Deepa V.

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Objective

I intend to pursue a career in research activities and improve my technical skills and knowledge in my engineering field from a reputed research center and thereby to reach the pinnacle in the image processing field with sheer determination, dedication and hard work.

Research Interests

Digital Image Processing, Machine Learning, Deep Learning, Computer Vision

Work Experience

Sept. 2021 - Associate Professor and Head of the department, Department of Artificial Intelligence Dec. 2023 and Data Science, St. Joseph's College of Engineering and Technology, Kottayam, Kerala, India.

May 2005 - Assistant Professor, Department of Electronics and Instrumentation Engineering, August 2021 St.Joseph's College of Engineering and Technology,Kottayam, Kerala, India. Courses taught include Digital Signal Processing, Biomedical Instrumentation, Control System,

- Robotics, Digital Signal Processing Lab June 2004 - **Guest Lecturer**, Department of Electronics and Communication Engineering, Government
- April 2005 Engineering College, Idukki, Kerala, India.
- April 1999 Trainee, Cochin Shipyard Ltd., India , Utility and Maintenance department. June 2001

Education

2017-2022	Doctor of Philosophy (Ph.D).
Specialization	Bio-medical Image Processing.
College	Rajiv Gandhi Institute of Technology, Kottayam, Kerala, India.
University	APJ Abdul Kalam Technological University Kerala, India.
2007-2009	Master of Technology (M. Tech).
Specialization	Instrumentation and Control Systems.
College	National Institute of Technology, Calicut, Kerala, India.
2001-2004	Bachelor of Engineering (B.E).
Specialization	Electronics and Instrumentation Engineering.

College Sapthagiri College of Engineering, Tamil Nadu, India.

1995-1998 Diploma in Electronics.

Stream Electronics

Board Board of technical Education, Kerala.

1993 Secondary School Leaving Certificate Examination.

Board Board of Public Examination, Kerala.

Skill Set

Software MATLAB. Packages Programming Python. Languages Platforms Windows.

Ph.D thesis

Title Detection and Grading of Diabetic Retinopathy using Textural Feature Descriptors and Machine Learning Algorithms

Guide Dr. C. Sathish Kumar, Principal, RIT, Kottavam.

Description Diabetic retinopathy (DR), a severe complication of diabetic mellitus, is a microvascular disease of the eye that can cause irreversible blindness. DR can lead to vision loss and blindness if left untreated early. Therefore, it is crucial for diabetic patients to undergo frequent eye screening for early recognition and treatment. The task of accurately grading DR in an automated manner is challenging. Advancements in image processing and machine learning algorithms lead to effective ways for fast and accurate diagnosis. The research intends to develop automated DR grading algorithms using advanced medical image processing techniques based on adequate feature descriptors. Several algorithms for categorizing DR fundus images using leading textural features and machine learning are presented in the thesis. The research initially focuses on the early detection of DR using a transform-statistical feature extraction technique. The research extends to a multi-class DR grading system using textural features based on multiresolution micro-macro feature descriptors. A comparative evaluation of four pre-trained models, VGG19, ResNet50, InceptionV3, and Xception for DR detection of fundus images is presented. Further, the efficacy of three high performing models, ResNet50, InceptionV3, and Xception, is assessed for multi-class DR grading. A more accurate DR grading system is obtained using an ensemble of multi-stage deep convolutional neural networks. An ensemble of multi-stage CNN with Xception and InceptionV3 models having shallow-dense layer feature concatenation is employed for DR grading using image patches. Thesis also proposes hierarchical clustering by Siamese network (HCSN) with pre-trained CNN models for DR grading. The performance quality measures, classification accuracy, true positive rate, true negative rate, positive predictive value, quality index, and F-score for all the methods are computed.

M.Tech Project

Title Tracking of Manoeuvring Targets- A Comparative Evaluation of Fuzzy Algorithms Towards the Development of GMM Based Fuzzy-EKF

Guide Dr. A. Unnikrishnan, Sc'G', NPOL, Kochi

Description An exploratory study is carried out on the algorithms for handling manoeuvre during target motion analysis (TMA), encountered in the context of bearing only tracking (BOT).

Languages

English S/R/W Malayalam S/R/W Hindi S/R/W

S/R/W

Technical Programmes Attended

- 1 One week FDP and Workshop on Nextgen Computing Paradigms for Big Data Applications organized by Indian Institute of Information Technology (IIIT) Kottayam.
- 1 One week FDP on Statistical and Machine Learning Techniques with Applications organized by Indian Institute of Information Technology (IIIT) Kalyani.
- 2 Five day Workshop on Demystifying Machine Learning Algorithms organized by Dept. of Al and DS, Muthoot Institute of Technology and Science, Ernakulam.
- 3 Five day Workshop Sponsored by KTU on Practical Data Science, Dept. of Computer Science Engineering, SJCET, Kottayam.
- 4 One Week STTP on Advanced Techniques of Material Characterization for Research, Centre for Continuing Education, NIT, Jalandhar.
- 5 Five day Workshop on Python for Artificial Intelligence and Machine Learning, Dept. of Computer Applications, TKM College of Engineering Kollam.
- 6 One week FDP on Machine Learning, Saintgits College of Engineering, Kottayam
- 7 Two day Workshop on Deeplearning- Academics and REsearch Perspectives, PSG College of Engineering, Coimbatore.
- 8 One day Workshop on Research Methodology- Writing Effective Researvch Articles , Mangalam College of Engineering, Kottayam.
- 9 Three day Workshop Sponsored by DTE, Kerala on Data Analytics and Program Security, RIT, Kottayam
- 10 Five day STTP Sponsored by TEQIP Phase-II on LaTeX and SAGE, Dept. of Mathematics RIT, Kottayam.
- 11 One day Workshop on Pursue, Publish, Prosper Sponsored by ISTE Staff Chapter, SJCET, Kottayam.

Achievements and Extra Curricular Activities

- 1 Board of Study member in APJ Abdul Kalam Technological University Kerala, from September 2021- December 2023
- 2 Head of the Artificial Intelligence and Data Science department in St. Joseph's College of Engineering and Technology, Palai (from Sept.2021-Dec. 2023).
- 2 Resource person of Two day National Seminar, Mar Augusthinos College, Ramapuram on Ethical dimensionality of CHAT GPT (June 29 & 30, 2023).
- 3 Mentor and in-charge of Artificial Intelligence and Data Science Students Association (ADSA) in St. Joseph's College of Engineering.
- 4 Organized a workshop for students on Opportunities and Trends in Artificial Intelligence in St. Joseph's College of Engineering.

- 5 Women in Development Cell main coordinator in St. Joseph's College of Engineering, Palai, Kerala, from June 2005 to May 2017.
- 6 Examination cell in charge of AEI department in St. Joseph's College of Engineering, Palai
- 7 Registration coordinator of RAEREST International Conference 2016, organized by St.Joseph's College of Engineering, Palai.
- 8 Conference convenor of iMac4S, IEEE international Multi-conference Convener2013, organized by St.Joseph's College of Engineering, Palai.
- 9 Organizing secretory of National Conference on Emerging Trends in Electronics 2011, organized by St.Joseph's College of Engineering, Palai.
- 10 Have participated in the district level youth festival events like Group dance, Thiruvathirakali, Oppana, and other dance items during school and college days.

Research Publications

- V. Deepa, C. S. Kumar, T. Cheriyan, "Automated grading of DR fundus images using CNN with hierarchical clustering of image patches by Siamese network", Phys. Eng. Sci. Med., vol. 45(2), pp. 623-635, June 2022. https://doi.org/10.1007/s13246-022-01129-z. (Springer publication-SCIE, IF: 7.0)
- V. Deepa, C. S. Kumar, T. Cheriyan, "Ensemble of multi-stage deep convolutional neural networks for automated grading of diabetic retinopathy using image patches", J. King Saud Univ., Comp. and Info. Sci., May 2021. doi.org/10.1016/j.jksuci.2021.05.009, SCIE, IF: 8.8
- 3 V. Deepa, C. S. Kumar, S. Susan Andrews, "Fusing dual-tree quaternion wavelet transform and local mesh based features for grading of diabetic retinopathy using extreme learning machine classifier", Int. J. Imaging Syst. Technol., vol. 31, pp. 1625-1637, Mar. 2021. doi:DOI:10.1002/ima.22573. (Wiley Online Library- SCIE, IF: 2.0)
- 4 V. Deepa, C. S. Kumar, S. Susan Andrews, "Automated detection of microaneurysms using Stockwell transform and statistical features", IET Image Process., vol. 13(8), pp. 1341-1348, Apr. 2019. doi: 10.1049/iet-ipr.2018.5672. (IET Digital Library- SCI, IF: 1.9)
- 5 V. Deepa, C. S. Kumar, S. Susan Andrews, "Automated grading of diabetic retinopathy using local-spatial descriptors", in Proc. IEEE Int. Conf. on Computing, Power and Communication Technologies (GUCON, 2020), New Delhi, Oct. 2020, pp. 660-664.
- 6 V. Deepa, C. S. Kumar, T. Cheriyan, "Automated detection of diabetic retinopathy images using pre-trained convolutional neural network," in Proc. Int. Conf. on Communication, Control and Information Sciences (ICCISc, 2021), IEEE, Idukki, Jun. 2021,vol. 1, pp. 550-555.
- 7 V. Deepa, C. S. Kumar, T. Cheriyan, "Pre-trained Convolutional Neural Network for Automated grading of diabetic retinopathy," in Proc. Int. Conf. on Electrical, Electronics, Information and Communication Technologies (ICEEICT, 2022), IEEE, Trichy, Feb. 2022, pp. 1-5.
- 8 Jose AM, Kumar CS, Deepa V, "Automated Detection of Microaneurysm using Textural Analysis," in Proc. Int. Conf. on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), IEEE, Kerala, Jul. 2019, pp. 791-796.
- 9 V. Prasannan, C. S. Kumar and V. Deepa, "An Automated Approach for Diagnosing Diabetic Retinopathy in Retinal Fundus Images," in Proc. Int. Conf. on Recent Trends in Electronics, Information and Communication Technology (RTEICT), IEEE, Bengaluru, pp. 381-386

- 10 R. Pradeepa, A. Unnikrishnan, V. Deepa and J. Mija S, "Gaussian mixture modeling of rule base to track maneuvering targets, using fuzzy EKF," **TENCON 2009 2009 IEEE Region 10 Conference,** doi: 10.1109/TENCON.2009.5396026., pp. 1-6,
- 11 R. Pradeepa, A. Unnikrishnan, V. Deepa and J. Mija S, " On the Application of Fuzzy logic in Tracking of Maneuvering Targets using EKF," in Proc. Int, Conf. on Control Instrumentation and Systems Conference (CISCON)
- 12 V. Deepa and S. J. Mija, "Comparative study of fast output sampling feedback and relay free sliding mode controllers for power system stabilizer," **TENCON 2008 2008 IEEE Region 10 Conference**, doi: 10.1109/TENCON.2008.4766417., pp. 1-6,