# Ananta Bhattarai

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in *anantarb1*
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## Education

**Oct. 2020 – Sep. 2023**
**M.Sc. Computer Science**, *Technical University of Munich*, Munich, Germany
Focus Area: Computer Vision, Machine Learning
Thesis: 3D GAN Inversion with Deep Learning (**Accepted at WACV 2024**)
Supervisors: Prof. Matthias Nießner and Artem Sevastopolsky

**Sep. 2017 – Aug. 2020**
**B.Sc. Computer Science**, *Jacobs University Bremen*, Bremen, Germany
Selected Coursework: Software Engineering, Operating Systems, Computer Networks
Exchange semester at **Carnegie Mellon University**
Thesis: Scalable Optimal Variable Selection
Supervisor: Prof. Peter Zaspel

## Experience

**Apr. 2022 – Sep. 2023**
**Working Student Data Science/Machine Learning**, *Siemens*, Munich, Germany
- Worked on computer vision, robustness and explainable AI (XAI) projects under the supervision of Dr. Michael Lebacher and Prof. Florian Buettner
- Proposed novel method for aggregation of existing explanation methods to improve robustness and faithfulness (**Work got accepted at ICML 2024**)
- Designed a safety validation framework for autonomous trains with GANs (**Work got accepted at SAFECOMP 2023**)

**Aug. 2021 – Nov. 2021**
**Machine Learning Engineer**, *Floy*, Munich, Germany
- Implemented a pipeline for data processing, model training, and deployment
- Developed a U-Net segmentation model that segments lesions in an MRI Spine scan with a Dice Score of **0.83**
- Modified BioBERT language model such that it can answer whether radiologist reports indicate abnormalities in the Spine with an accuracy of **93%**

**May 2021 – Nov. 2021**
**Interdisciplinary Project Student**, *Newgate*, Munich, Germany
- Developed an ML model to detect real-time changes in returns co-movements in digital asset markets
- Implemented and integrated the model into the existing pipeline for simulation
- Improved risk management and enhanced cross-sectional investment strategies with the deployed model

**Sep. 2018 – May 2020**
**Research And Teaching Assistant**, *Jacobs University Bremen*, Bremen, Germany
- Teaching Assistant for Intelligent Mobile Systems course taught by Prof. Francesco Maurelli
- Teaching Assistant for Machine Learning course taught by Prof. Peter Zaspel
- Research with Prof. Francesco Maurelli on autonomous driving algorithms for Duckietown

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| Aug. 2019 –<br>Dec. 2019 | **Undergraduate Researcher**, *Carnegie Mellon University*, Pittsburgh, USA<br>○ Worked on deep learning research under the supervision of Prof. Ruslan Salakhutdinov<br>○ Proposed a novel approach to learning programmable potentials using deep learning<br>○ Led the experiments by running hyperparameter optimization and verifying the robustness of the model (**Work got accepted at AAAI Spring Symposium: MLPS 2021**) |
| June 2019 –<br>Oct. 2019 | **Research Assistant**, *Deutsches Forschungszentrum für Künstliche Intelligenz (DFKI)*, Bremen, Germany<br>○ Worked on a clustering project under the supervision of Dr. Daniel Harnack<br>○ Proposed an ML model to perform unsupervised clustering of robot trajectories<br>○ Implemented the proposed method, combining an LSTM auto-encoder and Gaussian mixture model |

## Projects

**TriPlaneNet: An Encoder for EG3D Inversion**, Project Page, Code
○ Proposed and implemented a novel 3D GAN inversion framework
○ Outperformed previous state-of-the-art methods with respect to photometric metrics
○ Work got accepted at **WACV 2024**

**Graph Neural Network based RANSAC**, Slides, Code
○ Proposed and implemented a different variant of RANSAC based on graph neural network
○ Applicable for outlier detection tasks
○ Benchmarked on feature matching problem and outperformed existing state-of-the-art methods

**Face Reconstruction on Highly Distorted Images**, Report, Code
○ Proposed and implemented a novel optimization scheme that comprises five steps (coarse-to-fine) and distortion-prior
○ Achieved plausible reconstructions in comparison to results obtained by applying straight-forward optimization

**Empathetic Dialogue Agent trained with Reinforcement Learning**, Report, Code
○ Developed a dialogue agent by incorporating reinforcement learning in the training
○ Trained with a similar reinforcement learning with human feedback strategy to how ChatGPT is trained but two years back
○ Reported metrics suggest our model is preferred over other state-of-the-art methods for empathetic conversations

**AlphaOne: Self-play Reinforcement Learning on Imperfect Information Games**, Report, Code
○ Proposed and implemented a self-play algorithm for imperfect information games
○ Showed the potential of the approach by comparing it with state-of-the-art methods

## Skills

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| Programming Languages | Python, C++, C, Java |
| Libraries | PyTorch, TensorFlow, scikit-learn, Pandas, NumPy, OpenCV, SciPy, Keras |
| DevOps | Git, Docker, AWS |

## Awards

o Outstanding Cambridge Learner Awards for scoring highest mark in Nepal in the November 2014 Cambridge International A Level examinations for Mathematics

## Languages

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| English | Fluent |
| Nepali | Mother Tongue |
| German | Basic |

## Publications

[1] Thomas Decker, <u>Ananta R. Bhattarai</u>, Jindong Gu, Volker Tresp, and Florian Buettner. *Provably Better Explanations with Optimized Aggregation of Feature Attributions*. ICML, 2024.

[2] Thomas Decker, <u>Ananta R. Bhattarai</u>, and Michael Lebacher. *Towards Scenario-based Safety Validation for Autonomous Trains with Deep Generative Models*. SAFECOMP, 2023.

[3] Ryan Mohr, Allan M. Avila, Soham Ghosh, <u>Ananta Bhattarai</u>, Muqiao Yang, Xintian Feng, Martin Head-Gordon, Ruslan Salakhutdinov, Maria Fonoberova, and Igor Mezic. *Combining Programmable Potentials and Neural Networks for Materials Problems*. AAAI Spring Symposium: MLPS, 2021.

[4] <u>Ananta R. Bhattarai</u>, Matthias Nießner, and Artem Sevastopolsky. *TriPlaneNet: An Encoder for EG3D Inversion*. WACV, 2024.