

# Rakesh Bal

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## Education

### University of California Los Angeles

Master of Science in Computer Science | GPA - 3.81/4.0

### Indian Institute of Technology (IIT) Kharagpur

Bachelor of Technology in Computer Science and Engineering | GPA - 9.04/10.0

Los Angeles, CA

Sep'21 - Jun'23

Kharagpur, India

Jul'16 - May'20

## Work Experience and Internships

### Amazon Web Services (AWS)

Applied Scientist Intern - Project Code: [GitHub](#)

- Analysed the performance of Protein LLMs (from Transformers - BERT, T5, GPT) on Drug Target Interaction (DTI) problem
- Obtained 20% & 12% improvement with ProtBERT over two datasets compared to the baseline with significant cost reductions
- Employed large AWS GPU Clusters and services like **S3**, **EC2**, **SageMaker**, **Lambda** for training pipelines and dashboards
- Devised ways to add Physics-based equations and cross-attention to the models and published them in Amazon ML conference

### Goldman Sachs

Analyst, Engineering Division

- Integrated two internal bug & issue tracking softwares as a full-stack development project and worked on their cloud migration
- Implemented backend (with RESTful APIs) using Java/SpringBoot and frontend using TypeScript/Angular & Redux
- Coordinated with end-users for the entire SDLC; deployed project to **production** and handled adoption by over **10000** users

### University of California Los Angeles

Research Assistant

- Augmented Protein & Molecule contact maps using Diffusion Docking and AlphaFold to DTI models and attained 10% boost
- Experimented with different novel cross-attention and contrastive loss architectures for modeling Drug-Protein Interaction

### Accenture Technology Labs

Research Intern

- Developed stock price prediction models using news articles and knowledge graphs to incorporate real-world domain knowledge
- Applied GCNs with events for real-world stock scenarios leading to performance improvement of 5% over the baseline models

### University of California Los Angeles

Graduate Teaching Associate

- Managed and led discussion sections/office hours for **500** undergrad students in CS32 and Chem 20A courses for 5 quarters

## Publications

### Analysing the Extent of Misinformation in Cancer Related Tweets

[\[Link\]](#)

- Rakesh Bal\*, Sayan Sinha\*, Swastika Dutta, Rishabh Joshi, Sayan Ghosh, Ritam Dutt
- 14th International AAAI Conference on Web and Social Media (**ICWSM 2020**) [27 citations]

### Two-Sided Fairness in Non-Personalised Recommendations

[\[Link\]](#)

- Aadi Swadipthio Mondal\*, Rakesh Bal\*, Sayan Sinha\*, Gourab K. Patro
- 35th AAAI Conference on AI (**AAAI 2021**) Student Abstract and Poster Program

\* - equal contribution

## Relevant Projects

### Autonomous Underwater Vehicle (AUV), IIT Kharagpur

[\[Link\]](#)

- Implemented real-time underwater buoy detection using MobileNet and made inference of the model lightweight by 20%
- Used ROS packages like Actionlib and Smach to implement the Mission Planner Stack, participated in SAVe at NIOT, Chennai

### CLIP for Visual Question Answering (VQA)

[\[Link\]](#)

- Harnessed OpenAI **CLIP** in VQA models like MCAN and Pythia in both zero-shot and finetune settings with 2% upgrade
- Added Language Driven Semantic Segmentation (**LSeg**) to pipeline for answering number-based questions in VQA2.0 dataset

### Text Graph Convolutional Networks (GCNs)

[\[Link\]](#)

- Investigated TextGCN by reproducing the model's results and adding new components on 5 different text classification datasets
- Designed new graph construction algorithms and improved the time cost of graph construction in TextGCN model by 5 times

## Skills

**Languages:** Python, Java, C, C++, Shell, C#, JavaScript, TypeScript, Go, Matlab, Lisp

**Frameworks:** PyTorch, Tensorflow, Keras, Angular, React, Node.js, Flask, SpringBoot, Kafka, AWS, MySQL, MongoDB, Docker

## Achievements

- Participated in Winter Camp and awarded Certificate in drill and weapon training at National Cadet Corps (NCC) Aug'18
- Secured All India Rank 265 (200K candidates) in IIT-JEE Advanced and 187 (13M candidates) in IIT-JEE Mains Jun'16
- Secured 5th position in District Level Chess Championship held at SCS College, Puri amongst 1000 players Jan'10