*willing to relocate for US positions

# Subhayan Mukherjee

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## SKILLS

**CODING LANGUAGES**
C / C++ • Python • Matlab • Java

**ML / CV LIBRARIES**
Keras ( Tensorflow ) • OpenCV
Scikit-Learn • Scikit-Image
Numpy • Scipy • Tesseract OCR

**DATABASES**
MySQL • Oracle

**PLATFORMS**
Windows • Linux ( Ubuntu )

**DEV ENVIRONMENTS**
Visual Studio • Spyder • Eclipse

**VERSION CONTROL**
Git • Perforce

**BUILD MANAGEMENT**
CMake • Maven

**PACKAGE MANAGEMENT**
Anaconda • pip • vcpkg • APT

## EDUCATION

**UNIVERSITY OF ALBERTA**
PhD | Computer Science
**Machine Learning • Computer Vision • Signal Processing**
2015 - 2020 | Edmonton, CA
GPA: 4.0 / 4.0

**NATIONAL INST. OF TECH.**
M-Tech | Information Tech.
**Stereo Depth Estimation**
2012 - 2014 | Surathkal, IN
GPA: 8.33 / 10.0

**HERITAGE INST. OF TECH.**
B-Tech | Information Tech.
2005 - 2009 | Kolkata, IN
Major GPA: 8.16 / 10.0

## PROFILE LINKS

linkedin.com/in/subhayanmukherjee
github.com/subhayanmukherjee
Publications Link | Portfolio Link

## COMMUNICATION

| | |
|---|---|
| Bengali | Native or bilingual |
| English | Full professional |
| German | Elementary |

## SUMMARY

• 3+ yrs. exp. in industrial and internship settings where end to end machine learning and computer vision pipelines are productionized and productized.
• Designed machine learning systems that can process large volumes of data.
• Designed systems that run on-edge or in compute restrained environments.
• 3 years software engineering experience with code deployed in production.
• Start-up experience with rapid prototyping, experimentation and execution.
• Sound in fundamentals of machine learning, deep learning, computer vision.
• Self-motivated, detail-oriented and accountable quick learner; able to work independently and in a team on all aspects of the software when called upon.

## EXPERIENCE

**TETRA TECH** | Software Developer Level 2 ( Scientist II )
• Deep Learning • Computer Vision May 2020 - Present | Edmonton, CA

• High performance pattern segmentation on Depth data via Multi-Threading.
• Real-time feature extraction, object detection, localization and classification.
• Optical Character Recognition using LSTM trained on real & synthetic data.
• Script based reusable processing pipelines for rapid re-training & iteration.

**3VGEOMATICS** | Research Intern + University Collaborator
• Deep Learning • Computer Vision Jul 2017 - May 2020 | Vancouver, CA

• Extremely scalable filtering and per-pixel quality analysis for radar imagery.
• Research and prototype new unsupervised learning approaches to perform inference at scale on petabytes of unlabeled radar data using CNNs & GMMs.
• Reading and implementing current research papers on machine learning & computer vision; Understanding mathematical foundations of the algorithms.

**DOLBY LABS** | Video Imaging Research Intern
• **HDR Patent** US010223774B2 Sep 2016 - Apr 2017 | Sunnyvale, US

• Research and prototype high dynamic range (HDR) image enhancement for embedded platforms through perceptual masking of quantization artefacts.
• Accelerating tone mapping interpolation via fewer points without artefacts.
• Subjective experiments on reference monitors using different color spaces.

**SOFTWARE ENGINEERING** | Systems / Software Engineer R&D
• **Informatica** ( Java API development ) Jul 2014 - Jul 2015 | Bangalore, IN
• **Infosys** ( Mainframes development ) Dec 2009 - Aug 2011 | Bhubaneswar, IN

## AWARDS

2019 Graduate Excellence Scholarship (CAD 12,000) funded by Alberta Govt.
2017 Pansy and George Strange Graduate Scholarship (declined the offer)
2016 Runner-Up Certificate, PhD Early Achievement Award, Computer Science
2012 98 %tile in Graduate Aptitude Test in Engineering (Govt. funded M-Tech)
2007 3rd in pan-India C Programming contest organized by Jadavpur University

## PHD CONTRIBUTIONS

S. Mukherjee, A. Zimmer, X. Sun, P. Ghuman, and I. Cheng, "An unsupervised generative neural approach for insar phase filtering and coherence estimation," *IEEE Geoscience and Remote Sensing Letters*, vol. (Early Access), pp. 1–5, July 2020.

S. Mukherjee, I. Cheng, S. Miller, T. Guo, V. Chau, and A. Basu, "A fast segmentation--free fully automated approach to white matter injury detection in preterm infants," *Medical & Biological Engineering & Computing*, vol. 57, pp. 71–87, July 2018.

# PHD PROJECTS

**DEEP FEATURES FOR IMAGE QUALITY ASSESSMENT** • Kernel Density Estimation • Auto-Encoders

• Opinion-Unaware, Distortion-Unaware, No-Reference IQA using learned deep features instead of hand-crafting.
• Unsupervised learning of image quality features from pristine images dataset using Convolutional Autoencoder.
• Non-parametric pristine image model built by fitting arbitrary feature distributions via Kernel Density Estimation.

**STEREO DEPTH ESTIMATION FOR SALIENT OBJECT DETECTION** • Compute-Efficient Stereo Depth

• Stereo disparity estimation based on interpolation from sparse disparity estimates on image segment boundaries.
• Disparity & Saliency used to predict Regions-of-Interest using GPUs and Multi-threaded fast parallel computation.

**CNN-BASED PARAMETER-TUNING OF NOISE FILTER** • Collaborative Filtering • Real-Time Conv-Net

• Image-based prediction of 3D decorrelating unitary transform coefficient threshold for stacks of matched blocks.
• Shallow Neural Network architecture with Separable Convolutions for fast convergence and real-time prediction.

**LESION DETECTION FROM PRETERM INFANT BRAIN MRI** • Genetic Algorithms • Outlier Detection

• Brain ventricle detection as optimal set of candidate blobs via Genetic Algorithm. Sampling brain white matter in ventricle vicinity. Detecting lesions as outliers in white matter intensity distribution based on Gaussian assumption.

# PUBLICATIONS

## JOURNAL ARTICLES

1. Xinyao Sun, Aaron Zimmer, Subhayan Mukherjee, Parwant Ghuman, Irene Cheng, "IGS-CMAES: A Two-Stage Optimization for Ground Deformation and DEM Error Estimation in Time Series InSAR Data", Remote Sensing, 13, 13:2615, July 3, 2021

2. Subhayan Mukherjee, Aaron Zimmer, Xinyao Sun, Parwant Ghuman, Irene Cheng, "An Unsupervised Generative Neural Approach for InSAR Phase Filtering and Coherence Estimation", IEEE Geoscience and Remote Sensing Letters, Early Access, 1-5, July 31, 2020

3. Xinyao Sun, Aaron Zimmer, Subhayan Mukherjee, Navaneeth Kamballur Kottayil, Parwant Ghuman, Irene Cheng, "DeepInSAR—A deep learning framework for SAR interferometric phase restoration and coherence estimation", Remote Sensing, 12, 14:2340, July 21, 2020

4. Subhayan Mukherjee, Irene Cheng, Steven Miller, Ting Guo, Vann Chau, Anup Basu, "A fast segmentation-free fully automated approach to white matter injury detection in preterm infants", Medical & Biological Engineering & Computing, 57, 71-87 (2019)

5. Subhayan Mukherjee, Ram Mohana Reddy Guddeti, "Depth-Based Selective Blurring in Stereo Images Using Accelerated Framework", 3D Research, 5, 14:1-21 (2014), June 25, 2014

6. Subhayan Mukherjee, "Automated Enhancement of Grayscale Images using a Fast and Scalable K-Means approach", International Journal of Engineering and Technology, 1, 5:376-380, December 2009

## CONFERENCE PROCEEDINGS

1. Subhayan Mukherjee, Giuseppe Valenzise, Irene Cheng, "Potential of deep features for opinion-unaware, distortion-unaware, no-reference image quality assessment", International Conference on Smart Multimedia (Springer LNCS volume 12015), pages 87-95, December 16, 2019

2. Subhayan Mukherjee, Navaneeth Kamballur Kottayil, Xinyao Sun, Irene Cheng, "CNN-Based Real-Time Parameter Tuning for Optimizing Denoising Filter Performance", International Conference on Image Analysis and Recognition (Springer LNCS volume 11662), pages 112-125, August 27, 2019

3. Subhayan Mukherjee, Aaron Zimmer, Xinyao Sun, Parwant Ghuman, Irene Cheng, "CNN-based InSAR Coherence Classification", IEEE SENSORS Conference, pages 1-4, December 27, 2018

4. Subhayan Mukherjee, Aaron Zimmer, Navaneeth Kamballur Kottayil, Xinyao Sun, Parwant Ghuman, Irene Cheng, "CNN-based InSAR denoising and coherence metric", IEEE Sensors Conference, pages 1-4, December 27, 2018

5. Navaneeth Kamballur Kottayil, Aaron Zimmer, Subhayan Mukherjee, Xinyao Sun, Parwant Ghuman, Irene Cheng, "Accurate pixel-based noise estimation for InSAR interferograms", IEEE Sensors Conference, pages 1-4, December 27, 2018

6. Xinyao Sun, Navaneeth Kamballur Kottayil, Subhayan Mukherjee, Irene Cheng, "Adversarial training for dual-stage image denoising enhanced with feature matching", International Conference on Smart Multimedia (Springer LNCS volume 11010), pp 357-366, December 8, 2018

7. Subhayan Mukherjee, Irene Cheng, Anup Basu, "Atlas-free method of periventricular hemorrhage detection from preterm infants' T1 MR images", International Conference on Smart Multimedia (Springer LNCS volume 11010), pages 157-168, December 8, 2018

8. Subhayan Mukherjee, Guan-Ming Su, Irene Cheng, "Adaptive dithering using Curved Markov-Gaussian noise in the

quantized domain for mapping SDR to HDR image", International Conference on Smart Multimedia (Springer LNCS volume 11010), pages 193-203, December 8, 2018

9. Nikunjkumar Patel, Subhayan Mukherjee, Lihang Ying, "Erel-net: A remedy for industrial bottle defect detection", International Conference on Smart Multimedia (Springer LNCS volume 11010), pages 448-456, December 8, 2018

10. Subhayan Mukherjee, Irene Cheng, Anup Basu, "Highlighting objects of interest in an image by integrating saliency and depth", IEEE International Conference on Image Processing, pages 6-10, September 25, 2016

11. Subhayan Mukherjee, Irene Cheng, Ram Mohana Reddy Guddeti, Anup Basu, "Entropy-difference based stereo error detection", IEEE Image, Video, and Multidimensional Signal Processing Workshop, pages 1-5, July 11, 2016

12. Isha Singh Jassi, S Ruchika, Susmitha Pulakhandam, Subhayan Mukherjee, TS Ashwin, G Ram Mohan Reddy, "Ember: A Smartphone Web Browser Interface for the Blind", ACM International Symposium on Visual Information Communication and Interaction, 106-112, August 5, 2014

13. Subhayan Mukherjee, Ram Mohana Reddy Guddeti, "A hybrid algorithm for disparity calculation from sparse disparity estimates based on stereo vision", IEEE International Conference on Signal Processing and Communications, pages 1-6, December 15, 2014

14. Amol Kokane, Hitesh Singhal, Subhayan Mukherjee, G Ram Mohana Reddy, "Effective e-learning using 3D virtual tutors and WebRTC based multimedia chat", IEEE International Conference on Recent Trends in Information Technology, pages 1-6, December 29, 2014

15. Subhayan Mukherjee, Hitesh Singhal, Prashant Jha, Amol Kokane, Priyank Rastogi, Ravi Mittal, Ram Guddeti, "Learner centered design approach for e-learning using 3D virtual tutors", IEEE International Conference on Technology for Education, pages 133-134, March 3, 2014

## PATENT

### US10223774B2 | DOLBY LABORATORIES LICENSING CORPORATION, SAN FRANCISCO, CA

Harshad Kadu, Subhayan Mukherjee, Guan-Ming Su, "Single-pass and multi-pass-based polynomial approximations for reshaping functions", U.S. Patent and Trademark Office, March 5, 2019

## ACADEMIC ACTIVITIES

### PEER REVIEW

Served as peer reviewer 75 times for articles in academic journals and conference proceedings. My Publons public profile with verified records: `https://publons.com/researcher/3127318/subhayan-mukherjee/peer-review/`

### INVITED TALK

Presented my research at Edmonton Data Science, an event attended by industry representatives at all levels, to learn about latest data science developments: `https://www.meetup.com/startupedmonton/events/stxglqyzmbgb/`

### CONFERENCE CHAIR

Served as a Submissions Chair at the First and Second International Conferences on Smart Multimedia (Springer LNCS proceedings), held in Toulon, France (August 2018) and San Diego, USA (December 2019) respectively.