# Ragav Venkatesan

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## Profile

Research Scientist at AWS AI working on Amazon SageMaker, focused on emerging computer vision and machine learning technologies. Areas of specialties 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) *Research Scientist - Amazon Web Services* — November 2017 – Present

- 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.
- Teaching
  - Amazon A9 CVC workshop on AWS Sagemaker. — February 2019
  - Convolutional Neural Networks at Amazon Machine Learning University. — 2018
  - Deep Neural Network Bootcamp. — 2018

(P2) *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.

(P3) *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. (Chinese translation available since 2019.)

## Book Chapters

(C1) 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.

## Media

(M1) **Ragav Venkatesan**, " Academic Dishonesty: On why integrity is an important virtue. ", *in The Education Plus column of The Hindu*, Oct 22nd 2012.

## Teaching Experience

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

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

(L2) **Qualcomm**, San Diego, California, - 2017.
*Tools for Measuring Images*

(L3) **Siemens**, Princeton, New Jersey, - 2017.
*Measuring Images*

(L4) **International Conference on Image Processing**, Phoenix, Arizona - 2016.
*Neural Dataset Generality*

(L5) **International Workshop on Video Processing and Quality Metrics for Consumer Electronics**, Chandler, Arizona, USA - 2014.
*Perception-Inspired Spatio-Temporal Video Deinterlacing.*

(L6) **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

- Student 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

- Satyaki Chakraborty, Intern at AWS AI Labs.
- Jaya Vijetha Reddy Gatupalli, MS Student.
- Yikang Li, MS Student.
- Anchit Agarwal, MS Student.

## Conferences attended

- 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.

## Programming

**Programming Languages:** Python, Matlab, and LaTeX.
**Libraries:** Tensorflow, MxNet, Gluon, Theano, OpenCV, and other Python ML basics.

## Award and Grants

- ASU CIDSE travel grants (Multiple)
- Facebook travel grant for Facebook machine learning seminar and tour 2017.
- ACM SIGMM travel award for ACM Turing Award Ceremony, 2017.

## Nonscholastic activities

**Founder, administrator, executive member and various other offices** Online help forums for new incoming graduate students in organizations including ASU Launchpad (co-founder), United States-India Education Foundation, Chennai and others.

**Indian students association** Executive member, counsel and secretary of a major university student organization and interest group. Worked on promoting cultural and academic special-interest issues, drafted statements and policies. Managed events for upto 700 people-audience at prestigious venues.

**Thaalam Studios** Founder, owner and lead producer at self-funded music studio. Le Kaapi Projekt was music collaboration that was an outcome from this studio.

**ASU International Graduate Student Conference** Organized workshops on networking and career planning.

## References

Will be provided on request.