

Muhammad Khan

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EDUCATION

Loyola University Chicago - BS in Software Engineering, Minor in Philosophy
Harry S Truman College - Dual Enrollment (While in High School)
Nicholas Senn High School - High School Diploma

August 30th, 2021- Current 3.9 GPA
June 5th, 2019 - June 11th, 2021 4.0 GPA
Aug 2018 - May 2021

PUBLICATION

- M Khan, et al, "Identification and Analysis of the Spread of {Mis}information on Social Media"(CSoNET),* 2023

WORK AND VOLUNTEER EXPERIENCE

The Loyola University of Chicago

Computer Vision and Security Researcher

September 2023 - Current

- Developed object detection solutions with image segmentation, with a goal of distributing public health resources to Nigerian communities combating malaria.
- Coordinated satellite data collection missions, reducing cloud interference and improving data accuracy through precise monitoring of atmospheric conditions
- Trained and fine-tuned VideoMAEv2 models, achieving 65% precision in detecting human-initiated violence by integrating UniFormerV2 and VideoSWIN for superior spatial-temporal analysis.
- Constructed machine learning models (Mask-RCNN, Faster-RCNN) using Python, boosting detection accuracy by 18% through novel training methodologies via satellite data collection and enhanced customized datasets
- Expanded research to bridge AI, biophysics, philosophy, and psychology, exploring the cognitive mechanisms behind innate human violence detection.
- Utilized eye-tracking glasses to collect annotated videos, training models to replicate human gaze patterns and improving violence detection precision.
- Created an IRB-approved proposal involving human subjects, reinforcing model performance by incorporating temporal salience data from visual annotations.
- Implemented Python and JavaScript solutions to process Harmonized Sentinel-2 satellite data, classifying settlements and geological features with spectral band operations.
- Maintained and optimized server integrity with regular resource monitoring and dependency management, ensuring 99.9% uptime and peak performance.

Cybersecurity (AI/ML) Researcher

January 2022 - September 2023

- First-authored a research publication accepted at the 12th International Conference on Computational Data and Social Networks, contributing novel insights into misinformation propagation on social media.
- Led a team of graduate students and seniors, advancing research on COVID-19 misinformation propagation through a Dr. Scholl Foundation-funded project involving a 4-student undergraduate team.
- Developed Python software leveraging Twitter APIs to collect tweets and metadata, managing and processing ~50 million data points for accurate information/misinformation classification.
- Created optimized programs in Python and Java to remove redundant data (e.g., retweets) and sequester relevant information using unique tweet IDs.
- Modified and fine-tuned cutting-edge algorithms such as BERT to automate misinformation detection, improving classification accuracy up to 95%
- Engineered workarounds for API resource limits, employing dimensionality reduction and data compression techniques (e.g., coresets) to handle high data volumes efficiently.
- Proficient in Python, Java, TensorFlow, PyTorch, MMLabs, Pandas, NumPy, and Matplotlib for machine learning, data analysis, and visualization.

Computer Vision Research Fellow

May 2023 - June 2023

- Identified and integrated video transformers and datasets (Moments in Time, Kinetics, Something-Something V2) to develop a text-guided action recognition model for complex video analysis.
- Designed and implemented a Python configuration file to train the VideoSWIN Transformer using MMLabs repositories, achieving successful deployment.
- Diagnosed and resolved networking issues on Lambda Server, implementing alternative network solutions to ensure uninterrupted operations.

- Leveraged Argonne National Laboratories' Polaris supercomputer to train the VideoSWIN model on the Something-Something V2 (SSV2) dataset, accelerating research timelines.
- Collaborated closely with lab members, maintaining consistent progress and alignment across project deliverables.
- Developed deep expertise in state-of-the-art architectures and datasets, gaining advanced knowledge to train and fine-tune vision transformers effectively.

GlobeMed - Director of Finance

June 2022 - May 2023

- Secured over \$5,000 in funding by creating and submitting detailed funding requests on behalf of the chapter.
- Collaborated with the Director of Campaigns to acquire 4+ fundraising spots, ensuring continuous availability of funds for events and initiatives.
- Advocated successfully for chapter funding at Student Activities and Greek Affairs (SAGA) hearings, achieving a 20% increase in budget allocations compared to previous years and expanded vendor access to student organization
- Developed an annual budget in partnership with the executive board, optimizing fund distribution across operations, events, and outreach activities.

Private Tutor

Sep 2021 - Feb 2022

- Elevated student performance from C averages to A- grades by providing personalized, one-on-one academic support in math.
- Designed tailored lesson plans aligned with students' individual learning styles, resulting in 30% improvement in test scores on average.
- Identified and closed knowledge gaps by adapting teaching strategies, boosting students' confidence and comprehension.
- Taught essential skills such as study techniques, time management, and exam strategies, enabling students to perform consistently better in high-pressure situations.
- Facilitated seamless remote learning through Zoom and Google Classroom, ensuring 100% attendance and engagement during virtual sessions.

Chemistry Research Lab Intern

July 2019 - August 2019

- Synthesized N-Heterocyclic ligands through multistep chemical processes, achieving a 95% purity rate in final products.
- Operated advanced analysis equipment, including NMR and GC-MS, to accurately verify chemical compositions and structure.
- Mastered the use of diverse lab equipment and implemented proper sanitation protocols, ensuring compliance with safety standards and minimizing contamination risks.

Nicholas Senn High School

Local School Council Student Representative

January 2020 - December 2020

- Represented the student body at Local School Council (LSC) meetings, addressing key issues related to rules, staff, and curriculum, and influencing decisions on proposals by contributing over 10 actionable suggestions.
- Facilitated discussions on public comments regarding school operations, leading to the implementation of three new solutions aimed at improving student engagement.
- Assisted in developing a Continuous Improvement Work Plan (CWIP), outlining strategic initiatives for school enhancement across leadership, culture, and curriculum areas.
- Participated in the selection process for assistant principal candidates, contributing to interviews that led to hiring individuals with a 90% satisfaction rate from faculty and staff.

AWARDS

- Dean's List (2021 - 2023)
- Model UN 2021 Best Delegate (2021)
- High Honor Roll (2018 - 2021)
- QuestBridge Match Finalist (2020)
- IB Completion with Distinction (2020)
- Verizon Innovative Learning Second Place Finalist (2018)
- David Prasse Scholarship (2021 - 2025)
- John Grant Health Equity Award - 2025

SKILLS, LICENSES & CERTIFICATIONS

- Bilingual in Urdu and English • Python • Java • Data Analysis and Visualization • AI Research and Development •
- Basics of Health Privacy • HIPS for Social and Behavioral Investigators • Social and Behavioral Research Conduct •