

Ashish Menon

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OBJECTIVE

Passionate about leveraging machine learning, deep learning and computer vision knowledge to solve real-world challenges and problems across diverse domains focusing on research and innovation driven impactful solutions.

EDUCATION

- **International Institute of Information Technology**

Master of Science by Research; GPA:7.83/10.0

Hyderabad, India

Aug. 2018 – Dec. 2021

- **M S Ramaiah Institute of Technology**

Bachelor of Engineering in ECE; CGPA: 9.33/10.0

Bengaluru, India

Aug. 2013 – June. 2017

EXPERIENCE

Qualcomm India R&D

Senior Engineer

Bengaluru, India

Jan-2022 - Present

One of the first initial member of the Machine Learning (ML) Camera team, actively researching in ML based Image restoration, enhancement, interpolation tasks for mobile camera image signal processor (ISP).

- Core responsibilities

- Proposed and implemented Deep Learning (DL)based image signal processing (ISP) algorithms for image restoration, enhancement and interpolation tasks tailored for snapshot and real-time processing pipelines, adhering to strict hardware constraints.
- Conducted proof-of-concept (POC) studies, initial image quality (IQ) assessments, and comparative analyses with existing ISP solutions.
- Actively involved in model development, training, inference, quantization, optimization, loss function brainstorming, debugging, tuning suggestions, on device IQ analysis.

- Achievements

- Delivered the first set of models demonstrating IQ improvements across tasks in the front-end (sensor-side) and deeper in the ISP pipelines, now implemented in Qualcomm-powered devices.
- Collaborated with hardware team to propose and design first of its kind specialized h/w blocks meant for DL -based features deployment on device. It involved optimizations interms of model size, activation functions, image resolution input. Approved for future Qualcomm chipsets.
- Proposed and presented novel ML based ideas and hardware level optimizations spanning multiple tasks like remosaic, tone enhancement denoising, across multiple internal Qualcomm conferences.
- One of the proposed idea of DL based spatially varying kernels as a generic solution for multiple image processing tasks was recognized amongst the top 12 Red-IP proposals within the Multimedia organization, now considered for patent filing, now in development phase.

- Cross-Collaborations: Worked with deployment teams for system-C implementations of the ML features, quantization teams to resolve IQ issues, hardware teams to enhance ML solution's hardware stickiness.

- Technical Knowledge: CNNs, Image-Denoising, Bayer Image analysis, Network compression, Knowledge Distillation (KD), Activation functions, loss functions, optimization, transformers, sensor dependent color space, fixed point implementations, Diffusion, GAN driven KD.

IIIT Hyderabad

Graduate Research Assistant

Hyderabad, India

Jan 2019 - Dec 2021

Deep Learning towards Cancer Diagnosis using digitized images of biopsies (WSI), under the guidance of Dr. C.V. Jawahar and Dr. P.K. Vinod.

- **Assisting WSI annotation:** Developed a retrieval-classification method with an interactive learning and relevance feedback mechanism to assist experts in cancer region localization on large WSIs. The pipeline uses semantic-based image retrieval followed by active learning for efficient patch/region selection. This approach reduced expert scanning efforts to 2% of the WSI area and decreased labeled data requirements by 95% while achieving state-of-the-art results in classification and segmentation tasks.
- **Pan Cancer deep features similarities:** The above work was extended to analyze similarities of cancer manifestation (using a cancer classification model) in multiple organs from a deep learning perspective. Demonstrated similarities in certain features of cancer cells between certain organs; qualified using gradCAM heatmaps and quantified using IOU Jaccard index and geometry of cellular morphology.
- Other works: **Synthetic image generation, nuclei segmentation, active learning, Multiple Instance attention Learning, self supervised learning, weakly supervised learning, GANs for data augmentations** were some of the key deep learning areas that were explored for the research work.

COURSES AND PROGRAMMING SKILLS

MS by Research

IIIT Hyderabad, India

Aug 2018 - Dec 2019

- **Courses:** Digital Image Processing, Topics in Applied Optimization, Statistical Methods in AI, Wireless Communication, Computer Vision , Medical Image Analysis
- **Programming Languages:** C, C++, Python
- **Frameworks:** Pytorch, Tensorflow, Keras, Matlab

OTHER PROJECTS

Simultaneous Localization and Mapping [LINK]

Bachelors

MSRIT, Bengaluru, India

Aug 2016 - April 2017

Developed a 2D-based indoor SLAM and autonomous navigation system using an Arduino-powered 3-wheeled robot integrated with ROS. Utilized a mobile phone's gyroscope for localization and a Kinect for obstacle detection, projecting results onto a grid map. Sensor readings were processed on a remote device and visualized using ROS's RViz UI for real-time map building.

Masters Course Projects

MS

IIIT Hyderabad, India

Aug 2018 - Sept 2018

- **Principal Component Analysis (PCA)** to reduce image dimensions for efficient face image classification. Classification was performed using two methods: gradient descent with cross-entropy loss and a Naive Bayes classifier based on Bayes theorem for class probability estimation.
- **Classification on CIFAR-10:** Developed a classifier on various representation of data like PCA, LDA, Raw-data. Various classifiers were used including Softmargin Linear SVM, MLP, Kernel SVM with RBF-Kernel and Logistic Regression.
- **Contrast Based Filtering for Salient Region Detection [LINK]:** Image decomposed into basic, structurally representative elements that abstract away unnecessary detail, and at the same time allow for a very clear and intuitive definition of contrast-based saliency.

- **Detection-aided liver lesion segmentation using deep learning:** Cascaded Convolutional Neural Network (CNN) for segmenting the liver and its lesions from CT scans. The architecture first isolates the liver region and then accurately segments lesions within it.
- **Oriented Edge Forests for Boundary Detection** [[LINK](#)]: Developed a boundary detection model using a random forest classifier that analyzes local patches to predict oriented edges. Outputs are indexed by orientation and signed edge distance. Predictions are calibrated and fused over an image pyramid to obtain accurate boundary mapping.

PUBLICATIONS

- **Menon. Ashish**, Singh. Piyush, P.K. Vinod, C.V. Jawahar, "Interactive learning for Whole Slide Image Annotation", Asian Conference on Pattern Recognition, 2021 [[Paper](#)] [[Link](#)]
- **Menon. Ashish**, Singh. Piyush, P.K. Vinod, C.V. Jawahar, "Exploring pan-cancer similarities from a deep learning perspective", Frontiers in Oncology, section "Cancer Imaging and Image-directed Interventions" [[Link](#)]
- **R. Ashish**, B. M. Sujay, R. Caushik, S. Jayashree and H. P. Nischal, "2D Based Indoor Slam and Autonomous Navigation Using a Terrain Robot", 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, India, 2018, pp. 968-974. [[Link](#)]

OTHER WORKS

System admin for the **NVIDIA GPU cluster** (GeForce GTX 1080 Ti GPUs and GTX 2080 Ti GPUs) at the **CVIT lab in IIIT Hyderabad** whose responsibilities include but not limited to overseeing resource allocation policy, optimal gpu usage, data storage and efficient usage of the cluster