILLS

Programming Languages	: Python, MATLAB, R, C/C++, Core Java (acquainted), Pascal (acquainted), Delphi (acquainted).
Development Tools	: TensorFlow, Keras, PyTorch, Anaconda, PyCharm, Spyder, RStudio, Weka, Code::Blocks, Eclipse, Visual Studio.
Database	: Oracle DB server, Oracle XE, Microsoft SQL DB Server, Oracle SQL Developer, Microsoft SQL Management Studio.
Web Development	: HTML, CSS, PHP (acquainted), JavaScript (acquainted).
Others	: LaTeX, Rattle, Oracle P6 EPPM, Microsoft Project, Microsoft Azure, Android Development (prior experience).

WORK EXPERIENCE

Industry:

Visiting Researcher Jul 2018 - Jun 2019

Samsung R&D, New Delhi, India.

Worked on ‘End to End Emotional Speech Synthesis’ project, sponsored by Samsung R&D, in the investigation of Prof. R. Balasubramanian, IIT Roorkee.

Application Engineer May 2014 - May 2016

Oracle India Pvt. Ltd., Hyderabad, Telangana, India.

Worked with the Software Development team for the sustenance of a project management tool ‘Oracle Primavera P6 Professional’.

Project Intern Jan 2014 - May 2014

Oracle India Pvt. Ltd., Hyderabad, Telangana, India.

Worked with the Software Testing team for the quality assurance of ‘Oracle Primavera P6 Enterprise Project Portfolio Management Web’.

Academics:

Visiting Researcher

Dec 2019

Osaka Prefecture University (OPU), Osaka, Japan.

Worked at the Department of Computer Science and Intelligent Systems, OPU, Osaka, Japan, under Japan Science and Technology Sakura Science Plan.

Teaching Assistant

Jul 2018 - Present

Indian Institute of Technology, Roorkee, India.

Assisted Prof. R. Balasubramanian in tutorial and quiz sessions for Advance Algorithms (CSN 501), Computer Graphics (CSN 372), Database Management System (CSN 351), Data Structures (CSN 102), and Discrete Structures (CSN 106) courses.

Teaching Assistant

Jul 2016 - Jul 2018

Thapar Institute of Engineering & Technology, Thapar University, Patiala, Punjab, India.

Assisted Prof. R. K. Sharma and Prof. Shalini Batra in lab and quiz sessions for Data Structures and Algorithms (UCS 406) and Compiler Construction (UCS 802) courses.

AWARDS & SCHOLARSHIPS

1. Received the **third** position in the **Best Paper Award** category in the The 3rd RBCDSAI Conference on Deployable AI (DAI 2023) supported by Finnish Indian Consortia for Research & Education organized by IIT Madras and top Finnish universities.
2. Received the **Best Ph.D. Thesis Award** in the 9th IEEE Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON'22).
3. **Registration support** from the **Alumni fund, IIT Roorkee** to present a research paper in the 28th International Conference on Image Processing (ICIP), **Alaska, USA**.
4. **Registration support** from CSE Department, IIT Roorkee to present a research paper at the 22nd Annual Conference of the International Speech Communication Association (Interspeech 2021), **Brno, Czech Republic, Europe**.
5. **Registration support** from **Microsoft Research Grant** to present a research paper at the 25th IEEE International Conference on Pattern Recognition (ICPR 2020), **Milan, Italy, Europe**.
6. Received the **Best Paper Award** in the 5th IAPR International Conference on Computer Vision & Image Processing (CVIP'20).
7. Got selected to visit Osaka Prefecture University, Osaka, Japan under Japan Science and Technology **Sakura Science Plan** from 4-18 December 2019; received **travel support** from **Osaka Prefecture University, Japan** for the same.
8. **Travel support** from CSE Department, IIT Roorkee to attend 4th Summer School on Machine Learning and Computer Vision at the International Institute of Information Technology (IIIT) Hyderabad, India, in July 2019.
9. **Travel support** from CSE Department, IIT Roorkee to attend the 11th Indian Conference on 'Computer Vision, Graphics and Image Processing' (ICVGIP 2018) at IIIT Hyderabad and the Indian School of Business (ISB) Hyderabad, India, in December 2018.
10. Received the Institute **Gold Medal** in M.E. (CSE) in Nov 2018.
11. Received **MHRD Scholarships** during M.E. (2016-18) and Ph.D. (2018-22).
12. Qualified CBSE **UGC NET** Computer Science in Nov 2017.
13. Qualified **GATE** Computer Science (Rank 2205, percentile 97.91) in 2016.

WORKSHOP/TRAINING/CONFERENCES ATTENDED

1. Participated in the training course on High Performance Computing environments conducted by the Finnish IT Center for Science. Apr 2023.
2. Attended a training on 'Fundamentals of Deep Learning' by the NVIDIA Deep Learning Institute. Oct 2021.
3. IEEE 27th 'Int. Conference on Image Processing' (ICIP), Abu Dhabi, UAE. Oct 2020.
4. IEEE 22nd Workshop on 'Multimedia Signal Processing', Tampere, Finland. Sep 2020.
5. Visited Osaka Prefecture University, Osaka, Japan under Japan Science and Technology Sakura Science Plan. Dec 2019.
6. 4th Int. Conf. on 'Computer Vision and Image Processing', MNIT Jaipur. Sep 2019.
7. 4th Summer School on Machine Learning & Computer Vision, IIIT Hyderabad. July 2019.
8. Technical Session on 'Microsoft Azure Cloud Computing', IIT Roorkee. Apr 2019.
9. 11th Indian Conference on 'Computer Vision, Graphics and Image Processing', IIIT Hyderabad. Dec 2018.
10. Workshop on 'Computer Vision and Image Processing', IIT Roorkee. Mar 2018.
11. Short term course on 'Deep Learning and Applications', IIT Kanpur. Jan 2017.

TALKS/EVENTS/WORKSHOPS DELIVERED

1. Gave a spotlight talk on 'Interpretable Multimodal Emotion Recognition using Facial Features and Physiological Signals' at The Conference on Deployable AI. Jun 2023.
2. Headed the training programs conducted by PaiByTwo Classroom. Nov 2021 - Nov 2022.
3. Delivered a talk on 'Explainable AI' at the weekly Journal Club meeting of Bio-AI Lab, UiT Tromsø, Norway. Aug 2022.
4. Conducted a hands-on training session on 'Explainable AI' in Thapar Summer School 2022 at Thapar Institute of Engineering and Technology, Patiala, India. Jul 2022.
5. Organized a training session on 'Machine Learning for Computer Vision' by EICT Academy, IIT Roorkee. Mar 2022.
6. Delivered a talk in 'Executive Certificate Program in AI Strategy for Leaders' by Technology Innovation Hub, IIT Roorkee with The Economic Times. Jun 2022.
7. Participated and presented in 'Curriculum Conclave - 2021' (Computer Science Stream) for B.Tech. curriculum revision 2022 at M.I.T Manipal. Oct 2021.
8. Delivered a talk in 'Applied Data Science & Machine Learning with Python' course by EICT Academy, IIT Roorkee. Nov 2021.
9. Organized a training session on 'Deep Learning basics' during 'The Workshop On Computer Vision And Image Processing (WCVIP)' at IIT Roorkee. Dec 2020.
10. Organized a session on 'Dimensionality Reduction Algorithms' during workshop on Digital Image Processing & Applications (DIPA) at NIT Arunachal Pradesh. Aug 2020.
11. Conducted a training session on 'Classification Algorithms using Python' during 'Winter FDP on AI and Machine Learning' at E&ICT Academy, IIT Roorkee. Dec 2019.
12. Member of the Judge Allocation Committee, Smart India Hackathon (SIH) - Software Edition, organized at Indian Institute of Technology Roorkee, India. Mar 2019.

13. Organized a training on ‘Sequence-to-Sequence Learning’ during the course ‘Deep Learning and Applications’ at EICT Academy, IIT Roorkee. Aug 2019.
14. Conducted a hands-on training session on ‘Deep Learning 101’ during Thapar Summer School 2018 at Thapar Institute of Engineering and Technology, Patiala, India. Jun 2018.

ACTIVITIES

Research Review: Reviewed research papers in various reputed international journals and conferences, including IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE Transactions on Multimedia (TMM), Transactions on Circuits and Systems for Video Technology (TCSVT), IEEE Computational Intelligence Magazine, Elsevier Expert Systems with Applications (ESWA) Journal, Springer Neural Computing and Applications (NCAA) Journal, Springer Nature Computer Science (SNCS) Journal, Taylor & Francis Applied Artificial Intelligence (UAAI) Journal, IEEE Communication Letters Journal, The 61st Annual Meeting of the Association for Computational Linguistics (ACL 2023), The 29th International Conference on Neural Information Processing (ICONIP 2022) and The 6th International Conference on Computer Vision and Image Processing (CVIP 2021).

Memberships of Committees/Clubs: ACM, IEEE, Sakura Science Club: OPU Japan, Manipal Cognitive Science Forum, Manipal Photography Club, Thapar Movie Goers Group, Hyderabad Cycling Club, Oracle Volunteers.

Hobbies: Travel, Photography, Guitar, Audiobooks, Personal Finance, Meditation, Exercise & Nutrition, Teaching, Volunteering, Philosophy, and Psychology.

PERSONAL DETAILS

Father's Name	: Late Mr. Narayan Kumar	Mother's Name	: Mrs. Sushma Rani Babbar
Date of Birth	: Aug 30, 1991	Martial Status	: Married
Nationality	: Indian	Passport No.	: S2140966
Permanent Address: 3-B, Street No. 7, Setia Colony, Ganganagar, Rajasthan, India 335001			

REFEREES

Prof. Xiaobai Li

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Prof. R. Balasubramanian

Professor, CSE Department, Indian Institute of Technology, Roorkee, India.
E-mail: bala@cs.iitr.ac.in

Prof. Shalini Batra

Professor, CSE Department, Thapar University, Punjab, India.
E-mail: sbatra@thapar.edu

Prof. Harish SV

Professor, CSE Department, Manipal Institute of Technology, Karnataka, India.
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Updated: August 3, 2023