Hasib Zunair

Contact Information

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Professional: LinkedIn, GitHub

Skills

- **Research Expertise**: Computer Vision, Machine Learning, Image Recognition & Generation, Segmentation, Video Analysis, Object Detection, Visual Search, Technical Writing.
- **Programming Languages**: Python, Bash (Shell Scripting), Git, C++, Matlab.
- **Libraries & Programs**: NumPy, PyTorch, TensorFlow, Keras, OpenCV, imgaug, Scikit-learn, ONNX, CoreML, TensorBoard, Autodistill, LabelMe, Weights & Biases, Pytest.
- **Cloud Infrastructure & Deployment (CI/CD)**: Google Cloud Platform, Vertex AI, Docker, Flask, FastAPI, GitHub Actions, Gradio, Linux OS.
- **Team Management**: Led research teams from ideation, to development, to publication.
- **Product Management**: Led end-to-end development of novel algorithms from problem framing, to planning, to design of the experiments according to industrial and business needs.

Education

Ph.D. in Information Systems Engineering Sep 2021 - Dec 2024
Concordia University, Montreal, QC, Canada
Thesis: Masked Supervised Models for Visual Learning
Advisor: Prof. Abdessamad Ben Hamza

MAS.c in Quality Systems Engineering Sep 2019 - Aug 2021
Concordia University, Montreal, QC, Canada
Thesis: Designing Efficient Deep Learning Models for Medical Diagnosis
Advisor: Prof. Abdessamad Ben Hamza

B.Sc. in Electrical and Electronic Engineering May 2013 - Dec 2017
North South University (NSU), Dhaka, Bangladesh
Capstone: Design and Implementation of an Automated Attendance System

Industry Experience

Applied ML Scientist (Part-time) - *Decathlon, Montreal, Canada* Sept 2022 - Present
Developing machine learning and computer vision algorithms for sports use-cases and support the deployment on the cloud infrastructure and edge devices.

ML Specialist (5 months) - *Ericsson, Montreal, Canada* Feb 2024 - Jun 2024
Assisted three teams to build time-series forecasting models using proprietary historical data using machine learning. Also, delivered relevant ML tutorials and support project implementations.

Research Scientist Intern (12 months) - *Decathlon, Montreal, Canada* Sept 2021 - Aug 2022
Created image-based virtual try-on dataset using Decathlon products and developed FIFA to handle complex person poses while retaining the texture and embroidery of clothing items.

Research Scientist Intern (12 months) - *Decathlon, Montreal, Canada* Sept 2020 - Aug 2021
Researched approaches for semi-supervised image classification and developed STAR to improve Decathlon's existing computer vision models by leveraging large-scale unlabeled image data.

ML Specialist (6 months) - *Ericsson, Montreal, Canada* Oct 2021 - Mar 2022
Assisted two teams in detecting anomalies in proprietary historical time-series data using machine learning. Developed and delivered ML tutorials and support project implementations.

ML Engineer (4 months) - *Think Bricks LLC, Dhaka, Bangladesh* Apr 2019 - Aug 2019
Led and collaborated with a team of two interns and developed a deep learning model that improved diabetic retinopathy detection accuracy by 8% from fundus images, aiding doctors in diagnosis.

Selected Publications

Full list of publications available on Google Scholar.

P.1 **RSUD20K: A Dataset for Road Scene Understanding In Autonomous Driving**. Hasib Zunair, Shakib Khan, A. Ben Hamza. In **ICIP**, 2024.

P.2 **Learning to Recognize Occluded and Small Objects with Partial Inputs**. Hasib Zunair, A. Ben Hamza. In **WACV**, 2024.

P.3 **Masked Supervised Learning for Semantic Segmentation**. Hasib Zunair, A. Ben Hamza. In **BMVC**, 2022 (Oral Presentation).

P.4 **Fill in Fabrics: Body-aware Self-supervised Inpainting for Image-based Virtual Try-on**. Hasib Zunair, Yan Gobeil, Samuel Mercier, A. Ben Hamza. In **BMVC**, 2022.

P.5 **VISTA: Vision Transformer Enhanced by U-Net and Image Colorfulness Frame Filtration for Automatic Retail Checkout**. Md Shihab Istiak Hossain, Nazia Tasnim, Hasib Zunair, Labiba Kanij Rupty, Nabeel Mohammed. In **CVPR Workshop**, 2022.

P.6 **Synthetic COVID-19 Chest X-ray Dataset for Computational Analysis**. Hasib Zunair, A. Ben Hamza. In **ICML Workshop**, 2021.

P.7 **Sharp U-Net: Depthwise Convolutional Network for Biomedical Image Segmentation**. Hasib Zunair, A. Ben Hamza. In **Computers in Biology and Medicine**, 2021.

P.8 **STAR: Noisy Semi-Supervised Transfer Learning for Visual Classification**. Hasib Zunair, Yan Gobeil, Samuel Mercier, and A. Ben Hamza. In **ACM Workshop**, 2021.

P.9 **MoNuSAC2020: A Multi-organ Nuclei Segmentation and Classification Challenge**. Ruchika Verma, Neeraj Kumar, Hasib Zunair, A. Ben Hamza et al.. In **IEEE Transactions on Medical Imaging**, 2021.

P.10 **Uniformizing Techniques to Process CT scans with 3D CNNs for Tuberculosis Prediction**. Hasib Zunair, Aimon Rahman, Nabeel Mohammed, and Joseph Paul Cohen. In **MICCAI Workshop**, 2020.

Software Projects

All of my projects details are available on my website and the code on github.

`[Machine Learning Competitions]`

- Product Counting and Recognition for Retail Checkout, AI City Challenge, CVPR Workshop, 2022 - **3rd Place** (Paper, Code, Leaderboard)
- Tuberculosis Type Classification, ImageCLEF, 2021 - **2nd Place** (Paper, Code, Leaderboard)
- Nuclei Segmentation, MoNuSAC, 2020 - **11th Place** (Paper, Code, Leaderboard)
- Tuberculosis Prediction, ImageCLEF, 2019 - **5th Place** (Paper, Code, Leaderboard)
- Bengali Digit Recognition, bengali.ai, 2018 - **6th Place** (Paper, Code, Leaderboard)

`[Datasets]`

- Bangladesh Road Scene Understanding Dataset for Autonomous Driving, 2024 - (Link)
- Public Synthetic Dataset of COVID-19 Chest X-rays, 2021 - (Link)

`[Other Projects]`

- Monocular-to-3D Virtual Try-On, 2021 - (Webpage, Report, Video, Slides, Code)
- Low to High Resolution Knee MRI Reconstruction, 2019 - (Code)
- Deep Learning based Thyroid Nodule Segmentation from Ultrasound Images, 2020 - (Code)

Open-Source Contributions

meituan/YOLOv6 (GitHub Stars: >5600), Fix export of YOLO models to ONNX format.

kornia/kornia (GitHub Stars: >9500), Add MS-SSIMLoss reconstruction loss function as a feature.

keras-team/keras (GitHub Stars: >61000), Wrote tutorial code for 3D image classification.

Awards & Scholarships

Concordia University Graduate Doctoral Fellowship for Ph.D	2021
Concordia Internation Tuition Award of Excellence for Ph.D	2021
Concordia Merit Entrance Scholarship for Ph.D	2021
Two-year MITACS Accelerate Fellowship for MASc.	2020
Concordia Merit Entrance Scholarship for MASc.	2019
Best Student Paper Award, ICSSA, Kuching, Malaysia	2018
Winner (First Prize), IEEE SS12 Maker Fair, Hyderabad, India	2017

Invited Talks & Tutorials

Building and Applying Generative Models using PyTorch, Ericsson Canada (Link)	2024
Build and Deploy Custom Docker Images for Object Recognition (Link)	2023
Deep Learning in Computer Vision with PyTorch, NSU (Link)	2023
Intro to Deep Learning with NumPy, NSU (Link)	2022
Building ML models with TensorFlow, Ericsson Canada (Link)	2021
How to get started with building Computer Vision systems, NSU (Link)	2021
3D image classification from CT scans, Keras, TensorFlow (Link)	2020
Programming with Python, NSU (Link)	2019
Intro to Deep Learning for Image Classification using Python, NSU (Link)	2019
Basics of Image Processing and Computer Vision, NSU (Link)	2018
Intro to Robotics (ROBO101), a semester-long series of workshops, NSU	2018

Certifications & Training

Udemy - "Agile Crash Course: Agile Project Management; Agile Delivery" (Link)	2024
Udemy - "GitHub Actions - The Complete Guide" (Link)	2023
Udemy - "Terraform for Beginners using GCP - Google Cloud (Hands-on)" (Link)	2023
Udemy - "Google Cloud Machine Learning - Vertex AI" (Link)	2023
W&B - "Effective MLOps - Model Development" (Link)	2023
Udemy - "Google Cloud Platform (GCP) Fundamentals for Beginners" (Link)	2023
Udemy - "Kubernetes for the Absolute Beginners - Hands On" (Link)	2023
Udemy - "Docker for the Absolute Beginner - Hands On - DevOps" (Link)	2023
CIFAR - "Deep Learning + Reinforcement Learning Summer School" (Link)	2021
Coursera - "Deep Learning Specialization" (Link)	2019
Coursera - "Introduction to TensorFlow for AI, ML, DL" (Link)	2019
Coursera - "Convolutional Neural Networks in TensorFlow" (Link)	2019
Coursera - "IBM Machine Learning with Python" (Link)	2019

Academic Services

Reviewer: Winter Conference on Applications of Computer Vision (WACV), 2024
Reviewer: British Machine Vision Conference (BMVC), 2022, 2024
Reviewer: International Conference on 3D Vision (3DV), 2022, 2023, 2024

Reviewer: Pattern Recognition Letters (PRL), 2022
Reviewer: Physics in Medicine and Biology (PMB), 2021, 2022

Teaching Experience

Lab Demonstrator, COMP 6771: Image Processing, *Concordia University* 2022
Lab Demonstrator, COMP 333: Intro to Data Analytics, *Concordia University* 2021
Lab Demonstrator, COMP 6771: Image Processing, *Concordia University* 2021

Supervision & Mentoring

- Mominul Islam, "**CosSIF: Cosine similarity-based image filtering to overcome low inter-class variation in synthetic medical image datasets**", In **Computers in Biology and Medicine**, 2024.
- Jingnan Cao, "**Human Pose Estimation for Bike Posture Analysis**", In **Decathlon SportsLab, France**, 2023.
- Khundker Mohammad Sarwar Khalid, Farhan Ishraq Omi, Mohammed Bashem, "**Improving Masked Supervision for Semantic Segmentation**", 2023.
- Kazi Ramisa Rifa, Khalid Bin Shafiq, "**Bangladeshi Traditional Virtual Try-On with Deep Learning Techniques and Computer Vision**", 2023.
- Rejuana Islam, Fairooz Rahman, Md. Khaled Zohani Tonmoy, Mahmud Khan, "**Synthetic Data Generation for Imbalanced Medical Image Classification**", 2023.
- Ifad Uz Zaman, Sudipta Bhatta, Sadia Jeesan Ayesha, "**Improving Knowledge Distillation for Medical Image Classification**", 2022.
- Deponker Sarker Depto, Md. Mashfiq Rizvee, "**Quantifying imbalanced classification methods for leukemia detection**", In **Computers in Biology and Medicine**, 2022.
- Md Shakib Khan, Kazi Nabiul Alam, Abdur Rab Dhruba, "**Knowledge Distillation Approach Towards Melanoma Detection**", In **Computers in Biology and Medicine**, 2022.
- Deponker Sarker Depto, Shazidur Rahman, Md. Mekayel Hosen, Mst Shapna Akter, Tamanna Rahman Reme, "**Automatic Segmentation of Blood Cells**", In **Tissue and Cell**, 2021.
- Tamanna Rahman Reme, "**Analysis of Deep Learning Architectures on High Variation Malaria parasite Classification**", In **Tissue and Cell**, 2021
- Labib Chowdhury, "**Robust deep speaker recognition: Learning latent representation with joint angular margin loss**", In **Applied Sciences**, 2020

Community Activities

Founding President, IEEE Robotics and Automation Society, North South University 2017
Conducted technical workshops for undergraduate students on building mobile robots and led teams in organizing and participating in national and international robotics competitions.

Media Coverage

"One of our students did something crazy with transfer learning.", Jeremy Howard, fast.ai.
"Semi-supervised visual learning using large-scale sport image data.", Concordia University.
"A multi-year training program for AI professional development at Ericsson.", Concordia University.