

Raviteja Vemulapalli

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Research Interests

- Computer Vision, Machine Learning and Image Processing

Education

- Ph.D in Electrical Engineering, Aug 2011 - Aug 2016
University of Maryland, College Park, MD.
Advisor - Professor Rama Chellappa
- Bachelor of Technology in Electrical Engineering, Aug 2005 - May 2009
Indian Institute of Technology (IIT), Madras, India.

PhD Thesis

- **R. Vemulapalli**, “Geometric Representations and Deep Gaussian Conditional Random Field Networks for Computer Vision”, August 2016, *University of Maryland, College Park*.

Book Chapters

- **R. Vemulapalli**, H. V. Nguyen, and S. K. Zhou “Deep Networks and Mutual Information Maximization for Cross-modal Medical Image Synthesis”, *Elsevier’s book on Deep Learning for Medical Image Analysis*.

Publications

- **R. Vemulapalli**, F. Arrate, and R. Chellappa, “R3DG Features: Relative 3D Geometry-based Skeletal Representations for Human Action Recognition”, *Computer Vision and Image Understanding*, 152: 155-166 (2016).
- **R. Vemulapalli**, O. Tuzel, M.-Y. Liu, and R. Chellappa, “Gaussian Conditional Random Field Network for Semantic Segmentation”, *CVPR (Spotlight)*, 2016.
- **R. Vemulapalli**, O. Tuzel, and M.-Y. Liu, “Deep Gaussian Conditional Random Field Network: A Model-based Deep Network for Discriminative Denoising”, *CVPR*, 2016.
- **R. Vemulapalli** and R. Chellappa, “Rolling Rotations for Recognizing Human Actions from 3D Skeletal Data”, *CVPR*, 2016.
- **R. Vemulapalli**, H. V. Nguyen, and S. K. Zhou, “Unsupervised Cross-modal Synthesis of Subject-specific Scans”, *ICCV*, 2015.
- H. V. Nguyen, S. K. Zhou, and **R. Vemulapalli**, “Cross-Domain Synthesis of Medical Images Using Efficient Location-Sensitive Deep Network”, *MICCAI*, 2015.
- **R. Vemulapalli**, F. Arrate, and R. Chellappa, “Human Action Recognition by Representing 3D Human Skeletons as Points in a Lie Group”, *CVPR (Oral)*, 2014.
- **R. Vemulapalli**, J. Pillai, and R. Chellappa, “Kernel Learning for Extrinsic Classification of Manifold Features”, *CVPR*, 2013.
- **R. Vemulapalli** and R. Aravind, “Spatio-temporal Non-parametric Background Modeling and Subtraction”, *ICCV Workshop on Visual Surveillance*, 2009.
- **R. Vemulapalli** and L. Salgado, “Video Synchronization Based on Displacements of Center of Motion”, *Annual IEEE India Conference (INDICON)*, 2009.

Preprints

- **R. Vemulapalli** and D. W. Jacobs, “Riemannian Metric Learning for Symmetric Positive Definite Matrices”, *CoRR abs/1501.02393*, 2015.
- **R. Vemulapalli**, V. P. Boda, and R. Chellappa, “MKL-RT: Multiple Kernel Learning for Ratio-trace Problems via Convex Optimization”, *CoRR abs/1410.4470*, 2014.

Patents

- **R. Vemulapalli**, O. Tuzel, and M.-Y. Liu, “Method and System for Semantic Image Segmentation Using Gaussian Random Field Network”, filed March 2016, *patent pending*.
- **R. Vemulapalli**, O. Tuzel, and M.-Y. Liu, “Method and System for Denoising Images Using Deep Gaussian Conditional Random Field Network”, filed September 2015, *patent pending*.
- **R. Vemulapalli**, S. K. Zhou, and H. V. Nguyen, “Method and System for Unsupervised Cross-Modal Medical Image Synthesis”, filed September 2015, *patent pending*.

Experience

- Research Scientist, **Google**, Seattle, WA. Sep 2016 - Present
- Graduate Research Assistant, **University of Maryland, College Park**, MD. Aug 2011 - Aug 2016
Advisor - Professor Rama Chellappa
 - **Rolling Special Orthogonal Group for Human Action Recognition:** Proposed a new way to map temporal curves from the special orthogonal group to an Euclidean space by using rolling maps, and used it for skeleton-based human action recognition.
 - **Relative Geometry-based Skeletal Representation for Human Action Recognition:** Proposed a new 3D skeletal representation that explicitly models the relative geometry between different body parts using 3D rigid body transformations, and applied it to skeleton-based action recognition task.
 - **Kernel Learning for Classification of Manifold Features:** Developed a framework for extrinsic classification of manifold features using multiple kernel learning, and applied it to image set-based face and object recognition tasks.
 - **Multiple Kernel Learning for Ratio-trace Problems:** Proposed a convex multiple kernel learning formulation for ratio-trace problems, and used it to select features for discriminative dimensionality reduction and cross-modal retrieval.
- Research Intern, **Mitsubishi Electric Research Laboratories**, Cambridge, MA. Jan - Nov, 2015
Advisors - Dr. Oncel Tuzel, Dr. Ming-Yu Liu
 - **Gaussian CRF Network for Semantic Segmentation:** Proposed a novel deep network based on the mean field inference of a Gaussian CRF model, and trained it jointly with convolutional neural networks for the task of semantic segmentation.
 - **Deep Gaussian CRF Network for Denoising:** Proposed a novel deep network architecture for image denoising based on a Gaussian CRF model. In contrast to the existing discriminative denoising methods, the proposed deep network is capable of handling a range of noise levels.
- Research Intern, **Siemens Healthcare Technology Center**, Princeton, NJ. June - Aug, 2014
Advisors - Dr. Shaohua (Kevin) Zhou, Dr. Hien V Nguyen
 - **Unsupervised cross-modal medical image synthesis:** Proposed a general unsupervised approach for cross-modal synthesis of subject-specific scans, and used it for synthesizing T1-MRI images from T2-MRI images and vice versa.

- Software Engineer, Camera Design Team, **Cisco Systems**, India. Nov 2010 - July 2011
- Systems Technologist – R&D, **Tandberg** (acquired by Cisco Systems), India. July 2009 - Oct 2010
 - Worked on sensor color space calibration, auto white balancing and auto exposure algorithms used in Tandberg/Cisco video cameras.
- Undergraduate Research, **Indian Institute of Technology, Madras**, India. Jan - May, 2009
Advisor - Professor Aravind Rangarajan
 - **Spatio-temporal Non-parametric Background Modeling and Subtraction:** Extended the per-pixel non-parametric background model to spatio-temporal domain to handle dynamic scenes and noise in background subtraction.
- Undergraduate Summer Internship, **Technical University of Madrid**, Spain. May - July, 2008
Advisor - Professor Luis Salgado
 - **Video Synchronization Based on Displacements of Center of Motion:** Proposed an approach for synchronizing videos of a scene captured from different view points.

Course Work

- Statistical Pattern Recognition, Image Understanding
- Linear Subspaces and Manifolds in Computer Vision and Machine Learning
- Mathematical Methods for Data Dimension Reduction and Classification
- Convex Optimization, Probability and Random Processes, Advanced DSP
- Estimation and Detection Theory, Information Theory

Relevant Course Projects

- Face recognition and gender classification using support vector machines (SVM)
- Texture classification using local binary patterns (LBP)
- Image segmentation using normalized cuts and weighted kernel K-means
- Riemannian metric learning for symmetric positive definite matrices

Programming Skills

- C++, Python, MATLAB, Caffe

Achievements and Awards

- University of Maryland A. James Clark School of Engineering Dean's Doctoral Research Award, 2016.
- University of Maryland ECE Distinguished Dissertation Fellowship, 2016.
- University of Maryland A. James Clark School of Engineering Distinguished Graduate Fellowship, 2011-2012.
- University of Maryland ECE Graduate Teaching Fellow for Fall 2013.
- Among the top 0.2% students in the All India Joint Entrance Examination for the IITs in 2005.
- Certificate of Merit in science by the central board for secondary education for being among the top 0.1% students in India in 2003.

Professional Services

- Peer reviewer: CVPR, WACV, IJCV, IEEE TIP, IEEE TCSVT, CVIU, IMAVIS, JCVI, Pattern Recognition, Multimedia Tools and Applications.
- Coordinator for Computer Vision Student Seminars (CVSS), University of Maryland, 2013-2014.
- Student volunteer, CVPR 2012.

References

- **Professor Rama Chellappa**
Department of Electrical and Computer Engineering,
University of Maryland, College Park, MD.
rama@umiacs.umd.edu
- Additional references available upon request.