Sajal Maheshwari

Contact Information

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Education

Masters in Computer Vision, Carnegie Mellon University,
School of Computer Science, Pittsburgh, PA, USA **Dec 2020**

G.P.A.: 4.14/4.00

Relevant courses: Geometry in computer vision, Computational photography, Visual learning and recognition, Maths fundamentals, Computer vision, Introduction to machine learning, Localization and Mapping

B.Tech., Electronics and Communiation Engineering, IIIT - Hyderabad,
Hyderabad, India **Jun 2017**

G.P.A.: 8.21/10.0

Relevant courses: Computer Programming, Data structures, Algorithms and Operating Systems, Digital Signal Processing, Digital Image Processing, Statistical Methods in AI, Computer Vision

Patents (Filed)

Label efficient detection of camera movement in videos

- Using pre-trained labels and handcrafted features, proposed a novel method to detect camera movement in cinematic videos by comparing relevant spatial regions in the video frames. Improved the performance from the current SOTA by 20% along with 10X speed improvement

Message Passing Network Based Object Signature for Object tracking

- Using representation learning methods and message passing networks, developed a novel method for using learned embeddings in combination with traditional features for efficient vehicle tracking in self-driving systems

Publications

Murtuza Bohra, **Sajal Maheshwari** and Vineet Gandhi. "TextureToMTF: predicting spatial frequency response in the wild".Signal, Image and Video Processing (**SIVP**) 2020. [Link]

Pranjal Kumar Rai, **Sajal Maheshwari**, and Vineet Gandhi. "Document quality estimation using spatial frequency response". International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) 2018 (**Oral**). [Link]

Pranjal Kumar Rai*, **Sajal Maheshwari***, Ishit Mehta, Parikshit Sakurikar and Vineet Gandhi."Beyond ocrs for document blur estimation". International Conference on Document Analysis and Recognition(**ICDAR**) 2017 [Link]

Sajal Maheshwari, Pranjal Kumar Rai, Gopal Sharma and Vineet Gandhi. "Document blur detection using edge profile mining". Indian Conference on Computer Vision, Graphics and Image Processing(**ICVGIP**) 2016 [Link]

Experience

Amazon Prime video May 2022-Present | Seattle,WA
Applied Scientist | Virtual Product Placement(VPP)-Video Synthesis

- Developed computer vision models for classification of shot as moving or stationary in terms of camera movement, decreasing shot selection process for VPP by 20%
- Developed temporally human video matting and Segment Anything(SAM) based models for occlusion handling leading to photorealistic two-dimensional VPP deployed for real-time throughput. Improved accuracies over baseline models by greater than 30%
- Working on diffusion model based image matting for better occlusion handling for offline VPP

Qualcomm Inc. Feb 2021-May2022 | San Diego,CA
ML Research Engineer | Autonomous driving Sensor Fusion R&D Systems

- Developed vehicle tracking from a fusion of multiple input sensor modalities (camera and radar)
- Developed vehicle re-identification as a metric-learning problem using message-passing networks and integrated these models into existing vehicle tracking framework

Qualcomm Inc. May 2020-August 2020 | San Diego,CA
Research internship | Sensor Fusion R&D Systems

- Developed end-to-end pipeline to generate and evaluate appearance based feature using deep CNNs for tracking vehicles across multiple cameras mounted on an autonomous vehicle
- Improved Top-1accuracy by 15% and reduced the training time by 10x

Amazon Lab126/Carnegie Mellon University January 2020-December 2020 | Pittsburgh,PA
Graduate Student Researcher

- Explored various works and baselines for SLAM in indoor environments to handle presence of dynamic objects in the scene
- Incorporated semantic information using object level pose estimation during tracking and filtering out keypoints belonging to dynamic objects for robust map estimation, improving baseline results by approximately 5%.
- Improved the temporal performance of the entire framework by exploring state-of-the-art segmentation architectures(YOLACT and BlendMask) for faster object detection.

IIIT-Hyderabad October 2018-April 2019 | Hyderabad, India
Research Assistant

- Designed a encoder-decoder CNN architecture to refocus narrow aperture image to generate a focal stack of multiple wide aperture outputs using light field data, increasing the PSNR performance by 10 points
- Developed a deep CNN framework to accurately assess quality of natural images using Spatial Frequency Response

Qualcomm India Pvt. Ltd. July 2017 - October 2018 | Hyderabad, India
Associate Software Engineer

- Explored deep CNN models to calculate temporally smooth exposure value of scenes using RAW sensor image and previous exposure values as inputs
- Developed feature for 360 and dual smartphone cameras to sync the exposure values as a function of scene differences, especially in HDR scenes

Skills

Programming Languages: Python, Matlab, C, C++
Libraries: PyTorch, TensorFlow, OpenCV, scikit-learn, etc

Miscellaneous

Reviewer - ICRA 2022, ICVGIP 2018, CVPR 2022(OmniCV workshop)

Teaching Assistant

Digital Image Processing - IIIT-H July 2016-December 2016

Digital Signal Processing - IIIT-H January 2017-April 2017

Awards

Dean's Academic Merit List, IIIT-H: November 2014 - November 2017

Dean's Research Merit List, IIIT-H: November 2017