Hamza Tahboub

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EDUCATION

- **Northeastern University, Khoury College of Computer Sciences** — Boston, United States
  Bachelor of Science — Computer Science and Mathematics; GPA: 3.96, Dean's List — 2021 – 2025
  - **Relevant Courses:** Practical Neural Networks, Adv. Linear Algebra, Statistics and Stochastic Processes, Adv. Programming with Data, Data Management and Processing (graduate), Number Theory, Programming in C++, Matrix Methods in Machine Learning, Advanced Technical Writing, Object-Oriented Programming, Logic and Computation, Group Theory, Theory of Computation

SKILLS

- **Languages**: Python, Java, C++, SQL, LaTeX, Lisp, MATLAB, C#
- **Tools**: PyTorch, Git, LangChain, Hadoop, Spark, NumPy, Pandas, Sklearn, Matplotlib, Mongo, Azure, GCP, AWS

EXPERIENCE

- **Professor Huaizu Jiang's Visual Intelligence Lab — Northeastern University** — Boston, MA
  Full-Time Undergraduate Research Fellowship — *Aug 2024 – Dec 2024*
  - Led a computer vision project on social interaction modeling from an egocentric/first-person perspective. Preparing a paper submission on our competitive method to NeurIPS 2025.
  - Designed and evaluated multimodal transformer-based architectures to leverage the unique advantages of our egocentric data (additional information such as what/who each agent is looking at) while mitigating disadvantages (such as the shakiness of the viewpoint).
  - Devised and formulated new loss functions to help the agent base its responses on strategic thinking, which work by pulling together the embeddings of utterances that should have the same strategies.
  - Tackled in addition the subproblem in social games of strategy classification of past utterances, achieving a joint accuracy of 78.2% compared to the 66.5% reported in the paper that introduced the task.

  Research Assistant — *Aug 2022 – Present*
  - Researched reasoning capacity of medium-sized language models and general long-form video understanding.
  - Demonstrated how, contrary to popular belief at the time, medium-sized LMs cannot benefit from chain-of-thought prompting in the same way that LLMs can on most tasks.
  - Carried out a comprehensive analysis of state-of-the-art methods, implementing papers such as "Towards Long Form Audio-visual Video Understanding" from scratch in PyTorch to begin to improve them.
  - Conducted root-cause analysis on the weaknesses of long-form video models, finding that their training strategies, which try to compress information into convenient features, do not allow for OOD generalization.
  - Was awarded the Summit undergraduate research award in support of my work, including funding.

- **Genentech, Subsidiary of Roche** — San Francisco, CA
  NLP Research Co-op — *July 2023 – Dec 2023*
  - Contributed to experimental medical NLP research, designing experiments and reviewing new methods.
  - Distilled capabilities from attention-based language models to smaller ones while maintaining accuracy, reducing long-term computation costs by over 95% and reducing reliance on closed-source models.
  - Curated a synthetic dataset of over 100k samples for training deep transformers for specialized medical QA.
  - Implemented models from papers for the computer vision team for cellular semantic segmentation.
  - Developed an embedding-based semantic search engine to retrieve from medical corpora of 150k+ documents using methods in retrieval-augmented generation.

- **Khoury College of Computer Sciences — Northeastern University** — Boston, MA
  Teaching Assistant — *Jan 2022 – July 2022*
  - Mentored over 80 students for two semesters as a TA for the Fundamentals of Computer Science course.
  - Provided guidance in office hours, graded assignments, and led labs in which students practiced new material.

PROJECTS

- **MarkovPatch: Random Image Masks for Interpretable AI** — *Fall 2022*
  - Applied image masks to a pre-trained DNN during inference to identify spatial features of significance.
  - Developed a stochastic mask generator by sampling a second-order Markov chain. The distribution parameters were adjusted to alter the size and spatial correlation of the masks' patches.
  - Demonstrated that the model attends more to contour features and attributes unique to each class.

- **Assigning TAs to Labs Using Evolutionary Computing** — *Fall 2022*
  - Formulated matching teaching assistants to lab sessions with constraints as a cost optimization problem.
  - Developed a program that applies evolutionary computing principles to search for the minimum-cost solution.
  - Wrote scoring functions to quantify progress and agents that "mutated" solutions to search for better ones.

CERTIFICATIONS

- **Deep Learning Specialization**: Neural Networks and Deep Learning Fundamentals, Hyperparameter Tuning, Regularization and Optimization, Structuring Machine Learning Projects, Convolutional Neural Networks, Sequence Models. (online course taught by Professor Andrew Ng, Summer 2022)