Lavsen Dahal

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Education

- **Duke University** — Durham, USA
  Ph.D. in Electrical & Computer Engineering (CGPA 4.0/4.0) — *Aug 2023 – Present*
  Relevant Coursework: LLMs, Deep Learning & Machine Learning, NLP
- **University of Girona** — Girona, Spain
  Erasmus+ M.S., Medical Imaging & Applications — *Sep 2017 – Aug 2019*
- **Visvesvaraya National Institute of Technology** — Nagpur, India
  B.Tech., Electrical & Electronics Engineering — *Aug 2010 – Jun 2014*

Patents & Inventions

- **XCAT3 Computational Phantoms of Anatomy and Disease**: Filed *July 2025*, Duke University Office for Technology Transfer; framework for anatomically accurate computational models enabling advanced simulation and imaging research.
- **XCAT3 Phantom Generation Pipeline**: Filed *July 2025*, Duke University Office for Technology Transfer; automated pipeline for scalable creation of synthetic phantoms, streamlining workflows and supporting large-scale validation studies.

Skills Summary

- **Languages**: Python, R, MATLAB, C++
- **Deep Learning**: PyTorch, MONAI, TensorFlow, HuggingFace
- **MLOps & Deployment**: Docker, Singularity
- **Distributed Training**: PyTorch DDP, SLURM

Experience

- **Center for Virtual Imaging Trials, Duke University** — Durham, USA
  Research Assistant / Associate — *Jun 2022 – Present*
  - **Vision Language Model**: Aimed at localizing disease in a self-supervised or weakly labeled setting, leveraging multi-modal integration to enable robust detection with minimal manual annotation.
  - **Segmentation Algorithm**: Increased number of anatomical structures segmented from full-body human scans by 40% via multi-modal fusion of complementary imaging inputs.
  - **3D Digital Twins**: Designed end-to-end pipeline generating 2,500+ anatomical 3D digital twin models (surface & voxel), powering large-scale synthetic imaging experiments available at `https://xcat-3.github.io`.
  - **Research Supervision**: Mentored 5+ graduate students on diffusion models and Monte Carlo simulations, producing anatomically realistic datasets supporting advanced flow and motion analysis.
- **Nepal Applied Mathematics and Informatics Institute for Research** — Kathmandu, Nepal
  Research Associate — *Jul 2019 – Aug 2020*
  - **Uncertainty Modeling**: Developed Monte Carlo Dropout framework for Bayesian uncertainty estimation in deep neural networks for segmentation, enabling automated filtering of low-confidence predictions.
  - **Object Detection**: Built RCNN-based vertebrae detection system to automate Cobb angle measurements for scoliosis, reducing manual measurement time; results presented at MICCAI workshop.
  - **AI Workshop Leadership**: Co-organized international AI workshop with 100+ participants; delivered sessions on generative models and advanced ML applications.
- **VICOROB, University of Girona** — Girona, Spain
  Research Intern — *Feb 2019 – Jun 2019*
  - **Image Super-Resolution**: Developed deep learning–based super-resolution model for brain MRI surpassing conventional methods in PSNR and SSIM; gains validated via improved segmentation accuracy in downstream tasks.
- **BioMedIA, Imperial College London** — London, UK
  Research Intern — *Jul 2018 – Aug 2018*
  - **Lung Cancer Classification**: Engineered deep learning model to distinguish benign vs malignant lung nodules using LUNA dataset.
- **Kantipur Engineering College** — Lalitpur, Nepal
  Lecturer — *Nov 2016 – Aug 2017*
  - **Classroom Leadership**: Designed and taught Computer Programming & AI courses with real-world projects; improved student proficiency and project completion rates.
  - **Undergraduate Mentorship**: Advised multiple senior theses from proposal to defense, guiding advanced algorithm implementation and research methods.
- **JSW Steel** — Maharashtra, India
  Project Manager — *May 2014 – Jun 2016*
  - **Project Management**: Directed cross-functional teams delivering multi-million-dollar technical projects; oversaw strategic planning, procurement, and infrastructure upgrades with on-time, on-budget completion.

Teaching Experience

- **Duke University** — Durham, USA
  Teaching Assistant — *2024-2025*
  - **Natural Language Processing**: Graded assignments, and held office hours to support graduate-level NLP coursework.
  - **Machine Learning and Deep Learning**: Assisted in course delivery and held office hours, provided student mentorship, and graded projects in advanced ML/DL topics.

Honors and Awards

- **Ph.D. Fellowship – 2023**: $500K+ full-ride scholarship awarded by Duke University.
- **Erasmus+ Global Scholar – 2017**: €42K full-ride scholarship awarded by European Union; 22 recipients globally.

Publications (Selected)

1. **Dahal, L.**, Bhandari, Y., Segars, P., & Lo, J. (2025). Five Models for Five Modalities: Open-Vocabulary Segmentation in Medical Imaging. In *CVPR 2025*.
2. **Dahal, L.**, Ghojoghnejad, M., Vancoillie, L., Ghosh, D., et al. (2025). XCAT 3.0: A Comprehensive Library of Personalized Digital Twins Derived from CT Scans. *Medical Image Analysis*.
3. **Dahal, L.**, Wang, Y., Tushar, F.I., Montero, I., et al. (2023). Automatic Quality Control in Computed Tomography Volumes Segmentation Using a Small Set of XCAT as Reference Images. *Medical Imaging 2023*.
4. **Dahal, L.**, Kafle, A., & Khanal, B. (2020). Uncertainty Estimation in Deep 2D Echocardiography Segmentation. *arXiv preprint*.

Full publication list: Google Scholar