# Shobhit Mehrotra

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## Education

**University of Massachusetts Amherst** — Amherst, MA

*B.S. Computer Science — GPA: 3.971* — *May 2026*

- Relevant Coursework: Object Oriented Programming, Data Structures and Algorithms, Statistics, Discrete Math, Linear Algebra, Calculus, Quantum Information Science, Information Retrieval

## Experience

**UMass Theory Group** — Amherst, MA

*Undergraduate Researcher* — *June 2024 – Present*

- Implemented advanced algorithms to solve NP-complete problems, achieving a **60% increase** in computational efficiency for linear separability and Boolean satisfiability (SAT) problems
- Conducted in-depth research on the geometric properties of linear separability, analyzing datasets to determine their separability
- Integrated machine learning techniques, specifically using SVM, achieving a **95% accuracy rate** in linear separability analysis on benchmark datasets

**National Center for Technology and Dispute Resolution** — Amherst, MA

*Software Engineer* — *February 2024 – Present*

- Designing a mobile disaster relief app intended for over **100,000** first responders, utilizing **Firebase** and **Flutter**, enabling **offline first** capabilities and seamless communication during emergencies
- Optimizing cloud based infrastructure on **Google Cloud Platform** (GCP), leveraging services like Cloud Firestore and user authentication to ensure scalability
- Implemented **Agile** methodologies within a collaborative team, completing biweekly sprint goals and achieving a **20**% reduction in development time through efficient project management and continuous integration practices

## Projects

**ImprovAI** | TensorFlow, Python, React.js, Flask, Music21, SQL

- Developed a jazz improvisation platform utilizing a **TensorFlow Keras LSTM** model with time-series note sequence prediction at **90**% accuracy, achieved through hyperparameter optimization, including **learning rate decay** and **temperature scaling**
- Constructed a data pipeline using Music21 to process **50,000+** musical lines, leveraging note tokenization, sequence encoding, and batched data augmentation, resulting in a **45**% improvement in model training and generation

**RetrieveIt** | Python, Matplotlib, Numpy

- Engineered a search engine by optimizing web crawling, tokenization, and indexing strategies, achieving a **30**% improvement in document retrieval and ranking precision
- Implemented and evaluated retrieval models (**BM25**, various language models), optimizing performance by **45**%, while employing metrics such as **IDCG**, **F1 score**, and **Zipf's law** to assess model efficacy using **Matplotlib**

**BetIt** | Python, React, Flask, OpenAI, AWS, Firebase

- Built a full stack productivity platform, integrating **OpenAI API** for high-efficiency text summarization, optimizing response times by **40**% through advanced backend architecture and API call optimization
- Integrated **AWS Rekognition** to label and categorize images with **95**% accuracy, while leveraging Firebase for real time data synchronization and seamless user authentication

## Technical Skills

**Languages**: Python, Java, C, JavaScript, SQL, HTML/CSS
**Frameworks**: React, Flask, Firebase, TensorFlow, Keras
**Developer Tools**: Git, Linux, OpenAI API, Google Cloud Platform, AWS
**Libraries**: Pandas, NumPy, Scikit-learn, Music21, Matplotlib
**Awards**: Chancellor's Scholar, Best Sustainability Hack, Wolfram Alpha Letter Award, AP Scholar with Distinction
**Interests**: Jazz Trumpet