Hasib Zunair

Ph.D in Machine Learning & Computer Vision
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Website LinkedIn Google Scholar GitHub

Work Experience

Decathlon Montreal, Canada
Machine Learning Engineer *Sept. 2022 – June 2024*

- Developed machine learning (ML) algorithms, communicated with PM, collaborated with mobile app dev team for stat-tracking basketball game videos on edge compute in real-time by creating dataset for detection, using fine-tuning and model quantization techniques, **driving higher user engagement** on app.
- Created a data annotation workflow, accelerating model development, **saving** 7× **time** and **reducing costs**.
- Built object detector to identify bike brands from marathon images to **improve identifying penetration rate**.
- Deployed ML APIs optimized for inference efficiency, using model compression techniques like quantization, pruning, knowledge distillation, **reducing memory and latency**.
- **Mentored an intern** in developing a domain-specific human pose estimation model for bike posture analysis.
- **Tools**: Python, PyTorch, HF Transformers, ONNX, CoreML, FastAPI, Docker, GCP services, GitHub Actions.

Machine Learning Research Intern *Sept. 2020 – Aug. 2022*

- Developed generative AI virtual try-on algorithm, created dataset using clothing products, **improved realism of synthetic images**, preserving texture, embroidery and handling complex person poses; published in BMVC'22.
- Created semi-supervised learning algorithm improving accuracy and robustness compared to existing methods. Owned feature in team's ML library to train models using large-scale unlabeled data **saving** 6× **time**, **reducing** 5× **cloud compute resources**; published in MMSports'21.
- **Led and managed the two research projects** from ideation, dataset creation, algorithm development, experimental design, to writing design documentation and technical reports, aligned with business needs.
- **Tools**: Python, PyTorch, TensorFlow, OpenCV, LabelMe, Docker, Gradio, HF Spaces.

Concordia University Montreal, Canada
Machine Learning Researcher *Sept. 2019 – Dec. 2024*

- Designed accurate and efficient deep learning algorithms in 2D & 3D computer vision for image recognition, segmentation, generation etc., **addressing complex real-world challenges**. Tailored models like DINO, ViT, GANs, 3D U-Net, YOLO, SAM, VLMs and applied unsupervised, self-supervised, zero-shot learning approaches.
- **Led publications and presented novel findings** at conferences like **WACV**, **BMVC**, **ICIP** and journals like **CIBM** and **IEEE TMI**, and workshops at **CVPR**, **ICML** and **MICCAI**. (1000+ citations)
- Collaborated with **developers in industry** and **external researchers** to build domain-specific ML solutions.
- Mentored **15 students from undergraduates to Ph.Ds** in guiding research and implementation of algorithms, **publishing work at several journals**.
- **Tools**: Python, PyTorch, OpenCV, NumPy, Scikit-learn, Pillow, MMCV, Timm, Tensorboard, Weights & Biases.

Ericsson Montreal, Canada
Machine Learning Specialist *Feb. 2024 – June 2024*

- Assisted 11 individuals in building time-series forecasting models using proprietary historical data.
- Taught machine learning concepts including Building Large Language Models (LLMs) using PyTorch.
- Recommended approaches, tools and libraries for **streamlining project development and deployment**.

Machine Learning Specialist *Oct. 2021 – Mar. 2022*

- Assisted 10 individuals in detecting anomalies in historical time-series data using machine learning.
- Taught machine learning concepts, including Building Machine Learning (ML) Models using TensorFlow.
- Guided project implementation through code reviews to **ensure successful project completion**.

Education

- **Concordia University** Montreal, Canada
  Ph.D and MASc in Computer Vision, Machine Learning & Artificial Intelligence *Sep. 2019 – Dec. 2024*
- **North South University** Dhaka, Bangladesh
  B.Sc. in Electrical & Electronic Engineering *May 2013 – Dec. 2017*

Skills

- **Programming Languages**: Python, Bash (Shell Scripting).
- **Tools & Libraries**: PyTorch, TensorFlow/Keras, OpenCV, NumPy, Scikit-learn, Weights & Biases, Pytest.
- **Cloud Infrastructure and MLOps**: GCP, FastAPI, Docker, Gradio, Git, GitHub Actions, Kubernetes.

Open-Source Contributions

- kornia/kornia (GitHub Stars: >10K), Added implementation of MS-SSIM + L1 loss function as a core feature.
- keras-team/keras (GitHub Stars: >61K), Wrote tutorial code for 3D image classification from CT scans.
- meituan/YOLOv6 (GitHub Stars: >5.7K), Fixed export of object detection models to ONNX format.

Selected Publications

Full list of publications available on Google Scholar.

- **PEEKABOO: Hiding Parts of an Image for Unsupervised Object Localization**. Hasib Zunair, A. Ben Hamza. In *BMVC*, 2024.
- **Learning to Recognize Occluded and Small Objects with Partial Inputs**. Hasib Zunair, A. Ben Hamza. In *WACV*, 2024.
- **Masked Supervised Learning for Semantic Segmentation**. Hasib Zunair, A. Ben Hamza. In *BMVC*, 2022 (Oral Presentation, Top 5%).
- **Sharp U-Net: Depthwise Convolutional Network for Biomedical Image Segmentation**. Hasib Zunair, A. Ben Hamza. In *Computers in Biology and Medicine*, 2021 (Impact Factor: 7.7).
- **A Multi-organ Nuclei Segmentation and Classification Challenge**. Ruchika Verma, Neeraj Kumar, Hasib Zunair, A. Ben Hamza. In *IEEE Transactions on Medical Imaging*, 2021 (Impact Factor: 10.6).

Machine Learning Competitions

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

Mentoring & Supervision

- Mominul Islam. **CosSIF**. In *Computers in Biology and Medicine*, 2024 (Impact Factor: 7.7).
- Deponker Sarker Depto, Md. Mashfiq Rizvee. **Leukemia detection**. In *Computers in Biology and Medicine*, 2022.
- Md Shakib Khan, Kazi Nabiul Alam, Abdur Rab Dhruba. **Knowledge Distillation in Melanoma Detection**. In *Computers in Biology and Medicine*, 2022.
- Deponker Sarker Depto, Shazidur Rahman, Md. Mekayel Hosen, Mst Shapna Akter, Tamanna Rahman Reme. **Blood Cell Segmentation**. In *Tissue and Cell*, 2021.
- Tamanna Rahman Reme. **Malaria Classification**. In *Tissue and Cell*, 2021.

Certifications & Training

- Agile Crash Course: Agile Project Management; Agile Delivery. 2024
- Google Cloud Machine Learning - Vertex AI. 2023
- Effective MLOps - Model Development. 2023
- Terraform for Beginners using GCP - Google Cloud (Hands-on). 2023
- Kubernetes for the Absolute Beginners - Hands On. 2023
- Docker for the Absolute Beginner - Hands On - DevOps. 2023
- Deep Learning + Reinforcement Learning Summer School. 2021

Awards & Scholarships

- Concordia University Graduate Doctoral Fellowship and International Tuition Award of Excellence for Ph.D. 2021
- MITACS Accelerate Fellowship for two years for MASc. 2020
- Concordia Merit Entrance Scholarship for Ph.D and MASc. 2021, 2019

Academic Services

- **Reviewer**: WACV'24, BMVC'22, 3DV'22-'24, Pattern Recognition Letters'22, Physics in Medicine and Biology'21-'22.
- **Lab Demonstrator**: COMP6771 - Image Processing, Winter'21 and Winter'22; COMP333 - Intro to Data Analytics, Fall'21 at Concordia University. Taught image processing and data analysis concepts and implementations using Python, OpenCV, NumPy, Scikit-learn, Pandas, Matplotlib to graduate level courses of 80 students and guided course projects.

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.