Hasib Zunair

Ph.D Candidate in Computer Vision (Expected December 2024)
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Website LinkedIn Google Scholar GitHub

Work Experience

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

- Developed machine learning (ML) algorithms like object and shot detection, trajectory prediction, event counting, player tracking, model quantization to automate **stat-tracking mobile basketball game videos** in real-time.
- Created a data annotation workflow, **accelerating ML model development lifecycle** with a 7× speedup.
- Built detector to **identify bikes** from marathon images to automate identifying penetration rate of bike brands.
- Deployed **cloud-based ML APIs** to serve scalable computer vision solutions, optimized models for efficiency.
- Mentored an intern in developing a domain-specific **human pose estimation** model for bike posture analysis.
- **Tools**: Python, PyTorch, YOLOv6, YOLOv8 Pose, ONNX, CoreML, FastAPI, Docker, GCP services, Weaviate.

Research Scientist Intern *Sept. 2020 – Aug. 2022*

- Developed an algorithm and created a dataset using Decathlon clothing products for **image-based virtual try-on**, preserving clothing texture, embroidery and handling complex person poses; published in BMVC'22.
- Trained new **semi-supervised image classification** algorithm using large-scale unlabeled data that requires 6× less compute, 5× less memory, boosts robustness compared to existing methods. Optimized method on **sport-or-not**, **yoga-pose** and **sport classification**, improving predictive accuracy; published in MMSports'21.
- Led and **managed all the steps of the two research projects** from ideation, to planning and development of algorithms, to design of the experiments according to industrial and business needs, leading to publications.
- **Tools**: Python, TensorFlow, PyTorch, OpenCV, NumPy, Scikit-learn, LabelMe, Docker, Gradio, HF Spaces.

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

- Designed accurate and efficient **deep learning** algorithms in **computer vision** for image generation, recognition, segmentation, object detection, addressing complex challenges. Tailored models like DINO, ViT, cGAN, ResNet, LeViT-UNet, DETIC, CLIP and SAM and applied unsupervised, self-supervised, **zero-shot learning** paradigms.
- Led publications and presented work at top conferences and journals like **WACV**, **BMVC**, **ICIP** and **IEEE TMI**, and workshops at **CVPR**, **ICML** and **MICCAI**, showcasing novel findings in computer vision, 890+ citations.
- Collaborated with **product teams** in industry and external researchers to develop innovative ML solutions.
- Mentored **15 students from undergraduates to Ph.Ds** in deep learning research, guiding development.
- **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, pair programming, and verified experimental steps like data preparation, model design, training, validation, and selection to **ensure successful project completion**.

Education

- **Concordia University** Montreal, Canada
  Ph.D. in Information Systems Engineering *Sep. 2021 – Dec. 2024*
- **Concordia University** Montreal, Canada
  MASc in Quality Systems Engineering *Sep. 2019 – Aug. 2021*
- **North South University** Dhaka, Bangladesh
  B.Sc. in Electrical & Electronic Engineering *May 2013 – Dec. 2017*

Skills

- **Programming Languages**: Python, Bash (Shell Scripting), HTML, CSS
- **Libraries**: PyTorch, TensorFlow, OpenCV, NumPy, Scikit-learn, ONNX, CoreML, Weaviate, Weights & Biases, Pytest.
- **Cloud Infrastructure Tools**: Google Cloud Platform, FastAPI, Docker, Gradio, HF Spaces, GitHub Actions.

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, ImageCLEF - **2nd Place** (Paper, Code, Leaderboard) 2021
- Nuclei Segmentation, 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

Open-Source Contributions

- keras-team/keras (GitHub Stars: >61000), Wrote tutorial code for 3D image classification.
- meituan/YOLOv6 (GitHub Stars: >5600), Fix export of models to ONNX format.
- kornia/kornia (GitHub Stars: >9500), Add MS-SSIMLoss reconstruction loss as a feature.

Datasets

- Bangladesh Road Scene Understanding Dataset for Autonomous Driving. In *ICIP*. 2024
- Public Synthetic Dataset of COVID-19 Chest X-rays. In *ICML Workshop*. 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

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 (Impact Factor: 7.7).
- 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 from microscopic slides**. In *Tissue and Cell*, 2021.
- Tamanna Rahman Reme. **Analysis of deep learning architectures on high variation Malaria parasite classification**. In *Tissue and Cell*, 2021.

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.