Jefrey Bergl

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EDUCATION

University of North Carolina at Chapel Hill Expected Graduation: May 2026
BS *Computer Science and Applied Mathematics*
Dean's List (4 semesters)
Relevant Coursework: Graduate Machine Learning, Graduate Computer Vision, Graduate Deep Learning, Optimization for Machine Learning, Numerical Analysis, Advanced Programming Language Concepts

RESEARCH EXPERIENCE

UNC Chapel Hill Fall 2024 – Present
Undergraduate Research Assistant | Advisor: Prof. Thomas Hofweber

- Co-authored *The Black Tuesday Attack: How to Crash the Stock Market With Adversarial Attacks to Financial Forecasting Models* (submitted to Journal of Cybersecurity; see Publications).
- Developed adversarial perturbation framework for financial forecasting models; ran experiments on CNN and MLP architectures.
- Received $3,000 in undergraduate research funding to support the *Black Tuesday Attack* project.

PUBLICATIONS & PREPRINTS

Thomas Hofweber, **Jefrey Bergl**, Ian Reyes, Amir Sadovnik. *The Black Tuesday Attack: How to Crash the Stock Market With Adversarial Attacks to Financial Forecasting Models*. Submitted to *The Journal of Cybersecurity*, 2025. arXiv preprint, https://arxiv.org/abs/2510.18990.

PROJECTS

Cost-Effective Brain Tumor Detection with CNNs | *Technologies: Python, TensorFlow/Keras, scikit-learn, NumPy, Pandas, Matplotlib* Dec 2024

- Built a low-parameter CNN to classify grayscale brain MRI scans with an emphasis on minimizing false negatives for safe prescreening in resource-limited settings.
- Implemented a 3-block CNN with data augmentation, tuned filters, dropout, dense units, and learning rate. Compared against transfer learning baselines (ResNet-50, VGG-16) by unfreezing last 20 layers and adding a binary head.
- Our tuned CNN achieved Accuracy ≈ 0.85 and F1 ≈ 0.87; VGG-16: Accuracy ≈ 0.93, F1 ≈ 0.93; ResNet-50: Accuracy ≈ 0.86, F1 ≈ 0.87. Our model reduced the false-negative rate and slightly increased true positives vs. VGG while remaining far smaller and cheaper to deploy.
- Link to code: Github

Evaluating Vision Transformer Behavior in Real-World Settings | *Technologies: Python, PyTorch, HuggingFace Transformers, OpenAI CLIP, BLIP, TimeSformer* May 2025

- Investigated the real-world performance of five Vision Transformer models across 30 diverse images and videos to assess robustness beyond benchmark datasets.
- Developed an evaluation pipeline using PyTorch and HF models to collect classification outputs, captioning results, and VQA responses; curated systematic input cases to expose common error modes.
- Identified characteristic failure patterns: CLIP's sensitivity to rare classes, TimeSformer's difficulty with occluded action cues, BLIP's tendency toward generic captions, ViLT's susceptibility to perspective illusions, and ViT's poor age prediction under makeup/domain shift.
- Poster: ViT Evaluation Poster

TECHNICAL SKILLS

Programming Languages: Python, Java, C, LISP, Prolog, SML, MATLAB, Julia
Mathematics: Optimization, Probability & Statistics, Linear Algebra, Graph Theory, Numerical Methods, PDEs

PRESENTATIONS

AI@UNC
"Adversarial Attacks on Financial Forecasting Models" [slides]
Selected for Spotlight Presentation

References available upon request.