

# Jefrey Bergl

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## EDUCATION

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**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

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**UNC Chapel Hill**

Oct 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

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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

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**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  $\approx 0.85$  and F1  $\approx 0.87$ ; VGG-16: Accuracy  $\approx 0.93$ , F1  $\approx 0.93$ ; ResNet-50: Accuracy  $\approx 0.86$ , F1  $\approx 0.87$ . 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

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**Programming Languages:** Python, Java, C, LISP, Prolog, SML, MATLAB, Julia

**Mathematics:** Optimization, Probability & Statistics, Linear Algebra, Graph Theory, Numerical Methods, PDEs

## PRESENTATIONS

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### AI@UNC

“Adversarial Attacks on Financial Forecasting Models” [[slides](#)]

*Selected for Spotlight Presentation*

*References available upon request.*