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Cool Cottage, Kallupalam, Attoor Post,

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Official Address:

Head of Electrical And Electronics Engg.

College of engineering Tirkaripur

CAPE Institutions (Kerala Govt. Undertaking)

HIGHLIGHTS

DOCTORATE @ IIT kANPUR

11 YEARS OF TEACHING (9 years after PhD)

4 YEARS OF RESEARCH IN IIT KANPUR

2 YEARS INDUSTRIAL EXPERIENCE

3 YEARS OF EXPERIENCE AS VICE PRINCIPAL

1 KERALA STATE COUNCIL SPONSORED PROJECT- 5 LAKHS

6 STUDENT LEVEL RESEARCH FUNDING

23 SCI-INDEXED JOURNALS (31 Impact factor)

FOREIGN RESEARCHERS TIE UP(SPAIN)

Dr.Mohanalin Raja Rathnam

DOB: 22/05/1980 *Research experience: 4*

No. of years in teaching/industry:12 *Experience after PhD:10*

Total no. of research publications: 23

ABOUT ME

I work in a 'NAAC' accredited college which was established by Kerala state government in 2000. Moreover, Iam the head of a NBA accredited department (Electrical Engineering). Also, during the year of 2004-2005, I worked for Adhiyamaan college of Engineering. During this period, my department (Instrumentation and Control) prepared for accreditation and achieved it successfully. Apart from this academic contribution, I have enough amount of research experience too. At present, I have a project worth of 5 Lakhs sponsored by Kerala state research council. Right from my PG days, I had a special keen interest in medical fraternity. This inhibition started with my PG research, where I contributed developing a new expert system that can aid in diagnosing 11 types of cancer. The model was developed by interrogating several cancer patients over several months. Several interviews were conducted with various radiologist too, before concluding the knowledge base that I utilized to create a model. This eventually led me inside Indian Institute of Technology (IIT Kanpur) to pursue my Doctorate. Inside IIT Kanpur, I continued my research in cancer, but this time I restricted myself to breast cancer. I developed seven various enhancement and detection algorithms for identifying micro-calcifications. I was the 1st researcher to show the potential of Tsallis entropy in detecting the cancerous tissues.

Moreover, I developed various applications using that entropy by innovating a way to automatize it. This was appreciated by Prof. Tsallis himself in his research article. Moreover, I have innovated 2 new algorithms for rigid registering/aligning mammograms. Apart from these works, my path breaking contribution came in form of a hyper elastic image regularizer, which broke the assumptions that were found in literature for nearly two decades. Also, I have contributed few algorithms successfully for identifying epilepsy at early stage. Moreover, along with my doctoral student, I have identified new features for speech processing too. Right now, I'm engaged in non-medical area too. Lately I have developed a wild interested towards seismic signal processing, an area which closely resemble like EEG processing. I, along with a group have utilized wavelet transform to develop trendsetting approaches to denoise seismic signals and also to extract the features for design purpose. Right now, I have 23 internationally acclaimed journals with an outstanding impact factor of 31 (approx).

Education Details

Ph.D.

Ph.D. Electrical engineering, October, 2009/ 2010

Indian Institute of technology (IIT), Kanpur, India

Dissertation Topic: **Hyper-Elastic Image Registration- An application to Mammograms"**

Supervisor: Prof. Prem Kumar kalra.

PhD Thesis Summary:

This thesis is collection of proposals of registration techniques and segmentation algorithms that was useful in detecting breast cancer. Currently, elastic transformations are the popularly used method to register mammograms. These transformations needs control points extracted from the mammogram. Nipple is the only reliable control point present in the mammogram. In most of the mammograms nipple may not appear, making extraction of location difficult. Besides elastic transformations, lot of Physical model based techniques is present to register medical images and they don't require nipple location or landmarks to register. However, feeble amount of research has been devoted for physical model based registration applicable for mammograms which is far more challenging than many other medical images. This is due to the dynamic nature of breast. Some important physical models are elastic model, fluid model, viscous elastic model etc. The basics of the formulation of the regularization term of these existing models are highly questionable, if not condemnable. Elastic model assumes the body to behave linearly and the body to undergo small deformation. However, in reality, it is contrary and it has been found by researchers that human body excluding bone undergoes large deformation. To avoid the small deformation problem, fluid models have been introduced. Fluid models assume the body to have the physics of fluid. This kind of assumption is baseless and illogical; still it is being under use to match medical images. But, scientifically it leaves a big hollow between reality and proposed models. The same explanation can be ex-tended to viscous models as well. So, the need of the hour is a model which makes no use of control points, yet robust and scientifically correct too. In this thesis, the properties of the human organ especially breast have been studied well and it is concluded that human body is highly nonlinear and possesses Hyper-Elastic property. By understanding the properties of the flesh, a new clinically meaningful Hyper-Elastic model has been proposed for registration of mammograms. This thesis also introduces several Micro-calcifications (Mcs) detection algorithms. Traditionally Shannon entropy (SE) was used to isolate Mcs. But, mammograms are highly complicated images, demanding a non extensive technique. Tsallis entropy (TE) which possesses the above mentioned property has been a revolution in late in image processing field. TE has been introduced in this thesis for detecting Mcs. TE has one more parameter called q which depends on the non-extensiveness of the mammogram. There is no existing technique discussing the automation of q selection. A new technique, based on density index of the mammograms to calculate q is proposed. The success of this procedure much depends on the removal of pectoral muscles from mammogram. Further, one more technique based on type II fuzzy set is proposed for identifying the best threshold corresponding to the optimal q, which is considered to be more elegant than the former. Normalized Tsallis entropy (NTE), often considered as nephew of TE has also been tested for its capability in detecting Mcs. Thus, a complete evolution of techniques based on TE and NTE is shown. Global registration is an important step applied prior to any local registration techniques to avoid the local minima.

M.Tech

- **Masters of Technology**, May, 2004 **Biomedical Signal Processing and Instrumentation**

SASTRA, Tanjore, India

Dissertation Topic: **Artificial Intelligence based expert system to identify cancer**

CGPA - 8.13

- **PG Thesis Summary:**

An expert system is a software which can be useful for decision making. In this project, I have designed an expert system using artificial intelligence which can aid in diagnosing 11 types of cancer. The essential steps are to interview many cancer experts and to record their decision making skills and knowledge. Then a huge matrix that connects the data and the questionnaire was developed. The questions are developed with help of qualified Doctors from Tanjore medical college. The answers for these questions will lead to formation of a vector array. Then using some matrix manipulation, the results can be yielded. The results will suggest the stage of cancer if present and further medical treatment advices etc. Final validation was performed with help of Doctors/radiologist.

B.E

- **Bachelor of Engineering, Electrical Engineering**, April, 2001

Noorul Islam College of Engineering, Manonmaniam Sundaranar University, India

Percentage of marks- 78.23

Total No. of Working Experience Academic/ Industrial / Research Experience

- 16 + Years **(Including the period of Ph.D Research)**

- **College of Engineering Tirkaripur (NAAC and NBA for EEE)**
  Associate Professor (**Jan 2019 – till to date)**

  Iam the head of EEE department. This department is NBA accredited.

- **College of Engineering Pathanapuram (TEQUIP Coordinator)**
  Associate Professor (**Dec 2015 – Jan 2019) Transferred**

  I was the head of EEE department and Vice principal. I along with Dr.Sampath Kumar of Vimal Jyothi college Kerala have procured a Kerala state sponsored project worth of 5 lakhs INR. This project is about to be completed. During this period, I have procured 6 research seed money (students level). Moreover, some of my findings have been published in journals

- **Lourde Matha College of Science and Technology, India**

  I was working as Professor and Research Chief from Nov 2014 – Dec 2015.
  I was the Head of EEE department. As an additional duty, I was the chief of all the research

❖ St. Joseph's College of Engineering and Technology, India

I was working as a Professor during January 2014 till October 2014. I was instrumental in signing a 'MoU' with URV university, Spain, considered as top universities across the globe. **(Till to this date, I am doing research works along with this reputed Spanish team)** I was the coordinator of this activity. I was taking care of research activities to encourage/inspire other teachers to get into the field. The quality of UG and PG projects are taken care of. I along with **Dr.Priestly Shan** have developed an algorithm during this time. We successfully published our findings in JMIHI journal of US.

❖ St. Xavier's Catholic College of Engineering, India

I was working as an associate professor during November 2010 till December 2013. I taught neural networks, Image processing and soft computing skills for M.E students. I have been a part of several conference activities. I am guiding 3 PhD students and all are in submission stage of their thesis respectively. I am part of doctoral committee formed by Anna University for conducting seminars and discussions among other PhD students.

❖ Aries Biomed Technologies, Coimbatore, India

I stared my research career after my PhD as a technical lead manager in this medical research industry during October 2009 - October 2010. During this period, I was creating several new designs and implementing several ideas related to medical instruments.

❖ Indian Institute of Technology, Kanpur, India

I started pursuing my research at IIT Kanpur during August, 2006 till December, 2009. Duties included shared administrative responsibilities with faculty instructor, attending student inquiries, and oversight of graduate student teaching assistants and graders. Duties at various times have included office hours and leading weekly computer lab exercises. I have worked in a team of 4 in PCB lab development which includes development of website, procuring various new state-of-art instruments, maintaining databases and coordinating with senior engineers to develop high skill PCBs for the entire IIT community.

❖ Adhiyamaan college of Engineering, Hosur, India

I started my teaching career as a Lecturer during this period (i.e August, 2004 - July, 2006). I had taught major Electrical and Bio-Medical courses, guided several Bachelor level Thesis and conducted various electrical and Bio-medical labs.

❖ PACE Tech, Hosur, India.

I briefly worked as a Trainee Engineer after my Bachelor's degree during May,2001-April, 2002.

Journal Publications

1.Paul Joshua, Jaya Christa and Mohanalin, Adaptive Neuro-Fuzzy inference system based under Frequency Load Shedding for TamilNadu, Springerlink, The Journal of Supercomputing, Mar 2018. **(ISI indexed, Impact Factor-1.5)**

2) Satheesh Kumar N, J. Mohanalin, Mahil, "Recognition of autism in children via electroencephalogram behaviour using particle swarm optimization based ANFIS classifier", Springer link Multimedia Tools and Applications**. (ISI indexed, Impact Factor-1.35)**

3) Paul Joshua, Jaya Christa and Mohanalin, A Review of Load Forecasting Schemes, International Journal of Printing, Packaging and Allied Sciences, 2017, Vol.75.

4) Johny Elton, Vasuki and Mohanalin,"Voice Activity Detection using Fuzzy Entropy and Support Vector Machine", Entropy, 2016, Vol 18(18), **(ISI indexed, Impact Factor-2.35)**

5) Torrents-Barrena J, Lazer Prinza, Mohandhas Beena Mol, Mohanalin and Puig D, Complex wavelet algorithm for computer- aided diagnosis of Alzheimer disease, IET, Electronic Letters, Vol 5, Issue 20, 2015, pp: 1566 – 1568. **(ISI indexed, Impact Factor-1.23)**

6) Prinza, Rajeesh, jordina, Beena Mol, Mohanalin, Domenec Piug, "A novel Fuzzy Entropy Threshold based on a Complex Wavelet Denoising Technique to Diagnose Alzheimer Disease", IET Healthcare Technology Letters, 2016, **(ISI indexed, Impact Factor-1.12)**

7). Beena Mol, Prabavathy and Mohanalin, Fuzzy Threshold based Wavelet Processing of Random Time Series and Highly Noisy Accelerograms, Asian Journal of Civil Engineering (BHRC), Vol 17, No.8 (2016), pp: 1131 – 1150.

8). Beena Mol, Mohanalin, Prabavathy, Jordina and Dominic Piug, A Novel Wavelet Seismic De-noising Method using Type II Fuzzy, Applied Soft Computing (Elsevier), Vol 48, 2016, pp: 507 - 521 , **(ISI indexed, Impact Factor-3.97)**

9). Johny Elton, Vasuki and Mohanalin, A novel entropy based algorithm to remove silence from speech and classifying the residue as voiced/unvoiced regions, Asian Journal of Information Technology, Medwells, 2015, Vol. 15: 3770 -3779

9. Beenamol, Prabavathy and Mohanalin "A Novel Wavelet Based Relative Displacement Analysis of Structure Subjected to Seismic Base Excitation " Disaster Advances, vol.7, 2014, pp.1-9, **(ISI indexed, Impact Factor-2.3)**

10. Mohanalin and Beenamol, "A new Wavelet algorithm to enhance and detect Microcalcications", Elsevier Signal processing, vol.105, 2014, pp.438-448 **(ISI indexed, Impact Factor-3.5)**

11. Beenamol, Prabavathy and Mohanalin "A Robust 'Rule based De-noising Scheme' using Wavelets" Journal of medical imaging and health informatics, Vol. 4, No.4, pp.1-12, **(ISI indexed, Impact Factor-.6)**

12. Beenamol, Prabavathy and Mohanalin "Wavelet based denoising of contaminated strong ground signals using Bayes technique" Disaster Advances. Vol. 7, no 2, pp.9-17, (**ISI indexed, Impact Factor-2.3)**

13. L.Prinza, MohanalinandBeenamol"DenoisingPerformanceofCom-plex Wavelet Transform with Shannon Entropy and its Impact on AD EEG Classication using Neural network" Journal of medical imaging and health informatics, Vol (4), pp.1-11, March, 2014**.(ISI indexed, Impact Factor-.62)**

14. Mohanalin, PremKumarKalraandNirmalKumar"Poisson'sEqua-tion Based Image Registration: An Application For Matching 2D Mammograms." Journal of medical imaging and health informatics. Vol (4), pp.1-9, January, 2014**.(ISI indexed, Impact Factor-.62)**

15. M.Beenamol, S.Prabavathy and Mohanalin "Wavelet based Noise corrections of strong ground motion accelerograms: An application to earthquake discrete time series data recorded from the 2011 Japan earthquake" Research in Civil and Environment Engineering, Vol.1 (2013), pages: 92-112.

Journal Publications continued..

16. Beenamol, S.Prabavathy, Mohanalin "Wavelet based Seismic Signal Denoising using Shannon and Tsallis Entropy " Elsevier, Computers and Mathematics with Applications,Volume 64 Issue 11, Pages 3580-3593, 2012**. (ISI indexed, Impact Factor-2.069).**

17. Mohanalin, Prem Kumar Kalra and Nirmal Kumar "An automatic method to Enhance Microcalcications using Normalized Tsallis Entropy" Elsevier Signal processing, Vol.90, issue 3, pp. 952-958, 2010**. (ISI indexed, Impact Factor-2.238)**

18. Mohanalin, Beenamol, Prem Kumar Kalra and Nirmal Kumar, "An automatic Image registration scheme using Tsallis entropy" Elsevier, Biomedical Signal Processing and Control, Vol.5, pp.328-335, 2010. **(ISI indexed, Impact Factor-2.73)**

19. Mohanalin, Beenamol, Prem Kumar Kalra and Nirmal Kumar, "A novel automatic microcalcication detection technique using Tsallis entropy and a type II fuzzy index", Elsevier, Computers and Math-ematics with Applications, Vol. 60, pp. 2426-2432, 2010. **(ISI indexed, Impact Factor-2.06)**

20. Mohanalin, Prem Kumar Kalra, Nirmal Kumar, Tsallis Entropy Based Micro calcication Segmentation Graphics, Vision and Image Processing Journal, ISSN 1687-398X, Volume 9, Issue 1, February 2009, pages 49-54

21. Mohanalin, Prem Kumar Kalra, Nirmal Kumar, An Application of Renyi Entropy in segmenting Microcalcications using Otsus Method International Journal of Information Processing, Vol.3, No. 2, pp. 121-130, 2009.

22. Mohanalin, Prem Kumar Kalra, Nirmal Kumar, Microcalcications Segmentation using Normalized Tsallis Entropy: an Automatic q cal-culation by exploiting type II Fuzzy sets IETE Journal of Research, Vol. 55, Issue : 2, pp. 90-96, 2009. **(ISI indexed, Impact Factor-0.89)**

23. Mohanalin, Prem Kumar Kalra, Nirmal Kumar, Mutual Informa-tion based Rigid Medical Image registration using Normalized Tsallis entropy and Type II fuzzy index. International Journal of Computer Theory and Engineering, Vol.1, No. 2, pp. 180-185, 2009.

Conference Publications continued..

1)J.Mohanalin, P.K.Kalra, Nirmal Kumar, Tsallis Entropy based Contrast Enhancement of Microcalcifications", ICSAP-Malyasia, IEEE Computer Society.

2. J.Mohanalin, P.K.Kalra, Nirmal Kumar, Extraction of Micro Calcification using Non Extensive Property of Mammograms", IACC-IEEE Computer Society, Patiala,

3) J.Mohanalin, P.K.Kalra, Nirmal Kumar, “Enhancement of Micro Calcifications in mammograms using Gaussian Membership function based on Tsallis Entropy", IACC-IEEE Computer Society, Patiala.

4)J.Mohanalin, P.K.Kalra, Nirmal Kumar, “Fuzzy Based Micro calcification Segmentation",ICECE-IEEE Bangladesh 2008.

5) J.Mohanalin, P.K.Kalra, Nirmal Kumar,\Combination of Normalized Tsallis Entropy and S-Membership function for Contrast Enhancement of Micro calcifications", ICCVGIVP 2009. Proceedings published by TATA MCGRAW.

6) J.Mohanalin’ A novel algorithm for medical Video Compression using H.264 and Fuzzy Technique", EAST 2007, held in NICE, Pages 226-231.

7. J.Mohanalin, P.K.Kalra, “A simple Region growing Technique for Extraction ROI from Mammograms",ICQMOIT 2008 held at IBS Hyderabad, India, October 2008, pages 231- 238

8. J.Mohanalin, D.Raja, “Artificial Intelligence Based Expert System for Diagnosing Cancer", TIMA 2004 held at CSIR Complex, Chennai, India, 16th-18th December 2004

9. J.Mohanalin, P.K.Kalra, Nirmal Kumar, A Novel Histogram based Technique for grading Mammograms", International Conference on Mathematics and Computer Science 2009.

10. J.Mohanalin, P.K.Kalra, Nirmal Kumar, A Robust Algorithm for Micro Calcification Segmentation", ICJIT 2008 , Pages 226-231

11. J.Mohanalin, P.K.Kalra, Nirmal Kumar, A Robust Algorithm for Micro Calcification Enhancement", ICIP 2008 , Pages. 587-593
12. J.Mohanalin, P.K.Kalra, Nirmal Kumar, A novel Hyper elastic based Image Registration",NSCMIT 2007, pages 178-183

PATENTS APPLIED

1) “A new design for hybrid boiler” In advanced stage with Indian govt. Patent agency.

Research Project

“A new innovative hybrid boiler” 5 Lakhs, funded by Kerala state research council

Seminars presented

1. Basics of Image Processing and Medical imaging and how they co-exist[SASTRA]
2. Telemetry System in Hospitals [SASTRA]
3. Applications of Expert System in Biomedical Engineering [SASTRA]
4. The development of H.264 algorithm for medical video compression [IIT]
5. Neo Hookean based Hyper-Elastic Image Registration of 2D medical images: an application for matching mammograms [IIT]
6. Basics and application of Radon Transform in medical images [IIT]
7. Basics and application of FFT, DFT, FT [IIT]

Research Areas of Interest

1. Medical Image Registration
2. Partial differential equation (PDE) in medical image analysis
3. Medical Image Enhancement and Segmentation
4. Expert Systems
5. Artificial Neural Networks

Reviewer in Journals and University thesis

1. Elsevier Journal of Signal Processing
2. Elsevier Journal of Digital Signal Processing
3. Journal of Medical Imaging and Health Informatics
4. Elsevier Journal of Fuel and Energy
5. Journals of STM
6. Anna University Doctoral thesis

Other Technical Activities

1. Reviewer in and Chaired Various IEEE sponsored International Conferences
2. Board Member of Syllabus panel, Bio-Medical Department, Noorul Islam University

Editor in Journal

Journals of STM

Invited Technical Talks

1. SXCCE Organized R&D Series II : VLSI And Practical Implementations, Nov 20, 2012.
2. R&D of SXCCE wing Organized Research Perspective for PG Stu-dents, Oct 23, 2012.
3. PG Department of SXCCE organized "Applications of Artificial Neural network in Civil Engineering; A Matlab Approach," Oct 18, 2013.
4. Biomedical Engineering Department of SXCCE organized "Debugging in Matlab and other programming perspective"

SIGNATURE

KALLUPALAM

12/2/2019

[Dr. J. MOHANALIN]