Amit Kale

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OBJECTIVE

To obtain a challenging senior leadership position in AI/ML

EDUCATION

Ph.D., Electrical and Computer Engineering, October 2003; GPA: 3.8
"Algorithms for Gait-Based Human Identification from a Monocular Video Sequence"
University of Maryland at College Park, College Park, MD

M.Tech., Systems and Control Engineering, Spring 1998; GPA: 3.95
Indian Institute of Technology, Bombay, Mumbai India.

B.E., Electrical Engineering, Fall 1996; GPA: 3.75
Victoria Jubilee Technical Institute (affiliated to University of Bombay), Mumbai, India.

WORK EXPERIENCE

Head
Robert Bosch Research and Technology Center, Bangalore India
April 2024- date
I recently took over the role of the Head of Bosch Research and Technology Center, India. I have an Applied Research, Applied AI and Engineering for R&D departments reporting into me. As we witness the rapid developments that are taking place in the area of foundation models and GenAI, it is clear that there is one crucial ingredient for these technologies to be adopted successfully and thats data. Data is not only useful for training AI algorithms it plays an even more important role in validation. Different BUs at Bosch are at different levels of maturity with regard to data. For those that are less advanced, enabling tools to log data with some ground truth and making historical data usable for AI is one of my key priorities. For BUs that are more advanced, we are developing algorithms to build domain-specific foundation models. Additionally we are exploring the impact of GenAI on software development, methods for optimizing algorithms to run in real-time on resource-constrained hardware, and researching novel hybrids of physics-based models and AI methods to shorten the time required for parameter optimization in different applications

Chief Scientist
Robert Bosch Research and Technology Center, Bangalore India
October 2022- date
As a chief scientist in the area of data management for AI, I focus on problems related to enabling the data loop for AI. This includes supervising technology development to address every phase of the data loop starting with acquisition and ingest, data selection, labeling and QC, data re-use and usage of synthetic data for model development, approaches for validation and release of AI algorithms, leveraging state of the art foundation models. In this endeavor I lead a global team of 44 research scientists focussing on some of these aspects. I have had high impact contributions in AI based smart data curation, data-reuse and assisted annotation for data management (>15 mio Euro bottom line impact) and 40+ Invention Reports filed in the AI domain. This role is in addition to my director role.

Director of Research
Robert Bosch Research and Technology Center, Bangalore India
April 2022- date

In this role, I am responsible for the technology strategy, project acquisition, leadership and further development of the department of corporate research in India. I lead a group of 30 scientists in areas of AI, CV, ML and numerical methods for embedded software.

Principal Senior Expert and Group Manager
Computer Vision and Machine Learning

Robert Bosch Research and Technology Center, Bangalore India
June 2016- March 2022 In this role, I am responsible for the technology strategy, project acquisition, leadership and further development ofthe research group for computer vision and machine learning and in India and its projects. My primary focus is on developing core technologies that improve diffrent aspects of the data loop for AI development. This includes the phases of acquisition and ingest, smart data selection and curation of data for labeling, search and retrieval of data, identifying problematic images during validation and testing. We make use of advanced deep learning approaches to achieve these goals in multiple domains such autonomous driving, security and surveillance, retail, industrial imaging etc. We have built a number of high value scalable assets with relevant IP which we have transferred to BUs both globally and in the region for various applications.

Head of Research Group
Imaging and Computer Vision
Siemens Corporate Technology India
July 2012- to June 2016

In this role, I was responsible for technology strategy, project acquisition and the exploration of research projects for the imaging and computer vision program in India. My work involved exploring the clinical collaboration eco-system in India. Our work was demonstrated and published in leading conferences and journals like RSNA and Clinical Radiology Journal. My task involved interfacing the imaging and computer vision technology field and developing meaningful technology solutions to address needs of clinicians in India. I also worked jointly with the teams in the Development Center to provide enabling technologies towards building a proof of concept of ideas from team members working on specific applications. During my tenure here we developed successful partnerships with different business units in Siemens worldwide including our MR, CT, AX and Computer-aided diagnostics delivering high quality prototypes, while also contributing to the IP portfolio of Siemens, globally. Our work has resulted in 10 granted US patents with many more in the pipeline. I was also responsible for recruitment, mentoring and career development of a team of scientists and engineers in the research group 10 headcounts. I have helped develop the business case for novel applications of MR imaging for preventive healthcare in India and helped do a gap and need analysis for our x-ray product portfolio as well. I manage the budget and financing for my team. The total volume of funding I managed was close to Euro 500k.

Program Manager
Imaging and Intelligent Signal Processing
Siemens Corporate Technology India
Feb 2007 – June 2012

In this role I was responsible for leading and driving the mission of the imaging program in India. I was responsible for developing technical expertise by mentoring team members in computer vision applications in medical imaging, video surveillance and other domains. Other responsibilities included staffing the program as per target, financial budgeting, driving university relationships, scouting opportunities in Indian markets for novel imaging solutions, creating IP for the company and publications in reputed conferences and journals. Some of the topics I worked on which formed the basis for several BU funded research proposals and patents included:

- Automated Analysis of ECG and IECG signals
- Development of a robust low cost patient positioning and monitoring system for stereotactic radiotherapy of brain tumors.
- Robust Vessel segmentation in Angio Images for accurate 2D/3D registration within cardiac total occlusion project
- Human Activity Analysis
- Robust Face Detection and Tracking

Postdoctoral Research Associate and Assistant Research Professor
Department of Computer Science and
Center for Visualization and Virtual Environments
University of Kentucky Lexington, KY
Oct 2003 – January 2007

In this role I was responsible for development of novel applications in augmented environments using computer vision techniques. I supervised research conducted by Masters students and interns in the following areas:

- Augmented Reality systems using projector and camera including for Camera Projector based Scene Augmentation and Human Computer Interaction in Projector Camera Systems
- Semi-Supervised Learning for Background Subtraction and Object Detection
- Robust Visual tracking using parametric illumination models

Research Assistant
Center for Automation Research
University of Maryland, College Park
College Park, MD
Aug 1998 – Oct. 2003 In the course of my Ph.D. I developed robust algorithms for human identification using gait. I worked on template matching and hidden Markov model based models for gait recognition leading to a top performing system for gait recognition. I also worked on approaches for view invariant gait recognition and fusion of gait and face for robust human identification. My work on this topic is widely cited.

Honors

- Best Paper award at the IEEE Conference on Parallel Distributed and Grid Computing 2012 for our paper "Fast 3D Structure Localization in Medical Volumes using CUDA-enabled GPUs" co authored with Sharan Vaswani, Naga Vydyanathan and Rahul Thota
- Best paper award (poster) at British Machine Vision Conference (BMVC) 2005 for our paper entitled ""Offline Generation of High Quality Background Subtraction Data" co authored with Etienne Grossmann, Christopher Jaynes and Samson Cheung.
- My work in human motion analysis and tracking has been recognized to be among the top percentile of the accepted papers in the conferences pertinent to my field.

Professional Activities

- Jury member for grant proposal reviews at Grand Challenges Karntataka for Agriculture, Traffic management solutions 2018, 2019, 2020
- Program Co-chair for IEEE Workshop on Multimodal Surveillance - Sensors, Algorithms and Systems 2007
- Reviewer for IEEE Transactions on Image Processing, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Information Forensics and Security, IEEE Transactions on Systems Man and Cybernetics, ACM Transactions on Multimedia Computation, EURASIP Journal on Signal processing, IEEE Transactions on Biomedical Engineering.
- Program Committee member for IEEE CVPR 2006, IEEE ICIP 2006-2020 , ECCV 2008-2010, ICCV 2009, ACCV 2010, ACCV 2012, ICVGIP 2012, ACM Multimedia 2004, Workshop on Applications of Computer Vision 2005, International Conference on Circuits and Systems 2005, Workshop on Real time Vision for Human Computer Interaction 2004.

Featured Activities

- Research profile at Bosch Research https://www.bosch.com/research/know-how/research-experts/amit-kale/
- Research Blog article on Improving annotation efficiency for deep learning algorithms for computer vision https://www.bosch.com/stories/improving-annotation-efficiency-for-deep-learning-algorithms-for-computer-vision/

Patents

"A fast and robust Technique for Segmenting Angiogram Images", US Patent 8077954 granted 13.12.2011

"A robust and fast approach to automated coronary artery segmentation using cardiac phase based tracking and a novel vessel detection criterion", Vipin Gupta, Amit Kale and Hari Sundar. US patent 8422754 Granted 16.04.2013

"A robust and accurate approach to automatic Blood Vessel detection and segmentation from Angiography X-ray images using multi-stage Random Forests", Vipin Gupta, Amit Kale and Hari Sundar. US patent 8488852. Granted 16.07.2013

"An Automatic Non parametric Approach for classification and segmentation of ECG signals with high accuracy", Kaustubh Kulkarni, Stefan Kimmer and Amit Kale. US Patent 8880352. Granted 4.11.14

"A robust and accurate algorithm for automated measurement of intervals in an intracardiac eletrogram " Venkata Suryanarayana and Amit Kale. US Patent 9226682. Granted 5.1.16

"Determining plaque deposits in blood vessels" Yogesh Bathina, Parmeet Singh Bhatia, Rajendra Prasad Jadiyappa, Amit Kale, US Patent 9462987. Granted October 11, 2016.

"Automatic assessment of perceptual visual quality of different image sets" Parmeet Bhatia, Amit Kale US Patent 14/752395. Granted April 23, 2018

"Automatic detection of medical image acquisition protocol", Parmeet Bhatia, Amit Kale, US Patent 20170185713. Granted June 1 2020.

"Method and system for personalizing a vessel stent" Y.Bathina, A. Piriyakumar, R. Jadiyappa, Amit Kale, US Patent 10898266. Granted Jan 26, 2021.

Selected Journal Publications and Book Chapters

"On Kharitonov's theorem without invariant degree assumption "Amit Kale and Andre' L.Tits. Technical Report.Institute for Systems Research.1999. Automatica 36-7 pp 1075-1076 July 2000.

"Identification of Humans Using Gait" Amit Kale, A. N Rajagopalan, A. Sundaresan, N. Cuntoor, A. RoyChowdhury, V Kruger, Rama Chellappa IEEE Transactions on Image Processing September 2004

"Gait-based human identification using appearance matching" Amit Kale, Naresh Cuntoor, B Yegnanarayana, A N Rajagopalan and Rama Chellappa "Optical and Digital Techniques for Information Security" Ed. B Javidi et.al Springer Verlag 2004.

"Particle filter with Mode Tracker for Visual tracking across Illumination Changes" Samarjit Das, Amit Kale, Namrata Vaswani. "IEEE Trans. on Image Processing. April 2012

"Non-invasive quantification of hepatic steatosis in living, related liver donors using dual-echo Dixon imaging and single-voxel proton spectroscopy" S Krishan D Jain Y Bathina A Kale N Saraf S Saigal N Choudhary S.S. Baijal A Soin, Journal of Clinical Radiology. Nov 2015.

Selected Refereed Conference Proceedings

"Self-Supervised Learning for texture classification using limited labeled data", Sahana Prabhu, Jitendra Yasaswi and Amit Kale, ICIP 2022.

"Volumetric texture modeling using dominant and discriminative binary patterns", Parmeet S. Bhatia, Amit Kale, Zhigang Peng SPIE Medical Imaging 2019

"Automatic Optic Disk and cup segmentation of fundus images using deep learning", Venkata Gopal Edupuganti, Akshay Chawla, Amit Kale. ICIP 2018

"Fast 3D Structure Localization in Medical Volumes using CUDA-enabled GPUs",Proceedings of the 2nd IEEE International Conference on Parallel Distributed and Grid Computing 2012, Sharan Vaswani, Rahul Thota, Nagavijayalakshmi Vydyanathan and Amit Kale, **Won the best paper award at PDGC 2012**

"A robust and accurate approach to automatic Blood Vessel detection and segmentation from Angiography X-ray images using multi-stage Random Forests", Vipin Gupta, Amit Kale and Hari Sundar, Proc SPIE Medical Imaging 2012

"An Unsupervised Framework for Action Recognition Using Actemes", Kaustubh Kulkarni, Edmond Boyer, Radu Horaud, and Amit Kale, Proc. of ACCV 2010.

"A Framework for indexing human actions in video",Kaustubh Kulkarni, Srikanth Cherla, Amit Kale and V.Ramasubramanian. Proceedings of the 1st workshop on Machine Learning for Visual Motion Analysis, 2008.

"A Joint Model of Illumination and Shape for Visual tracking" Amit Kale and Christopher Jaynes. Proceedings of IEEE Computer Society CVPR 2006.

"Offline Generation of High Quality Background Subtraction Data" Etienne Grossmann, Amit Kale, Christopher Jaynes and Samson Cheung Proceedings of British Machine Vision Conference, September 2005, Oxford Brookes,UK. (**Best Poster Award at BMVC**)

"Towards Interactive Generation of "Ground Truth" in Background Subtraction from Partially Labeled Examples" Etienne Grossmann, Amit Kale, Christopher Jaynes Proceedings of the IEEE Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance, October 2005 Beijing China.

"The Smart Bookshelf: A study of camera projector scene augmentation of an everyday environment " Danny Crasto, Amit Kale and Christopher Jaynes Proceedings of the IEEE Workshop on Applications of Computer Vision, Colorado Springs CO January 2005

"Epipolar Constrained User Push Button Selection in Projected Interfaces " Amit Kale, Kenneth Kwan and Christopher Jaynes Proceedings of the 1st IEEE workshop on Real time Vision for Human Computer Interaction, Washington DC June 2004