Rajesh Shrestha

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RESEARCH INTEREST

Interested in unsupervised learning including generative models, representation learning, and multi-modal learning.

EDUCATION

Oregon State University — GPA: 4.0 **Corvallis, Oregon, USA**
Ph.D. Major in Computer Science and Minor in Artificial Intelligence *September 2021 - Current*

Pulchowk Campus,IOE — Grade: Distinction **Pulchowk, Lalitpur, Nepal**
Bachelor's Degree in Electronics and Communication Engineering. *November 2014 - September 2018*

WORK EXPERIENCE

Graduate Research Assistant
September 2021 - Current
Oregon State University

Unconditional diffusion generative models for inverse problems and conditional generation.
(Ongoing) Advised: Prof. Xiao Fu

- Most of existing methods try to approach this problem from guidance perspective. This involves using an approximation and highly depend on the guidance strength. This often leads either the generated images being inconsistent with the measurement or has low image quality.
- We view this problem with the lens of optimization and propose a better method in terms of quality of image, consistency with measurements and number of score evaluation.

Provable recovery of channel recovery from bits
Funded: MLWiNS (NFS/Intel) Advised: Prof. Xiao Fu

- Propose ADMM based recovery method for channel state information from compressed and quantized bits.
- Decouple the measurement consistent likelihood and channel array manifold constraint for effective recovery.
- Show that our method can provably recover the channel under realistic assumptions.

Exploratory system to learn target model Advised: Prof. Arash Termehchy

- Propose exploratory training method that collaborates with users to learn a target model.
- Perform user-study over real datasets on modeling human learning.
- Used a game-theoretic framework that models the joint learning of user and system to reach a desirable eventual stable state, where both user and system share the same belief about the target model
- An adaptive method was proposed for selecting examples to the users for feedback based on the model of the system and the user model on the data.
- Learning is done from these from noisy annotations and our method is shown to outperform existing works based on the convergence of the models and accuracy of the converged model.

Graduate Teaching Assistant
Sept 2021 - Mar 2023
Oregon State University

CS340 - Introduction to Database Prof. Michael Curry, Prof. Danielle Safonte

- Collaborated closely with professor to design the assignments and develop the autograder.
- Assisted the student learning through office hours and ed discussion.
- Collaborate with other TAs for grading and providing feedback

Machine Learning Engineer
Level 3, Level 2 and Associate
Fusemachines Inc., Kathmandu, Nepal *Oct 2018 - Aug 2021*

- **Recommendation systems for Push Notification Advertisement**
  - Collaborate client's team to design ETL data pipeline
  - Develop and experiment scalable recommendation models with drastic performance improvement in both offline data and production.
  - Work on deployment of the new changes without affecting the production.
  - Automate the daily ETL, training, and model update process to serve millions of push notifications per day.

  - *Tools and Techniques used:* Deep Factorization machines, Reinforcement learning techniques, Apache Spark, Jenkins, Lambda, Redshift, etc.
- **Field value extraction for semi-structured documents**
  - Worked in a team to create a product that detects and extracts values of specified fields from scanned files.
  - *Tools and techniques used:* Registrations, clustering, text recognition using CRNN etc.
- **Speech Recognition System for the Nepali language**
  - Worked in a team to create a product for the speech recognition of Nepali language.
  - *Tools and techniques used:* RNN, CTC, EESEN etc.
- **Managerial and other roles**
  - Supervised two machine learning engineers and guided in their project.
  - Assisted HR in hiring of new machine learning engineers.
  - Created teaching contents, assignments, and projects for fuse.ai and fellowship program

PUBLICATIONS

- **Rajesh Shrestha**, and Bowen Xie. "Conditional image generation with pretrained generative model." arXiv preprint arXiv:2312.13253 (2023). link
- **Rajesh Shrestha**. "Natural Gradient Methods: Perspectives, Efficient-Scalable Approximations, and Analysis." arXiv preprint arXiv:2303.05473 (2023).link
- Omeed Habibelahian, **Rajesh Shrestha**, Arash Termehchy, and Paolo Papotti. "Exploratory training: when trainers learn." In Proceedings of the Workshop on Human-In-the-Loop Data Analytics (HILDA '22). Association for Computing Machinery, New York, NY, USA, Link
- **Rajesh Shrestha**, Omeed Habibelahian, Arash Termehchy, and Paolo Papotti. 2023. "Exploratory Training: When Annonators Learn About Data." Proceedings of the ACM on Management of Data. Link
- **Rajesh Shrestha**, et al. "Downlink MIMO Channel Estimation from Bits: Recoverability and Algorithm." IEEE Transactions on Signal Processing (Under review) Link.

RELEVANT PROJECTS

- **Camera Model Identification to authenticate digital images:** Use of image processing and modern deep learning with ensembling techniques for blind source camera identification of digital images pdf

HONOR AND AWARDS

- **Excellent Project Award** (Fusemachines Inc.): Award given for dedication and excellence in the project of Push Notification Recommendation System.
- **Private and Secure AI Scholarship** (Facebook and Udacity): Ranked in top 200/5000 in a challenge course and got a scholarship for Computer Vision Nanodegree.
- **AI Fellowship** (Fusemachines Inc.): Ranked in top 20 and got a fellowship for Edx AI Micromaster course from Columbia University.
- **Best Engineering Award, Panasonic Award** (ABU Robocon): Represented Nepal in ABU Robocon 2016 and won award for consistent performance in control and navigation of an autonomous robot.
- **Fellowship for Bachelor's** (Institue of Engineering, Pulchowk Campus): Ranked among top 100 out of 15000 applicants and got a full scholarship for Bachelor's in Electronics and Communication Engineering.

SKILLSETS

Generative models, diffusion, GANs, normalizing Flows, reinforcement learning, machine learning, deep learning, computer vision, recommendation system, etl, spark, jenkins, probabilistic graphical model, optimization, estimation, signal processing, embedded programming, python, git, matlab, bash, ssh, C, C++, pytorch, numpy, docker, opencv, pandas etc.