

KUSHAL KUMAR

Applied Scientist II @ Amazon, New York

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ACADEMIC DETAILS

Year	Education	College	Grade
2014-2018	B.S. in Mathematics and Scientific Computing [#]	Indian Institute of Technology, Kanpur	8.9/10.0

[#] With a **Minor** in Machine Learning and Applications within Computer Science department with GPA of 10.0

KEY PUBLICATIONS

- Unsupervised Multi-Modal Representation Learning for Retrieval of Similar Products at E-commerce Scale, CIKM 2023
- PAVE: Lazy-MDP based Ensemble to Improve Recall of Product Attribute Extraction Models, CIKM 2022
- Solving Price Per Unit Problem: Formulating Fact Extraction as Question Answering, KDD TrueFact 2021

APPLIED SCIENTIST II @ AMAZON.COM

(May 2020 - present)

- **DEMETER: Scaling Product Variations Program in Softlines** (Mentor: Rob Barton | Oct'23 - present)
 - Designed DEMETER, a scalable GenAI pipeline to fundamentally change product variations program in softlines
 - Trained novel representation models, used LLMs with ICL to automate match decisions & summarize variations
 - Deployed the pipeline improving recall (RE) to 74% @ 99% precision (PR), reducing human workload by five times
- **MERGEN: Multi-Modal Representation Learning for Blocking Products** (Mentor: Tarik Arici | Sep'22 - Oct'23)
 - Enhanced CLIP training procedure using product taxonomy to scale representation learning for product retrieval
 - Studied ANNS on these vectors to develop a policy for choosing pareto-optimal configurations based on use-case
 - Deployed retrieval service, called MERGEN, yielding 8% higher blocker RE @ 9% reduction in neighbor volume
- **PAVE: Product Attribute Value Ensemble** (Mentor: Anoop S V K K Saladi | Mar'21 - Sep'22)
 - Proposed a novel RL agent that improves recall of traditional attribute extraction models without dropping PR
 - Trained PAVE agent with KB and novel rewards to get 10% absolute lift in RE. This work was accepted in CIKM'22
- **Solving Price Per Unit Problem in Consumables** (Mentor: Tarik Arici | May'20 - Mar'21)
 - Built a two-step QnA framework for fact extraction task to extract price per unit (PPU) using product description
 - Achieved < 50ms latency due to lightweight multi-span model. This work was accepted in KDD workshop '21

SALIENT PROJECTS

- **Automated Attribution of Value at Risk (VaR)** (Senior Risk Analyst @ Goldman Sachs | Jun'18-Apr'20)
 - Automated portfolio VaR changes report using correlation-based clusters on multivariate Risk Factor vectors
 - Optimized clustering with PCA and created explanations using decision trees to reduce manual workload by 20%
- **Predicting Enhanced Satellite Images** (Research Intern @ IBM Research | Mentor: Jagabondhu Hazra | May'17 - Sep'17)
 - Predicted high resolution Landsat-like weekly image from coarse Modis Daily image using prior information
 - Implemented IDL based work on FSDAF algorithm in Python, making it independent of NASA's ENVI tool
- **Short Story Endings** (IITK | Mentor: Prof. Harish Karnick | Jan'18-Apr'18)
 - Built a binary classifier that predicts one of the two endings for the given four sentences of a story
 - Used ROCStories Corpora as the training set, and achieved an accuracy of 63% using feature ensemble methods
- **Predict Word from Brain Activity** (IITK | Mentor: Prof. Piyush Rai | Aug'16-Nov'16)
 - Predicted the word from a new brain activity query given 300 fMRI brain scan images of 5 persons
 - Tested several models like Multiclass Regression, SVM, Naive Bayes, LDA & LASSO to get best accuracy of 57/60
- **Fixing Degraded Facial Images using GANs** (Self Project | Dec'19-Jan'20)
 - Used true and degraded facial images to train a GAN model that generates restored image from a degraded image
 - Trained 4-layer GAN on 10k training data in Tensorflow and modified discriminator loss to get faster convergence

TECHNICAL SKILLS

Languages: Python • SQL • Scala • \LaTeX **AI/ML:** AWS • Spark • HuggingFace • Pytorch • Tensorflow • RLlib

KEY CURRICULAR ACHIEVEMENTS

- **General Proficiency Medal** for graduating with the highest CGPA in Mathematics & Scientific Computing department
- Recipient of the **Academic Excellence Award** on two occasions for achieving the highest semester GPA in the batch
- Achieved an **All India Rank - 933** in IIT-JEE Advanced 2014 examination, competing against 1.35 million candidates
- Recipient of fellowships such as **National Talent Search Exam**, **Kishore Vaigyanik Protsahan Yojana** and **INSPIRE**

KEY CO-CURRICULAR ACHIEVEMENTS

- Received the **Special Appreciation Award** for contributions to IIT Kanpur cricket team as the captain
- **Won bronze medal** as the captain in Inter-IIT 2017 among 21 participating colleges and **gold medal** as a player in 2015
- Served as a **Student Guide in Counseling Service**, mentoring nine freshmen to foster personal and academic growth
- Successfully completed a year long **National Cadet Corps (NCC) camp** in IIT Kanpur between 2014-2015