Vijai Thottathil Jayadevan

Curriculum Vitae

📞 +1 (408) 348 6596
✉ vijai.tj@gmail.com
🖥 www.vijaijayadevan.com
in vijaitj   🎓 GoogleScholar

Education

2014 – 2020   **Doctor of Philosophy, Electrical & Computer Engineering**, *Purdue University*, West Lafayette, IN, USA.
GPA: 3.82 (4.0 scale)

2011 – 2013   **Master of Science, Electrical & Computer Engineering**, *The University of Arizona*, Tucson, AZ, USA.
GPA: 4.0 (4.0 scale)

2004 – 2008   **Bachelor of Technology, Electronics & Communication Engineering**, *Cochin University*, Cochin, India.

Experience

Jun 2020 – Present   **Senior Computer Vision Scientist II**, *ChemImage Corporation*, Pittsburgh.

- Served as the team lead for a group of machine learning scientists and engineers with a track record of successfully delivering numerous milestones on various research projects.
- Worked on developing a new multispectral endoscope (in partnership with J&J) to detect critical structures like arteries, veins and nerves in surgical scenes. Developed deep learning models to perform semantic segmentation on in vivo images captured by the multispectral endoscope. The model, a custom CNN, achieved the target of higher than 80% sensitivity and specificity on a multi-target semantic segmentation task, well ahead of the deadline. This was challenging as targets were not always exposed and were many times obscured by blood, fat or tissue.
- Gained considerable experience in data collection (in vivo) at labs and also in processing raw data which included steps like dark frame subtraction, flat field correction and motion compensation between wavelength frames of a scene.
- Devised methods to deal with uncertainty in both human annotations and model outputs. This involved techniques like assigning confidence-based scores to annotations (which can be then utilized in model training), co-teaching networks, noise transition matrix estimation and Monte Carlo dropout.
- Enabled distributed training on an on-premise server with multiple GPUs using data parallelism by writing manual training loops. Integrated the code with the Determined AI interface for fast distributed hyper-parameter search and visualization.
- Developed a trainable shape prior based segmentation method to detect targets of specific shapes.
- Implemented a CycleGAN based image translation model used to generate scanning electron microscopy (SEM) images from optical microscopy images which was then used to perform image registration between the two modalities.
- Set up a git repository and designed a custom git workflow which enabled seamless code collaboration.

Aug 2018 – May 2019   **Graduate Teaching Assistant**, *Purdue University*, West Lafayette.
As a teaching assistant for Linear Circuit Analysis II (ECE 202), my responsibilities included holding regular office hours to help students understand the material and creating solutions for home-works and exams.

Jan 2014 – May 2020   **Graduate Research Assistant**, *Purdue University*, West Lafayette.
The focus of my work was on understanding the role of priors (like symmetry, compactness, planarity etc.) in three-dimensional (3D) visual perception and in using this information to develop better computer vision algorithms.

Aug 2011 – Dec 2013   **Graduate Research Assistant**, *The University of Arizona*, Tucson.
The research work involved the development of an algorithm for predicting the intermittency in solar irradiance caused due to clouds by analyzing the pictures taken by a camera tracking the sun. It involved image segmentation and non-rigid object tracking in images.

Aug 2008 – May 2011	**Systems Engineer**, *Tata Consultancy Services*, Cochin. Developed economic and statistical software applications for International Monetary Fund (IMF). Gained experience in developing web and desktop applications as well as windows services using coding languages like C# and VisualBasic.

Technical Skills

Machine Learning	TensorFlow/Keras, PyTorch, MATLAB, Scikit-learn, Pandas, OpenCV, TensorBoard, Hugging Face, Determined AI
Programming	Python, MATLAB, C++
Web	HTML, CSS, .NET Framework, Javascript
Other	Git, Qt, Unity, VIM, LaTeX

Selected Academic Projects

- *Shadow Rendering Algorithm (Spring 16)*: Implemented an efficient, high quality soft shadow rendering algorithm. The entire graphics rendering pipeline was developed from scratch in C++.
- *Computer Vision Algorithms (Fall 2014)*: Implemented and tested, in C++, the following algorithms: (1) Zhang's calibration algorithm to estimate intrinsic and extrinsic camera parameters (2) the normalized eight-point algorithm to estimate the fundamental matrix and perform 3D reconstruction from multiple views (3) the cascaded AdaBoost classifier for object detection.
- *JPEG Encoder (Spring 2014)*: Implemented a baseline JPEG encoder in ANSI C
- *Monte Carlo simulation (Spring 2012)*: Implemented a Monte Carlo simulation project to find out the probability law on angle of divergence from initial direction of photons traveling through a scattering media, as part of a course on probability.

Relevant Graduate Coursework

- Digital Signal Processing
- Biomedical Imaging
- Digital Image Processing
- Computer Vision
- Real Analysis
- Model Based Imaging
- Applied Linear Algebra
- Digital Image Analysis
- Computational Methods in Optimization
- Probability & Statistics for Optics
- Advanced Linear Systems Theory
- Advanced Computer Graphics
- Computational Models and Methods
- Advanced Topics in Visual Perception
- Numerical Linear Algebra
- Statistical Machine Learning

Publications

Journal Articles

V. Jayadevan, T. Sawada, E. Delp, and Z. Pizlo, "Perception of 3D symmetrical and nearly symmetrical shapes," *Symmetry*, vol. 10, no. 8, p. 344, 2018.

A. Michaux, V. Kumar, **V. Jayadevan**, E. Delp, and Z. Pizlo, "Binocular 3D object recovery using a symmetry prior," *Symmetry*, vol. 9, no. 5, p. 64, 2017.

A. Michaux, **V. Jayadevan**, E. J. Delp, and Z. Pizlo, "Figure-ground organization based on three-dimensional symmetry," *Journal of Electronic Imaging*, vol. 25, no. 6, p. 061606, 2016.

V. Jayadevan, J. J. Rodriguez, and A. D. Cronin, "A new contrast-enhancing feature for cloud detection in ground-based sky images," *Journal of Atmospheric and Oceanic Technology*, vol. 32, no. 2, pp. 209–219, 2015.

Conference Publications

V. Jayadevan, A. Michaux, E. Delp, and Z. Pizlo, "3D shape recovery from real images using a symmetry prior," in *IS and T International Symposium on Electronic Imaging Science and Technology, Computational Imaging XV*, 2017, pp. 106–115.

V. P. Lonij, **V. Jayadevan**, A. E. Brooks, J. J. Rodriguez, K. Koch, M. Leuthold, and A. D. Cronin, "Forecasts of PV power output using power measurements of 80 residential PV installs," in *2012 38th IEEE Photovoltaic Specialists Conference*. IEEE, 2012, pp. 003 300–003 305.

V. Jayadevan, J. J. Rodriguez, V. P. Lonij, and A. D. Cronin, "Forecasting solar power intermittency using ground-based cloud imaging," in *World Renewable Energy Forum, WREF 2012, Including World Renewable Energy Congress XII and Colorado Renewable Energy Society (CRES) Annual Conference*, 2012, pp. 2100–2106.

Other Publications

V. Jayadevan, J. J. Rodriguez, and A. D. Cronin, "A conditional random field model for context aware cloud detection in sky images," *arXiv preprint arXiv:1906.07383*, 2019.

V. Jayadevan, E. Delp, and Z. Pizlo, "Skeleton extraction from 3D point clouds by decomposing the object into parts," *arXiv preprint arXiv:1912.11932*, 2019.

V. Jayadevan, T. Sawada, E. Delp, and Z. Pizlo, "Monocular and binocular recovery of 3D symmetrical and near-symmetrical shapes," *Journal of Vision*, vol. 18, no. 10, pp. 719–719, 2018.

V. Jayadevan, A. Cronin, V. Lonij, S. Jones, and G. Torres, "Looking to the sky to predict solar power intermittency," in *APS Four Corners Section Meeting Abstracts*, 2011.

V. Lonij, S. Orsburn, A. Salhab, E. Kopp, A. Brooks, **V. Jayadevan**, J. Greenberg, M. St Germaine, N. Allen, S. Jones *et al.*, "The Tucson Electric Power solar test yard," in *APS Four Corners Section Meeting Abstracts*, 2011.

References

Dr. Edward J. Delp
Professor
Department of Electrical & Computer Engineering
Purdue University
☎ +1 (765) 494-1740
✉ ace@ecn.purdue.edu

Dr. Zygmunt Pizlo
Professor
Department of Cognitive Sciences
University of California, Irvine
☎ +1 (317) 796-5225
✉ zpizlo@uci.edu