

Tooba IMTIAZ

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EDUCATION

FALL 2021 - PRESENT	PhD Candidate , ELECTRICAL ENGINEERING, <i>Northeastern University</i> , Boston	Advisor: Prof. Jennifer Dy
2018 - 2020	Masters , ELECTRICAL ENGINEERING, (GPA: 3.87/4.3) <i>Korea Advanced Institute of Science and Technology (KAIST)</i> , S. Korea	Advisor: Prof. In-So Kweon
2014 - 2018	Bachelors , ELECTRICAL ENGINEERING, (GPA: 3.93/4.0, Rank: 5 th /156) <i>National University of Sciences and Technology (NUST)</i> , Pakistan	Advisor: Prof. Faisal Shafait

WORK EXPERIENCE

SEP 2021 - PRESENT	Research Assistant MACHINE LEARNING LAB @ SPIRAL , <i>Northeastern University, Boston</i> <ul style="list-style-type: none">Developed an optimization-based sparse adversarial attack on images and evaluated its interpretability. (Pre-print under review.)Implemented Nerf-based 3D scene reconstruction from phone camera videos to facilitate at-home patient health monitoring.
SPRING 2023	Teaching Assistant EECE7397 Advanced Machine Learning, Northeastern University
SEP 2020 - AUG 2021	External Consultant for ML and AI ENDRESS+HAUSER , <i>Maulburg, Germany</i> <p>Proposed ML and CV-based solutions for process automation and optimization. Led two projects, both deployed to production:</p> <ul style="list-style-type: none">Deep learning for unsupervised 3D classification: used Autoencoders, Capsule architectures, and Implicit Neural Networks.Forecasting on time series: utilized DNNs and Temporal Transformers to predict compound concentrations in liquids using sensors measuring base physical quantities. Achieved ~ 96% accuracy w.r.t. specialized physical sensors.
SEP 2018 - AUG 2020	Research Assistant ROBOTICS AND COMPUTER VISION LAB , <i>KAIST, South Korea</i> <ul style="list-style-type: none">Bosch-RCV Project: Performed camera calibration, data collection, and vehicle trajectory estimation. Designed an occlusion-robust vehicle re-identification method using GANs for seamless tracking across a multi-camera surrounding awareness system.Universal Adversarial Perturbations: Developed novel adversarial attack algorithms. Published at CVPR, AAAI, and ACCV '20.
SEP 2015 - MAY 2018	Research Intern TUKL-NUST R&D CENTRE , <i>NUST, Pakistan</i> <ul style="list-style-type: none">Proposed table detection and parsing in document images using ML and CV (LSTMs, text classification, clustering algorithms).Implemented LSTMs for handwritten address recognition to sort postal mail.

PUBLICATIONS

[SAIF: Sparse Adversarial and Imperceptible Attack Framework](#) | Under review

T. Imtiaz, M. Kohler, J. Miller, Z. Wang, M. Sznaier, O. Camps, J. Dy

Devised a sparse adversarial attack using Frank-Wolfe, achieving SOTA results under tight sparsity and magnitude constraints on ImageNet & CIFAR10.

[Volumetric propagation network: Stereo-lidar fusion for long-range depth estimation](#) | IEEE RA-L 2021

J. Choe, K. Joo, T. Imtiaz, I.S. Kweon

Proposed a geometry-aware stereo-LiDAR fusion network for long-range depth estimation. I contributed to the network design and experiments.

[Understanding Adversarial Examples from the Mutual Influence of Images and Perturbations](#) | CVPR 2020

C. Zhang*, P. Benz*, T. Imtiaz, I.S. Kweon

Analyzed logits of clean images against additive perturbations and proposed a novel adversarial attack. I developed the loss objective and experiments.

[CD-UAP: Class Discriminative Universal Adversarial Perturbation](#) | AAAI 2020

C. Zhang*, P. Benz*, T. Imtiaz, I.S. Kweon

Proposed a novel UAP attack, causing a DNN to misclassify only a select group of classes. I contributed to the sampling strategy and experiments.

[Double targeted universal adversarial perturbations](#) | ACCV 2020

P. Benz*, C. Zhang*, T. Imtiaz, I.S. Kweon

Proposed a 'bidirectional' targeted UAP attack, such that classification labels are switched across a pair of classes. I designed the ablative experiments.

SCHOLARSHIPS AND AWARDS

2022	ICML '22 volunteer award
2020	Qualcomm Innovation Fellowship Award, South Korea (among the 20 awardees)
2014-2018	NUST Merit Scholarship (Awarded to top-3 GPA holders of cohort)
2017	Global UGRAD Exchange Program, US Dept of State (~ 7.6% selection rate)

SKILLS AND SERVICE

PYTHON	PyTorch, Tensorflow, Keras, Numpy, scikit-learn, Matplotlib
C / C++ / JAVA	Object-oriented programming, Data structures, frontend and backend dev
MISC.	MATLAB (Image and signal processing, Geometry and ML Toolbox, Simulink), Unix, gcc, Git, SQL, \LaTeX , ROS, AutoCAD
SERVICE	Reviewer for ICCV 2023 Workflow chair at AAAI 2024