Bharathkumar “Tiny” Ramachandra

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Summary

Researcher in computer vision and deep learning and leader of high-performing ML teams. Expertise in judging, choosing and creating successful prototypes of deep learning systems based on recent academic advances, and in growing and leading cross-cultural teams with empathy. A lifelong learner with an obsession for improvement.

Work Experience

Lead Machine Learning Scientist at Invision AI

Aug 2021 – present

- Grew, led and retained a team of machine learning scientists and engineers.
- Led successful projects on federated learning and knowledge distillation for object detection.
- Identified key strategic opportunities for the use of machine learning in our products and directed development of these features to build out new technological capabilities.
- Collaborated actively with peer engineering, product, deployment and front-end development teams.

Computer Vision Scientist at Wrnch Inc.

Mar 2020 – Aug 2021

- Developed a novel system to solve a problem that the team had been grappling with for the past 5 years - a fully differentiable bottom-up joint-to-person association method for multi-person pose estimation with a Transformer network.
- Spearheaded the development of a novel system for 3D human pose estimation from a single RGB image.
- Contributed towards critical strategy to several projects on deep generative modeling of images with GANs, 3D hand pose estimation, 2D human pose estimation and inverse kinematics.

Computer Vision Research Intern at Mitsubishi Electric Research Labs

Summers 2018, 2019 | with Michael Jones

- Developed a new benchmark dataset, evaluation protocol and baseline algorithms for video anomaly detection that has nudged research in a more meaningful direction.
- Developed a novel video anomaly detection algorithm that learns a metric with a Siamese CNN from source datasets and uses it to subsequently score video patches in a target dataset.
- Generalized the Siamese CNN approach to process data across multiple scales using region proposals, Spatial Pyramid Pooling and a margin-based metric loss.

Data Science Intern at Samsung Research America

Summer 2017 | with Rui Chen

- Built a logistic regression pipeline on Spark to predict attributes of users based on historical transaction information.

Education

Ph.D. in Computer Science | *2014 – 2019* | GPA 4.0

North Carolina State University | *with Ranga Raju Vatsavai*

- Dissertation on ‘Anomaly Detection in Videos’.
- Wrote the most comprehensive survey on Video Anomaly Detection to-date.
- Reproduced code for papers that proposed convolutional auto-encoders to perform video anomaly detection using TensorFlow. 50+ ★s, 15+ forks on GitHub
- Collaborated in projects on video action recognition, semi-supervised image classification, remote sensing change detection, multi-modal image classification and manifold estimation.
- Relevant coursework: Visual Sensing, Advanced Machine Learning, Spatial and Temporal Data Mining, Artificial Intelligence, Data Science, Advanced Spatial Statistics, Design and Analysis of Algorithms.

B.E. (Hons.) in Computer Science | *2010 – 2014* | GPA: 3.51

Birla Institute of Technology and Science - Pilani, Dubai

Other Projects (GitHub)

- Implemented a manifold-aware density estimator using Python called Manifold Parzen Windows.
- Augmented a sparse point-cloud mapping library, ORB-SLAM2, to perform real-time SLAM using thermal sensors for energy audits of buildings.
- Performed highly optimized large-scale distributed training of deep neural networks and classification of satellite imagery on the latest Intel Xeon CPUs.

- Data Crunch for Social Good Event, NCData4Good: mapped food banks with their accessibility by public transport to identify food deserts in counties in North Carolina.

Technical Proficiency

Python; PyTorch; TensorFlow; OpenCV; Scikit-learn.
Deep learning; Computer Vision; Machine Learning; Artificial Intelligence.

Service

- Program Chair: SSTDM workshop at ICDM '21.
- Program Committee: SSTDM '19 (at ICDM '19).
- Reviewer: CIKM ['20], TPAMI ['20], WACV ['22, '21, '20], ICDM ['19], KDD['18], PKDD ['19], AAAI ['19], SDM ['20, '19, '18], PAKDD ['18], SSTD ['17], SSTDM ['16, '17].

Talks

- "Innovation to Implementation: Building Deep Tech Powered Systems" at McGill AI Society's Learnathon Feb 2021.
- "Understanding Human Pose" at McGill AI Society's Hackathon Sep 2020.

Awards

- WACV 2020 PhD consortium + travel award.
- Best paper award at ICCS 2016.

Patents

- "Pose Parsing using a Transformer Network" - patent pending 2021.

Select Publications (Google Scholar)

- **Ramachandra, B.,** Jones, M., & Vatsavai, R. R. (2020). A Survey of Single-Scene Video Anomaly Detection. *IEEE Transactions on Pattern Analysis and Machine Intelligence.*
- **Ramachandra, B.**, & Jones, M. (2020). Street Scene: A new dataset and evaluation protocol for video anomaly detection. In *The IEEE Winter Conference on Applications of Computer Vision* (pp. 2569-2578).
- **Ramachandra, B.**, Jones, M., & Vatsavai, R. (2020). Learning a distance function with a Siamese network to localize anomalies in videos. In *The IEEE Winter Conference on Applications of Computer Vision* (pp. 2598-2607).
- **Ramachandra, B.**, Jones, M., & Vatsavai, R. R. (2021). Perceptual metric learning for video anomaly detection. *Machine Vision and Applications, 32(3), 1-17.*
- Gadiraju, K. K., **Ramachandra, B.**, Chen, Z., & Vatsavai, R. R. (2020, August). Multimodal Deep Learning Based Crop Classification Using Multispectral and Multitemporal Satellite Imagery. In *Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining* (pp. 3234-3242).
- Chen, Z., Dutton, B., **Ramachandra, B.**, Wu, T., & Vatsavai, R. R. (2020). Local Clustering with Mean Teacher for Semi-supervised Learning. *To appear in IEEE International Conference on Pattern Recognition 2020*.
- **Ramachandra, B.**, Dutton, B., & Vatsavai, R. R. (2019). Anomalous cluster detection in spatiotemporal meteorological fields. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, *12*(2), 88-100.
- **Ramachandra, B.**, Gadiraju, K. K., Vatsavai, R. R., Kaiser, D. P., & Karnowski, T. P. (2016). Detecting extreme events in gridded climate data. *Procedia Computer Science*, *80*, 2397-2401. **(Best Paper Award)**
- Gadiraju, K. K., **Ramachandra, B.**, Shashidharan, A., Dutton, B., & Vatsavai, R. R. (2019, December). Scalable Data Parallel Approaches to Anomaly Detection in Climate Data using Gaussian Processes. In *2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA)* (pp. 485-488). IEEE.
- Chen, Z., **Ramachandra, B.**, Wu, T., & Vatsavai, R. R. (2018). Relational Long Short-Term Memory for Video Action Recognition. *arXiv preprint arXiv:1811.07059*.
- Chen, Z., **Ramachandra, B.**, & Vatsavai, R. R. (2020). Consistency Regularization with Generative Adversarial Networks for Semi-Supervised Image Classification. *arXiv preprint arXiv:2007.03844*.
- **Ramachandra, B.**, Dutton, B., & Vatsavai, R. R. (2019). Estimating a Manifold from a Tangent Bundle Learner. *arXiv preprint arXiv:1906.07661*.