ROBIK SHRESTHA

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A Ph.D. candidate with publications on scrutinizing and improving robustness of deep learning systems. Seeking research positions for computer vision/natural language processing/scalable and trustworthy AI.

Research Interests: Deep Learning, Bias-Resilience, Computer Vision/Vision+Language, Concept Learning and Continual Learning

WORK AND RESEARCH EXPERIENCE

Ph.D. Candidate, *Rochester Institute of Technology* Aug 2017 – Present

- Published 9 papers demonstrating failures of existing deep learning systems. Provided simpler, yet more robust solutions.
- Showed that existing bias mitigation methods can be *right for the wrong reasons*. Built simpler methods that outperform state-of-the-art debiasing methods.
- Developed *OccamNets* that apply Occam's razor to architecture design to *discard spurious factors* in the datasets.
- Developed *REMIND,* a model based on hippocampal indexing theory to enable online *continual/lifelong learning* using replay.
- Developed *RAMEN*, a Visual Question Answering system that generalizes to *natural and synthetic domains.*

Research Intern, *Adobe Inc* May - Oct 2021

- Improved sensitivity of vision and language embeddings to *fine-grained concepts* using *contrastive learning methods* with algebraic constraints.
- Tested fine-grained concept sensitivity by collecting *image-text pairs with small conceptual differences.*
- **Team:** Dr. Kushal Kafle, Dr. Scott Cohen, Dr. Zhe Lin

Research Assistant, *ITEL Laboratories* Jul 2018 - Mar 2021

- Built a *floor material classification system* to enable semi-automated insurance claims processing.
- Enhanced robustness by improving *bias-resilience*, *model calibration* and *out-of-distribution detection*.
- The project partially funded my Ph.D. research at RIT.

Teaching Assistant, *RIT* Spring 2018

- Collaborated with the course instructor Dr. Guoyu Lu to teach and assess Masters and Ph.D. students for the course of *MultiView Geometry.*

Software Engineer, *Viveka Health* Feb 2014 - Apr 2016

- As a first hire for this startup, I helped develop a *fraud detection engine* for U.S. health insurance claims that saved *$1M+* for *25K+ lives* through various employers and payers.
- Was involved in building the team by interviewing and hiring personnel and designing+implementing the full stack: cleaning up/loading data to add new clients, implementing fraud, waste, abuse detection engine, and designing UI + reports

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Software Engineer, *Yomari Incorporated* Nov 2012 - Feb 2014

- Developed *business intelligence solutions,* including ETL scripts and analytics reports for Nepal Telecom and international retailers.

PUBLICATIONS

1. **Robik Shrestha,** Kushal Kafle, Christopher Kanan. "OccamNets: Mitigating Dataset Bias by Favoring Simpler Hypotheses." *European Conference on Computer Vision (2022) (Oral Presentation, Top 2.7%)*

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2. **Robik Shrestha,** Kushal Kafle, Christopher Kanan. "An investigation of critical issues in bias mitigation techniques." *IEEE/CVF Winter Conference of Applications on Computer Vision* (2022)

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3. Usman Mahmood, **Robik Shrestha** et al. "Detecting Spurious Correlations With Sanity Tests for Artificial Intelligence Guided Radiology Systems." *Frontiers in Digital Health (2022)*

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4. Damien Teney, Kushal Kafle, **Robik Shrestha** et al. "On the Value of Out-of-Distribution Testing: An Example of Goodhart's Law." *Neural Information Processing Systems (2020)*

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5. Tyler Hayes*, Kushal Kafle*, **Robik Shrestha***, Manoj Acharya and Christopher Kanan. "REMIND Your Neural Network to Prevent Catastrophic Forgetting." *European Conference on Computer Vision* (2020). (* = equal contributions)

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6. **Robik Shrestha,** Kushal Kafle, and Christopher Kanan. "A negative case analysis of visual grounding methods for VQA." *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics* (2020).

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7. Kushal Kafle, **Robik Shrestha**, and Christopher Kanan "Answering questions about data visualizations using efficient bimodal fusion." *The IEEE Winter Conference on Applications of Computer Vision* (2020).

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8. **Robik Shrestha**, Kushal Kafle, and Christopher Kanan. "Answer them all! toward universal visual question answering models." *Proceedings of the IEEE conference on computer vision and pattern recognition* (2019).

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9. Kushal Kafle, **Robik Shrestha**, and Christopher Kanan. "Challenges and prospects in vision and language research." *Frontiers in Artificial Intelligence* (2019).

INVITED TALKS AND GUEST LECTURES

- "**Dataset Bias in Vision and Language Tasks: Problems and Potential Solutions**" for *Center for Human Aware AI (CHAI)*, Rochester, NY (Fall 2021)

- "**An Introduction to Bias Mitigation Techniques**" for the *Deep Learning course taught by Dr. Christopher Kanan*, RIT, (Spring 2020 and 2021)

REVIEWING EXPERIENCE

- International Conference on Learning Representations (ICLR) (2022)
- Neural Information Processing System (NeurIPS) (2022)
- IEEE/CVF Winter Conference of Applications on Computer Vision (WACV) (2021)
- Association for the Advancement of Artificial Intelligence (AAAI) (2019/20)
- Conference on Empirical Methods in Natural Language Processing (EMNLP) (2019/20)
- European Association for Computational Linguistics (EACL) (2020)
- Natural Language Engineering (NLE) (2020)
- IEEE Transactions on Circuits and Systems for Video Technology (ICSVT) (2020)

TECHNICAL SKILLS

- **Languages:** Python, Javascript, Shell Scripting
- **Frameworks/Tools:** PyTorch, Pytorch-Lightning, Tensorflow, Scipy, Pandas
- **Others:** AWS, MTurk, D3.js, Past: Java, C/C++

EDUCATION

Ph.D. in IMAGING SCIENCE **Aug 2017 - Current**
Chester F. Carlson Center for Imaging Science, RIT, Rochester Institute of Technology
Relevant Courses: Deep Learning Systems for Vision; Mathematics for Deep Learning; Image Processing and Computer Vision; Human Visual System; Principles of Statistical Data Mining; Probability, Noise and System Modeling
Advisor: Dr. Christopher Kanan | **Research Group:** kLab

B.E. in COMPUTER ENGINEERING **Oct 2008 - Dec 2012**
Institute of Engineering, Tribhuvan University, Nepal
Full Merit-Based Scholarship, Obtained 1st rank
Relevant Courses: Image Processing and Pattern Recognition, Artificial Intelligence