Ragav Venkatesan

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Profile

Applied Scientist II at AWS AI Labs working on Amazon SageMaker and Amazon SageMaker RL focused on emerging computer vision and machine learning technologies. Areas of recent research interests include:

- Neural Network Compression.
- Convolutional neural networks.
- Multiple-instance learning.

Education

Doctor of Philosophy - Computer Science — October 2017
Advisor: Professor Baoxin Li
Arizona State University, Tempe, Arizona, USA

Master of Science - Electrical Engineering — August 2012
Advisor: Professor David Frakes
Arizona State University, Tempe, Arizona, USA

Bachelor of Engineering - Electronics and Communication Engineering — June 2010
Anna University, Chennai, Tamil Nadu, India

Professional Experience

(P1) *Applied Scientist II - Amazon Web Services* — March 2019 – Present

(P2) *Research Scientist - Amazon Web Services* — November 2017 – March 2019

- Developed the following artifacts with the Amazon SageMaker Team:
  - Amazon SageMaker Reinforcement Learning .
  - Amazon SageMaker Object Detection Algorithms .
  - Amazon SageMaker Semantic Segmentation Algorithms .
  - Bring your own Tensorflow and MXNet models to Amazon SageMaker.
  - Neural Network Compression using AWS SageMaker Reinforcement Learning.
- Teaching
  - Amazon A9 CVC workshop on AWS Sagemaker. — February 2019
  - Convolutional Neural Networks at Machine Learning University. — 2019 – 2018
  - Deep Neural Network Bootcamp. — 2018

(P3) *Research Assistant - Arizona State University.* — August 2011 – October 2017

- The Diabetic Retinopathy project — Funding Agency: National Institute of Health.
- The MIDAS project — Funding Agency: National Science Foundation.
- Action recognition and capability modeling — Funding Agency: National Science Foundation.

(P4) *Computer Vision Research Intern - Intel Corp.* — December 2013 – August 2014

- Built vehicle and lane detection for automated driver assistance systems applications.

Thesis

(R1) **Doctoral dissertation** *Novel image features and learning techniques.* — October 2017

(R2) **Masters thesis** *Video Deinterlacing using Control Grid Interpolation Frameworks.* — August 2012

(R3) **Undergraduate thesis** *A comparative study of detection of faults and estimation of distance to faults on wired communication channels, using TDR and FDR techniques.* — May 2010

Books

(B1) **Ragav Venkatesan**, Baoxin Li, " Convolutional Neural Networks in Visual Computing: A Concise Guide ", CRC Press, a Tyler & Francis company, 2017.

Ragav Venkatesan, Baoxin Li, " 卷积神经网络与视觉计算 ", 机械工业出版社, 2019.

Book Chapters

(Bc1) Parag Chandakkar, **Ragav Venkatesan**, Baoxin Li, "Feature Extraction and Learning for Visual Data" in " Feature Engineering for Machine Learning and Data Analytics ", CRC Press, a Tyler & Francis company, 2017.

Peer-Reviewed Journal Publications

Multiple-Instance Learning

(J1) Parag Shridhar Chandakkar, **Ragav Venkatesan**, Baoxin Li, " MIRank-KNN: Multiple Instance Retrieval of Clinically-Relevant Diabetic Retinopathy Image ", *in SPIE Journal of Medical Imaging*, 2017.

Image Interpolation

(J2) **Ragav Venkatesan**, Christine Zwart, David Frakes, Baoxin Li" Spatio-temporal Video Deinterlacing using Control Grid Interpolation ", *in SPIE Journal of Electronic Imaging*, 24(2), 023022. 2015.

(J3) Christine Zwart, **Ragav Venkatesan**, David Frakes, " Decomposed Multidimensional Control Grid Interpolation for Common Interpolation-Based Image Processing Applications in Consumer Electronics ", *in SPIE Journal of Electronic Imaging*, vol. 24, no.4, pp.43012-1 to 43012-12. 2012.

Peer-Reviewed Conference Publications

Deep Learning

(C1) Xiang Xu, Xiong Zhou, **Ragav Venkatesan**, Gurumurthy Swaminathan, Orchid Majumdar " dSNE: Domain Adaptation using Stochastic Neighborhood Embedding ", *in IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Long Beach, California, USA, 2019. [ORAL] ($< 5.5\%$ Acceptance Rate).

(C2) **Ragav Venkatesan**, Jaya Vijetha Gattupalli, Baoxin Li, " On the generality of neural image features. ", *in IEEE International Conference on Image Processing (ICIP)*, Phoenix, Arizona, USA, 2016. [ORAL]

Multiple-Instance Learning

(C3) **Ragav Venkatesan**, Parag Shridhar Chandakkar, Baoxin Li, " Simpler non-parametric methods provide as good or better results to multiple-instance learning. ", *in IEEE International Conference on Computer Vision (ICCV)*, Santiago, Chile 2015. [Spotlight]

(C4) Parag Shridhar Chandakkar*, **Ragav Venkatesan***, Baoxin Li, Helen Li, " Retrieving clinically relevant diabetic retinopathy images using a multi-class multiple-instance framework ", *in proceedings of SPIE conference on Medical Imaging, International Society of Opticals and Photonics*, Orlando, Florida, USA, 2013. [ORAL]

(C5) **Ragav Venkatesan***, Parag Shridhar Chandakkar*, Baoxin Li, Helen Li, " Classification of Diabetic Retinopathy Images Using Multi-Class Multiple-Instance Learning Based on Color Correlogram Features ", *in Proceedings of International Conference of the IEEE Engineering in Medicine and Biology Society 2012 (EMBC'12)*, San Diego, California, USA, 2012. [Poster]

(C6) **Ragav Venkatesan***, Parag Shridhar Chandakkar*, Baoxin Li, Helen Li, " Clinically Relevant Diabetic Retinopathy Image Retrieval Using a Multi-Class Multiple Instance Framework ", *in proceedings of ACM conference on Bio-informatics, Computational Biology and Biomedicine (ACM-BCB'12)*. Orlando, Florida 2012. [ORAL]

ADAS: Bayesian Modelling

(C7) **Ragav Venkatesan**, Parag Shridhar Chandakkar, Baoxin Li, " Video-Based Self-Positioning for Intelligent Transport Systems Applications ", *in the Tenth International Symposium on Visual Computing (ISVC)*, Las Vegas, Nevada, USA, 2015. [ORAL]

Image Interpolation

(C8) **Ragav Venkatesan**, Christine Zwart, David Frakes, Baoxin Li, " Perception-Inspired Spatio-Temporal Video Deinterlacing ", *in the Eighth International Workshop on Video Processing and Quality Metrics for Consumer Electronics (VPQM)*, Tempe, Arizona, USA, 2014. [ORAL]

(C9) **Ragav Venkatesan**, Christine Zwart, David Frakes," Video Deinterlacing with Control Grid Interpolation Frameworks ", *in Proceedings of the IEEE International Conference on Image Processing (ICIP)*, Orlando, Florida, USA, 2012. [Poster]

* - Equal contribution from authors.

arXiv Papers

Deep Learning

(A1) **Ragav Venkatesan**, Hemanth Venkateshwara, Sethuraman Panchanathan, Baoxin Li., "A strategy for an uncompromising incremental learner.", arXiv: 1705.00744 2017.

(A2) **Ragav Venkatesan**, Vijetha Gattupalli, Baoxin Li., "Neural Dataset Generality.", arXiv: 1605.04369 2016.

(A3) **Ragav Venkatesan**, Baoxin Li., "Diving deeper into mentee networks.", arXiv: 1604.08220 2016.

Social Media Mining

(A4) Lydia Manikonda, **Ragav Venkatesan**, Subbarao Kambhampati, and Baoxin Li., "Evolution of fashion brands on Twitter and Instagram.", arXiv: 1512.01174 2015.

Teaching Experience

(T1) *Instructor - Arizona State University.*
CSE 591: Introduction to deep learning for visual computing (January - May 2017)

(T2) *Co-instructor - Arizona State University.*
CSE 509: Digital Video Processing (August 2015 - December 2015)

(T3) *Teaching Assistant - Arizona State University.*

- CSE 575: Statistical Machine Learning
  - Dr. Jingrui He (January 2015 - May 2015)
- CSE 569: Fundamentals of Statistical Learning
  - Dr. Baoxin Li (August 2014 - December 2014 and August 2016 - December 2016)
- CSE 509: Digital Video Processing
  - Dr. David Claveau (August 2012 - December 2012)
  - Dr. Hari Sundaram (August 2013 - December 2013)
- CSE 424, 485 and 486: Capstone Projects (January 2013 - May 2013)

(T4) *Guest Lectures - Arizona State University.*
Duties in this position involve providing specific lectures in courses on invitation.

- CSE 569: Hidden Markov Models (September 2017)
- CSE 569: Neural Networks (October - November 2017)

Selected Talks and Lectures

(L1) **IEEE Conference on Computer Vision and Pattern Recognition**, - 2019.
Domain Adaptation using Stochastic Neighborhood Embedding.

(L2) **Amazon A9 Computer Vision Conference**, - 2019.
Workshop on Amazon SageMaker.

(L3) **Seattle Machine Learning Meetup**, - 2019.
Amazon SageMaker Semantic Segmentation.

(L4) **ASU International Students Graduate Orientation**, - 2017.
Professional Networking for Graduate Students.

(L5) **Qualcomm**, San Diego, California, - 2017.
Tools for Measuring Images.

(L6) **Siemens**, Princeton, New Jersey, - 2017.
Measuring Images.

(L7) **International Conference on Image Processing**, Phoenix, Arizona - 2016.
Neural Dataset Generality.

(L8) **International Workshop on Video Processing and Quality Metrics for Consumer Electronics**, Chandler, Arizona, USA - 2014.
Perception-Inspired Spatio-Temporal Video Deinterlacing.

(L9) **SPIE conference on Medical Imaging**, Orlando, Florida, USA - 2013.
Retrieving clinically relevant diabetic retinopathy images using a multi-class multiple instance framework.

Software

(S1) Tf-Lenet : Using LeNet as a case-study, this repository provides an in-depth migration guide from theano to tensorflow.

(S2) Yann : Yet another neural network toolbox. A versatile toolbox for building various types of state-of-the-art Convolutional Neural Networks, with many options. This toolbox was written on top of theano and provides plug-and-play and modular capabilities of generating performance and research oriented deep convolutional neural networks.

(S3) InstaCrawl : Toolkit for crawling down Instagram.

(S4) Search Engine : Toolkit written in PyLucene for implementing vector-space similarities with additional options for Authorities and Hubs, Page Rank and other tools needed to construct a search engine.

(S5) Open Source Contributions: Contributed to various open source repositories including SageMaker Examples , SageMaker Python SDK and Gluon-CV .

Synergistic Activities

Membership

- Member, IEEE.
- Member, IEEE Signal Processing Society.
- Member, IEEE Computer Society.
- Member, ASU Visual Representation and Processing Group.
- Member ASU CUbiC: Cognitive and Ubiquitous Computing Group.

Reviewer

- IEEE Transactions of Neural Networks and Learning Systems, 2019.
- IEEE Winter Conference on Applications of Computer Vision, 2015 - 2019.
- ACM SIGGRAPH 2017.
- International Joint Conferences on Artificial Intelligence, 2017.
- IEEE International Symposium on Biomedical Imaging, 2016 -2017.
- IEEE Transactions on Circuits and Systems for Video Technology, 2013 - 2015.
- SPIE Journal of Electronic Imaging, 2013 - 2017.
- ASU-GPSA Centennial Professorship Award 2015.

Student Volunteer

- IEEE International Conference on Image Processing, 2016.
- ACM Multimedia, Sedona, Arizona, USA, 2011.

Mentoring

- Xiang Xu, Intern at AWS AI Labs.
- Satyaki Chakraborty, Intern at AWS AI Labs.
- Jaya Vijetha Reddy Gatupalli, MS Student.

- Yikang Li, MS Student.
- Anchit Agarwal, MS Student.

Conferences attended

- IEEE Conference on Computer Vision and Pattern Recognition, 2019.
- Amazon A9 CVC, San Jose, 2019.
- Amazon Machine Learning Conference, Seattle, Washington, 2018.
- ACM Turing Award Ceremony, San Francisco, California, 2017.
- Facebook Annual Machine Learning Seminar, Seattle, Washington, USA 2017.
- IEEE International Conference on Image Processing, Phoenix, Arizona, USA, 2016.
- IEEE International Conference on Computer Vision, Santiago, Chile, 2015.
- International Symposium on Visual Processing and Quality Metrics, Chandler, Arizona, USA, 2014.
- SPIE Conference on Medical Imaging Orlando, Florida, USA, 2013.
- ACM Conference on Multimedia, Scottsdale, Arizona, USA, 2011.

References Will be provided on request.