

Kumar Abhishek

TASC 1 9003, School of Computing Science, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6, Canada
☎ (+1) 604-710-2701 | ✉ kabhishe@sfu.ca | 🌐 www.kabhishe.com | 📧 Kumar Abhishek | 📧 kakumarabhishek | 📧 kakumarabhishek

Education

Simon Fraser University

Burnaby, Canada

PH.D. IN COMPUTING SCIENCE, GPA: 4.33

Summer 2020 - Present

- **Advisor:** Prof. Ghassan Hamarneh, Medical Image Analysis Lab
- **Supervisory Committee:** Prof. Manolis Savva, GrUVi Lab

M.Sc. (THESIS) IN COMPUTING SCIENCE, GPA: 4.07

Fall 2018 - Spring 2020

- **Advisor:** Prof. Ghassan Hamarneh, Medical Image Analysis Lab
- **Examination Committee:** Prof. Mark Drew (SFU), Prof. Sandra Avila (University of Campinas, Brazil), Prof. Angel X. Chang (SFU)
- **Thesis:** Input Space Augmentation for Skin Lesion Segmentation in Dermoscopic Images [[Link](#)]

Indian Institute of Technology (IIT)

Guwahati, India

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING

Fall 2011 - Spring 2015

- **Advisor:** Prof. Prithwijit Guha, Multimedia Analytics Lab
- **Thesis:** Summarization and Visualization of Large Volumes of Broadcast Video Data [[Link](#)]

Publications

IF: Impact factor | *: Equal contribution | Paper titles are hyperlinks to DOIs.

Journals:

- (j7) [Kumar Abhishek](#), Colin J. Brown, Ghassan Hamarneh, “**Multi-Sample ζ -mixup: Richer, More Realistic Synthetic Samples from a p -Series Interpolant**”, *Journal of Big Data*, 2024. [IF: 8.1]
- (j6) Ashish Sinha*, Jeremy Kawahara*, Arezou Pakzad*, [Kumar Abhishek](#), Enjie Ghorbel, Anis Kacem, Djamilia Aouada, Ghassan Hamarneh, “**Derm-Synth3D: Synthesis of in-the-wild Annotated Dermatology Images**”, *Medical Image Analysis*, 2024. [IF: 13.828]
- (j5) [Kumar Abhishek](#)*, Zahra Mirikharaji*, Alceu Bissoto, Catarina Barata, Sandra Avila, Eduardo Valle, M. Emre Celebi, Ghassan Hamarneh, “**A Survey on Deep Learning for Skin Lesion Segmentation**”, *Medical Image Analysis* 88 (102863), pp 1–55, 2023. [IF: 13.828]
- (j4) Mengliu Zhao*, Jeremy Kawahara*, [Kumar Abhishek](#), Sajjad Shamanian, Ghassan Hamarneh, “**Skin3D: Detection and Longitudinal Tracking of Pigmented Skin Lesions in 3D Total-Body Textured Meshes**”, *Medical Image Analysis* 77 (102329), pp 1–10, 2022. [IF: 13.828]
- (j3) [Kumar Abhishek](#), Jeremy Kawahara, Ghassan Hamarneh, “**Predicting the Clinical Management of Skin Lesions Using Deep Learning**”, *Nature Scientific Reports* 11 (7769), pp 1–14, 2021. [IF: 4.996] [Media Coverage: [Massive Science](#), [The Wire Science](#)].
- (j2) [Kumar Abhishek](#)*, Saeid Asgari Taghanaki*, Joseph Paul Cohen, Julien Cohen-Adad, Ghassan Hamarneh, “**Deep Semantic Segmentation of Natural and Medical Images: A Review**”, *Springer Artificial Intelligence Review* 54 (1), pp 137–178, 2020. [IF: 9.588]
- (j1) Weina Jin, Mostafa Fatehi, [Kumar Abhishek](#), Mayur Mallya, Brian Toyota, Ghassan Hamarneh, “**Artificial Intelligence In Glioma Imaging: Challenges and Advances**”, *Journal of Neural Engineering*, 17 (2) 021002, pp 1–17, 2020. [IF: 5.043]

Conferences and Workshops:

- (c13) Tanya Gatsak, [Kumar Abhishek](#), Hanene Ben Yedder, Saeid Asgari Taghanaki, Ghassan Hamarneh, “**PET-Disentangler: PET Lesion Segmentation via Disentangled Healthy and Disease Feature Representations**”, *The Society of Nuclear Medicine and Molecular Imaging (SNMMI) Annual Meeting*, pp 1–1, 2024.
- (c12) [Kumar Abhishek](#), Colin J. Brown, Ghassan Hamarneh, “ **ζ -mixup: Richer, More Realistic Mixing of Multiple Images**”, *Medical Imaging with Deep Learning (MIDL)*, pp 1–5, 2023.
- (c11) Arezou Pakzad, [Kumar Abhishek](#), Ghassan Hamarneh, “**CIRCLE: Color Invariant Representation Learning for Unbiased Classification of Skin Lesions**”, *European Conference on Computer Vision (ECCV) ISIC Skin Image Analysis Workshop*, pp 203–219, 2022. [Oral]
- (c10) Zahra Mirikharaji, [Kumar Abhishek](#), Saeed Izadi, Ghassan Hamarneh, “**D-LEMA: Deep Learning Ensembles from Multiple Annotations – Application to Skin Lesion Segmentation**”, *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) ISIC Skin Image Analysis Workshop*, pp 1837–1846, 2021. [Oral] [Best Paper Award]
- (c9) [Kumar Abhishek](#), Ghassan Hamarneh, “**Matthews Correlation Coefficient Loss for Deep Convolutional Networks: Application to Skin Lesion Segmentation**”, *IEEE International Symposium on Biomedical Imaging (ISBI)*, pp 225–229, 2021.
- (c8) [Kumar Abhishek](#), Ghassan Hamarneh, Mark S. Drew, “**Illumination-based Transformations Improve Skin Lesion Segmentation in Dermoscopic Images**”, *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) ISIC Skin Image Analysis Workshop*, pp 3132–3141, 2020. [Oral]
- (c7) [Kumar Abhishek](#), Ghassan Hamarneh, “**Mask2Lesion: Mask-Constrained Adversarial Skin Lesion Image Synthesis**”, *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) Workshop on Simulation and Synthesis in Medical Imaging (SASHIMI)*, pp 71–80, 2019.
- (c6) Saeid Asgari Taghanaki, [Kumar Abhishek](#), Ghassan Hamarneh, “**Improved Inference via Deep Input Transfer**”, *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, pp 819–82, 2019. [Early Accept]

- (c5) Sorour Mohajerani, Reza Asad, [Kumar Abhishek](#), Neha Sharma, Alysha van Duynhoven, Parvaneh Saeedi, “**CloudMaskGAN: A Content-Aware Unpaired Image-to-Image Translation Algorithm for Remote Sensing Imagery**”, *IEEE International Conference on Image Processing (ICIP)*, pp 1965-1969, 2019.
- (c4) Saeid Asgari Taghanaki, [Kumar Abhishek](#), Shekoofeh Azizi, Ghassan Hamarneh, “**A Kernelized Manifold Mapping to Diminish the Effect of Adversarial Perturbations**”, *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, pp 11332–11341, 2019.
- (c3) [Kumar Abhishek](#), Ashok Yogi, “**A Minutiae Count Based Method for Fake Fingerprint Detection**”, *Elsevier ScienceDirect Procedia Computer Science*, 58, 447-452, August 2015.
- (c2) [Kumar Abhishek](#), Amodh Kant Saxena, Ramesh Kumar Sonkar, “**Non-Invasive Measurement of Heart Rate and Hemoglobin Concentration Level through Fingertip**”, *IEEE International Conference on Signal Processing, Informatics, Communication and Information Systems (SPICES)*, pp 1–4, 2015.
- (c1) [Kumar Abhishek](#), Mrinal Haloi, Sumohana S. Channappayya, Siva Rama Krishna Vanjari, Dhananjaya Dendukuri, Swathy Sridharan, Tripurari Choudhary, Paridhi Bhandari, “**An Enhanced Algorithm for the Quantification of Human Chorionic Gonadotropin (hCG) Level in Commercially Available Home Pregnancy Test Kits**”, *IEEE National Conference on Communications (NCC)*, pp 1–5, 2014.

Pre-prints and Posters:

- (p10) Arezou Pakzad, [Kumar Abhishek](#), Ghassan Hamarneh, “**Color Invariant Representation Learning for Unbiased Classification of Skin Lesions**”, *SFU Computing Science Diversity Committee Awards Finalist*, 2023.
- (p9) [Kumar Abhishek*](#), Deeksha Kamath*, “**Attribution-based XAI Methods in Computer Vision: A Review**”, *arXiv pre-print arXiv:2211.14736*, 2022.
- (p8) [Kumar Abhishek](#), “**Improving Medical Image Diagnosis Using Graph-Based Global Reasoning**”, *Graph Machine Learning Seminar*, 2021.
- (p7) Zahra Mirikharaji, [Kumar Abhishek](#), Saeed Izadi, Ghassan Hamarneh, “**D-LEMA: Deep Learning Ensembles from Multiple Annotations**”, *Biomedical Imaging and Artificial Intelligence (BMAI) cluster Fall Research Showcase*, 2021.
- (p6) [Kumar Abhishek](#), Jeremy Kawahara, Ghassan Hamarneh, “**Direct AI-based Prediction of Clinical Management Bypassing Diagnosis: Application to Skin Lesions**”, *21st Annual UBC Dermatology Research Day*, 2021. [Oral]
- (p5) Mengliu Zhao*, Jeremy Kawahara*, Sajjad Shamanian, [Kumar Abhishek](#), Ghassan Hamarneh, “**Computerized Localization and Tracking of Pigmented Skin Lesions on 3D Whole Body Texturized Skin Meshes**”, *21st Annual UBC Dermatology Research Day*, 2021. [Oral]
- (p4) Mengliu Zhao, Sajjad Shamanian, Priyanka Chandrashekar, [Kumar Abhishek](#), Jeremy Kawahara, Ghassan Hamarneh, “**Skin Lesion Localization & Tracking on 3D Whole Body Colored Surface Images**”, *Emerging Technologies: BC's AI Showcase, University of British Columbia*, 2020.
- (p3) Mengliu Zhao, Sajjad Shamanian, Priyanka Chandrashekar, [Kumar Abhishek](#), Jeremy Kawahara, Ghassan Hamarneh, “**Acquisition and Analysis of 3D Whole Body Skin Images for Dermatological Studies**”, *Annual Tri-Cluster Research Day: The Future of Health, University of British Columbia*, 2020.
- (p2) [Kumar Abhishek*](#), Nishant Kambhatla*, “**Exploring the Generalizability of Sequence-to-Sequence Architectures**”, *Deep Learning Seminar*, 2019.
- (p1) Saeid Asgari Taghanaki, [Kumar Abhishek](#), Ghassan Hamarneh, “**Signed Input Regularization**”, *arXiv pre-print arXiv:1911.07086*, 2019.

Manuscripts under review:

- (u1) [Kumar Abhishek](#), Aditi Jain, Ghassan Hamarneh, “**Investigating the Quality of DermaMNIST and Fitzpatrick17k Dermatological Image Datasets**”, 2024.

Work Experience

Medical Image Analysis Lab, Simon Fraser University

Burnaby, Canada

GRADUATE RESEARCH ASSISTANT

September 2018 - Present

- I have worked on various medical image analysis tasks using deep learning, such as adding robustness to deep learning-based models (c4), input transformation methods to improve prediction performance (c6), leveraging illumination and color imaging-based information (c8), a new loss function (c9) and an ensemble model (c10) for improving segmentation, learning to augment medical image datasets by synthesizing realistic 2D images (c7) and 2D views of 3D scans (u1), augmenting classification datasets (c12, j6), predicting the clinical management decisions for diseases (j3), detecting and tracking skin lesion in 3D whole-body scans (j4), and learning skin-tone independent representations for unbiased skin disease diagnosis (c11). I have also reviewed the literature for semantic segmentation of natural and medical images in general (j2) and of skin lesion images in particular (j5), and artificial intelligence-based applications in medical imaging (j1).

School of Computing Science, Simon Fraser University

Burnaby, Canada

TEACHING ASSISTANT, CMPT 340: BIOMEDICAL COMPUTING

Spring 2021, Summer 2021, Fall 2023, Spring 2024

- Course planning, course elements' design: assignments and weekly quizzes, grading of assignments and final projects, and holding office hour sessions for questions and project guidance for three offerings of CMPT 340, an advanced undergraduate course on Biomedical Computing.

Altisource Labs

Bengaluru, India

DATA SCIENTIST

April 2017 - July 2018

- Worked on document image enhancement algorithms and OCR, and built tools for automatic information extraction from document images for loan underwriting.
- Developed an automated real estate image tagging platform using deep learning for classification of uploaded images into various scene categories.

Wipro Ltd.

Bengaluru, India

MACHINE LEARNING ENGINEER

July 2015 - March 2017

- Worked on fraud detection on internal employee data using big data and machine learning algorithms.
- Worked on a number of machine learning projects - from building an automated employee ticket handling system to predicting failures in a multi-node Hadoop cluster.

Multimedia Analytics Lab, IIT Guwahati

Guwahati, India

UNDERGRADUATE RESEARCH ASSISTANT

August 2014 - March 2015

- Bachelor thesis project on broadcast video analytics, advised by Prof. Prithwijit Guha. Developed a robust news presentation format detector for identifying various band elements and their layouts in a news video frame, and evaluated on data from recorded news videos of 4 English news channels.

Chief Technology Office, Wipro Ltd.

Bengaluru, India

SUMMER R&D INTERN, CTO TEAM | SUPERVISORS: R. HOSABETTU & A. K. LENKA, SENIOR CONSULTANTS

May - July 2014

- Developed an algorithm for the optical character recognition (OCR) of embossed credit/debit card numbers from the card images captured using a mobile camera, reporting an accuracy of 83%.

Lab for Video and Image Analysis, IIT Hyderabad

Hyderabad, India

SUMMER RESEARCH INTERN | SUPERVISOR: DR. S. CHANNAPPAYYA, PROFESSOR, DEPT. OF ELECTRICAL ENGINEERING

May - July 2013

- Developed an algorithm for quantifying the concentration of a hormone from the images of over-the-counter pregnancy test kits, using color space transformation followed by image segmentation and classification.

Relevant Courses

Simon Fraser University

2018-2021

Design and Analysis of Algorithms, Data Mining, Frontiers of Visual Computing, Illumination in Images, Machine Learning, Deep Learning, Graph Machine Learning, Medical Imaging Meets Machine Learning

IIT Guwahati

2011-2015

Pattern Recognition and Machine Learning, Digital Signal Processing, Digital Image Processing, Computer Vision, Biometrics, Speech Technology, Sparse Representation and Compressive Sensing, Probability and Random Processes, Advanced Topics in Random Processes, Game Theory and Economics

Honors & Awards

PhD Research Fellowship , Simon Fraser University	2023, 2024
Outstanding Reviewer Honorable Mention , MICCAI 2023	2023
Computing Science Diversity Committee Awards Finalist , Simon Fraser University	2023
Graduate Fellowship , School of Computing Science, Simon Fraser University	2018, 2021, 2022, 2023, 2024
Graduate Fellowship , Faculty of Applied Sciences, Simon Fraser University	2022, 2023, 2024
Helmut & Hugo Eppich Family Graduate Scholarship , Faculty of Applied Sciences, Simon Fraser University	2021, 2022, 2023, 2024
Brian J. Blaha Memorial Graduate Scholarship , Faculty of Applied Sciences, Simon Fraser University	2021, 2022, 2023
Best Paper Award , CVPR 2021 ISIC Skin Image Analysis Workshop	2021
Special Graduate Entrance Scholarship , Dean of Graduate Studies, Simon Fraser University	2020
Borden Ladner Gervais Graduate Scholarship , Faculty of Applied Sciences, Simon Fraser University	2019
Winner , Best Poster Award at AI Student Showcase, Vancouver	2018
Winner , Wipro Datathon, a machine learning competition with over 200 teams across all 11 offices of Wipro	2017
Undergraduate Research Travel Grant , Department of Electronics and Electrical Engineering, IIT Guwahati	2015

Service

Peer Reviewer

- **Journals:** Medical Image Analysis (MedIA), Computer Methods and Programs in Biomedicine (CMPB), Computers in Biology and Medicine (CIBM), Nature Scientific Reports (Nat Sci Rep), Nature Scientific Data (Nat Sci Data), Journal of Nuclear Medicine (JNM), npj Imaging.
- **Conferences and Workshops:** MICCAI, International Skin Imaging Collaboration (ISIC) Skin Image Analysis Workshop, IPMI, MedNeurIPS.

Volunteer Work

- Instructor for UBC Geering Up program for high school students on a hands-on introduction to Teachable Machine (2022).
- Executive Committee member of SFU Computing Science Graduate Student Association (2018–2020).
- Mentor and judge for Technovation Girls BC, an entrepreneurship event for getting 10-18 year old girls interested in STEM fields (2019–2020).