Joshua Feinglass

I'm a Founder and Principal Investigator at Green Squirrel Research developing **generalizable** and **robust** models for the deployment of safe and reliable AI systems. I received my PhD in Computing Engineering (specialized in Machine Learning) from Arizona State University in December 2024.

During my PhD studies, I worked in the ASU APG lab where I was advised by Yezhou Yang. I interned at Microsoft Research, where I developed novel datasets, machine learning models, and benchmarks for forecasting and analyzing cybersecurity incident escalation, and Lawrence Livermore National Lab, where I developed a novel zero-shot deep learning architecture using image and natural language data sources. Prior to pursuing my Signal Processing/Machine Learning specialized Master's degree in 2016, I also interned for two summers at Honeywell Honeywell where I worked on web development, test automation scripts, electrical component diagrams, and hardware programming.

After receiving my Master's degree, I worked full-time as a Senior Digital Signal Processing Engineering at GD General Dynamics where I designed algorithms for spectral decomposition, detection, characterization, and classification of communication and radar signals before pursing my PhD.

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Google Scholar
Curriculum Vitae (PDF)
Github
Linkedin

Education

Aug. 2019 — Dec. 2024
Ph.D. in Computer Engineering w/ Machine Learning Specialization
Arizona State University, Tempe, AZ
Advisor: Yezhou Yang
University Graduate Fellowship awardee

Aug. 2016 — May 2018
M.S. in Computer Engineering w/ Machine Learning Specialization
Arizona State University, Tempe, AZ
GPA: 3.93/4.00

Aug. 2012 — May 2016
B.S. in Electrical Engineering
Arizona State University, Tempe, AZ
Barrett, the Honors College Graduate
Electrical Engineering Student Mentor
GPA: 3.85/4.00

Work and Research Experience

Nov. 2023 — Present
Green Squirrel Research, Huntsville, AL (Remote)
Founder/Principal Investigator, AI at GSR
Leading and conducting research for start-up specialized in machine learning and artificial intelligence for computer vision and natural language processing. Spearheading three separate product research and development efforts in robust extraction/search/encapsulation of documents and their tables/figures, segmentation and characterization of projectiles and ignition events in ballistic experiments, and first-principles energy prediction in manufacturing with Large Language Models (LLMs).

May 2023 — Aug. 2023
Microsoft Research, Redmond, WA
Research Intern, Augmented Learning and Reasoning
Mentor: Jack (Jay) Stokes, Scott Freitas
Developed novel datasets, machine learning models, and benchmarks for forecasting and analyzing cybersecurity incident escalation. Further explored potential implementation options and use cases to demonstrate feasibility and product impact, respectively.

May 2022 — Dec. 2022
Lawrence Livermore National Lab, Livermore, CA
Graduate Research Intern, Computing at LLNL
Mentor: Jayaraman Thiagarajan, Rushil Anirudh, Jayram Thathachar
Developed a highly generalizable Zero-Shot Learning architecture with pre-trained vision pipelines, automated external knowledge retrieval from natural language sources, and model regularization techniques.

May 2018 — Dec. 2019
General Dynamics Mission Systems, Scottsdale, AZ
Senior Digital Signal Processing Engineer, Trusted Space Solutions
Created specifications for the standard operation and packet-level communication of devices in an edge computing framework. Developed algorithms for detecting communication and radar signals of interest and estimating their time and frequency characteristics for downstream decoding, classification, and localization tasks. Automated and optimized the creation of data compression pipelines for efficient communication channels and downstream data visualization tasks based on project requirements.

Jan. 2020 — Dec. 2024
Arizona State University, Tempe, AZ
PhD Researcher, Active Perception Group
Mentor: Yezhou Yang
Explored concepts like knowledge representation/extraction, model generalization/robustness, and inference consistency/evaluation in Natural Language and Image Processing applications. First author of a novel information theory based evaluation of captions for semantics and fluency presented in ACL 2021, outlier detection/uncertainty estimation using domain interpolation based sensitivity analysis presented as a spotlight presentation in the NeurIPS 2022 INTERPOLATE workshop, an object detection work which introduces and addresses upstream and downstream task misalignment by computing object importance scores using semantic modeling and graph signal processing presented at WACV 2024, and an algorithm for detector-based object part enhancment in fine-grained zero-shot image captioning presented in EMNLP 2024 Findings.

Jan. 2017 — Dec. 2017
Arizona State University, Tempe, AZ
Master's Research Assistant, Image, Video, and Usability (IVU) Lab
Mentor: Lina Karam
Built software frameworks using C, Python, OpenCV, Ada, and Matlab on a Linux platform for data acquisition and signal processing on the Soli radar device. Developed biometric and gesture detection/estimation algorithms using machine learning, sensor fusion, feature point tracking, beamforming, spectral analysis and pattern recognition algorithms on Photoplethysmographic (PPG) and Frequency-Modulated Continuous-Wave (FMCW) signal information.

May 2016 — Aug. 2016

Honeywell, Phoenix, AZ

Intern, Test Services

Mentor: Craig Stevens, Bob Apodaca

Modified and updated PHP/HTML/CSS/JavaScript/Fusebox based web applications and tested any changes using a Debian VM. Created and restructured Perl scripts, Ladder Logic Programs (PLC), and other software programs used for Test Cell support. Implemented revisions to existing AutoCAD Electrical designs and developed a strain-gauge specimen box to fulfill the electrical and mechanical requirements of a work request from another department.

May 2015 — Aug. 2015

Honeywell, Phoenix, AZ

Intern, Test Services

Mentor: Craig Stevens, Bob Apodaca

Modified and updated PHP/HTML/CSS/JavaScript/Fusebox based web applications and tested any changes using a Debian VM. Created and restructured Perl scripts, Ladder Logic Programs (PLC), and other software programs used for Test Cell support. Implemented revisions to existing AutoCAD Electrical designs and developed a strain-gauge specimen box to fulfill the electrical and mechanical requirements of a work request from another department.

Publications

Towards Modeling the Implicit Ontologies of Natural Language for Vision-Language Benchmarks

Joshua Feinglass

Arizona State University (Dissertation). 2024.

Project BibTeX

TROPE: TRaining-Free Object-Part Enhancement for Seamlessly Improving Fine-Grained Zero-Shot Image Captioning

Joshua Feinglass, Yezhou Yang

Findings of the Association for Computational Linguistics: EMNLP 2024 (EMNLP Findings). 2024.

Project BibTeX

'Eyes of a Hawk and Ears of a Fox': Part Prototype Network for Generalized Zero-Shot Learning

Joshua Feinglass, Jayaraman J. Thiagarajan, Rushil Anirudh, T.S. Jayram, Yezhou Yang

CVPR 2024 Workshop on Representation Learning with Very Limited Images (CVPR Workshop). 2024.

Project BibTeX

Grounding Stylistic Domain Generalization with Quantitative Domain Shift Measures and Synthetic Scene Images

Yiran Luo, Joshua Feinglass, Tejas Gokhale, Kuan-Cheng Lee, Chitta Baral, Yezhou Yang

CVPR 2024 Workshop on Vision Datasets Understanding (CVPR Workshop). 2024.

Project BibTeX

Towards Addressing the Misalignment of Object Proposal Evaluation for Vision-Language Tasks via Semantic Grounding

Joshua Feinglass, Yezhou Yang

Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV). 2024.

Project BibTeX

Covariate Shift Detection via Domain Interpolation Sensitivity

Tejas Gokhale*, Joshua Feinglass*, Yezhou Yang
NeurIPS 2022 Workshop INTERPOLATE (NeurIPS Workshop). New Orleans, LA, 2022.
Project BibTeX * Authors contributed equally

SMURF: SeMantic and linguistic UndeRstanding Fusion for Caption Evaluation via Typicality Analysis
Joshua Feinglass, Yezhou Yang
Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL). Online, 2021.
Project BibTeX

Talks

Characterizing and Mitigating the Misalignment Between the Evaluation of Generative Models and their Intended Use Cases
Jan. 2024 Invited Talk for the Reliability of Generative Models in Vision Tutorial at WACV 2024

Predicting the Evolution of Cybersecurity Incidents
Aug. 2023 Microsoft Research (Redmond)

Covariate Shift Detection via Domain Interpolation Sensitivity
Dec. 2022 NeurIPS 2022 Workshop INTERPOLATE

Recognizing Unseen Classes with Part-Whole Prototypes
Aug. 2022 Summer SLAM at Lawrence Livermore National Lab

Identifying Features of Out-of-Distribution Examples and their ties to Improved Evaluation of Generation Tasks
Apr. 2022 Cognition and Intelligence Lab at ASU

SMURF: SeMantic and linguistic UndeRstanding Fusion for Caption Evaluation via Typicality Analysis
Aug. 2021 ACL 2021