

AYUSH KUMAR SHAH

Ph.D. student in Computer Science

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📧 @ayushkumarshah 💼 @ayush7 💻 shahayush.com 🏷 Ayush Kumar Shah

SUMMARY

- Extensive theoretical and practical background in machine learning and computer vision, with experience in research and experimental design.
- Proficient in the deep learning pipeline: data analysis and cleaning, pre-processing, model design and training, and model evaluation, usually in PyTorch.
- Excellent teamwork, communication, and writing skills developed through previous industry experience, research publications, poster presentations, and talks.
- **Research Interests:** Pattern recognition, computer vision, detection and recognition of graphical structures, speaker understanding, multi-modal deep learning, natural language processing, visual scene parsing.

WORK EXPERIENCE

Amazon - Alexa AI

Applied Scientist Intern

Sunnyvale, California

May 2022 – Aug 2022

- Reduced annotation costs and training time, with competitive speaker identification results in voice assistants (e.g., Alexa) using semi-supervised techniques (Alexa Speaker Understanding team).

Fusemachines

Machine Learning Engineer

Kathmandu, Nepal

June 2019 – Aug 2020

- Optimized a client's business decisions for chemical products that go unsold using boosting classifiers.
- Automated bank data extraction by building a 95% accurate handwritten text (English & Nepali) recognizer.
- Increased a subscription-based e-commerce client revenue by 6% creating a recommendation system.
- Democratized AI by preparing course materials for Fusemachines AI Education Programs.

EDUCATION

PhD in Computing and Information Sciences, CGPA: 3.92/4

Rochester Institute of Technology (RIT)

Aug 2020 – Present

Rochester, NY, USA

Research Group: Document and Pattern Recognition Lab (DPRL)

Area of focus: extraction and visual parsing of graphical structures and notations, focusing on mathematical formulas and chemical diagrams in documents.

Relevant Courses: Pattern Recognition, Computer Vision, Mathematics for Deep Learning, Natural Language Processing, Software Engineering.

Bachelors in Computer Engineering, CGPA: 3.96/4

Kathmandu University

Aug 2015 – Oct 2019

Kavre, Nepal

Relevant Courses: Artificial Intelligence, Data Structures and Algorithms, Algorithm and Complexity, Software Engineering, Probability and Statistics, Machine Learning, Speech and Language Processing, C, C++.

RESEARCH EXPERIENCE

Document and Pattern Recognition Lab (DPRL), RIT

Graduate Research Assistant

Rochester, New York

Aug 2020 – Present

- Improved accessibility of mathematical information by creating innovative search engines, interfaces, and algorithms for extracting and recognizing math, including a new open-source math formula extraction pipeline for PDF documents.
- Accelerated the math formula recognition system by 6 times by implementing a custom dataloader with dynamic batch size for full GPU utilization in a distributed parallelization framework.
- Helped the document recognition community to visualize and evaluate graphical recognition results and errors, including specific type of errors in place, by building a new open-source visualization tool.

PUBLICATION

- **A. K. Shah**, A. Dey, and R. Zanibbi, “A Math Formula Extraction and Evaluation Framework for PDF Documents,” in Document Analysis and Recognition – ICDAR 2021, Cham, 2021, pp. 19–34. doi: 10.1007/978-3-030-86331-9_2
- B. M. Amador, M. Langsenkamp, A. Dey, **A. K. Shah**, and R. Zanibbi. 2023. “Searching the ACL Anthology with Math Formulas and Text”. In Proceedings of the 46th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR ’23). Association for Computing Machinery, ACM, New York, NY, USA, 5 page, accepted

TEACHING EXPERIENCE

Rochester Institute of Technology

Graduate Teaching Assistant

Rochester, New York

Aug 2022 – Dec 2022

- Course: Introduction to Machine Learning

Samriddhi College

Computer Science Instructor

Kathmandu, Nepal

Jan 2020 – June 2020

- Educated undergraduate Computer Science students about “Foundations in AI: Computer Science and Mathematics” including topics like Introduction to AI, CS Fundamentals, Python, Data Structure, DBMS.

TECHNICAL SKILLS

Programming Languages

Python, R, Matlab, C, C++, JAVA

Python Packages

Pytorch, Tensorflow, Scikit-Learn, OpenCV, Nltk, Pandas, Numpy, Matplotlib, Fastapi, BeautifulSoup, Regex, NetworkX, Jupyter

Database

MySQL, MongoDB

Miscellaneous

Git, Github, Bash, L^AT_EX, Jira, Linux, Arduino, Raspberry-pi

HONORS AND AWARDS

RIT Ph.D. Merit Scholarship/Assistantship. Financial Support for Ph.D. at RIT. 2020 – Present

Kathmandu University Merit-based scholarship (4x). \$440 worth scholarship awarded for securing the highest GPA in the Computer Engineering cohort (4/7 semesters). 2015 – 2019

Fusemachines Artificial Intelligence Scholarship Program. Selected among thousands of candidates nationwide for fuse.ai Artificial Intelligence Scholarship Online Course. Nov 2018

American Society of Nepalese Engineers Merit Award. A merit worth \$200, rewarded to the entrance topper of each university in Nepal, seeking admission for undergraduate degrees. May 2016

46th International Physics Olympiad (IPhO) Contestant. One of the largest olympiads for high school Physics enthusiasts with 5 contestants, each from 100 participating countries. June 2015

TALKS

Research Idea Ring (RIR) talk on “Line-of-sight with Graph Attention Parser (LGAP) for Math Formulas” at RIT. April 17, 2023

Poster presentation on “Reconstructing the Structure of Molecular Diagrams in PDF Documents using a CNN-Attention-Based Parsing Model” at the Molecule Maker Lab Institute (MMLI) All-Institute Retreat at **University of Illinois Urbana-Champaign (UIUC)**. Sept 28, 2022

Guest lecture on “Bayesian Decision Theory” for RIT’s undergraduate course - Intro to Machine Learning (40 students). Sept 5, 2022

Research Idea Ring (RIR) talk on “A Fast and Interpretable Context-aware Parser for Isolated Formulas and Chemical Diagrams” at RIT. April 7, 2022

Poster presentation on the MathSeer extraction pipeline at the 16th International Conference on Document Analysis and Recognition ICDAR 2021, Lausanne, Switzerland virtually. Sept 9, 2021