

# HAMMAD A. AYYUBI

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## EDUCATION

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### Columbia University

*PhD in Computer Science, GPA: 3.97/4.0*

*Advisor: Prof. Shih-Fu Chang*

New York, NY

*Sep. 2020 - Present*

### University of California, San Diego

*Master of Science in Computer Science, GPA: 4.0/4.0*

*Advisor: Prof. Gary Cottrell, Prof. Manmohan Chandraker*

San Diego, CA

*Sep. 2018 - June 2020*

### Indian Institute of Technology, Banaras Hindu University

*Bachelor of Technology in Electrical Engineering, GPA: 8.7/10*

Varanasi, India

*May 2012 - May 2016*

## WORK EXPERIENCE

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### Adobe

*Research Scientist Intern*

*Mentor: Dr. Vlad Morariu*

College Park, MD

*June 2024 - Aug 2024*

### Google

*Student Researcher*

*Mentor: Dr. Tianqi Liu*

New York, NY

*June 2023 - Nov. 2023*

### Microsoft Research

*Research Intern*

*Mentor: Dr. Oriana Riva and Dr. Jianwei Yang*

Redmond, WA

*June 2022 - Aug. 2022*

### SRI International

*Machine Learning Research Intern*

*Mentor: Dr. Yi Yao and Dr. Ajay Divakaran*

Princeton, NJ

*June 2019 - Sep. 2019*

### Soroco India Pvt. Ltd.

*Software Engineer - Deep Learning & Computer Vision*

Bangalore, India

*Feb 2018 - Aug 2018*

### Citicorp Services India Pvt. Ltd.

*Software Developer*

Pune, India

*July 2016 - Jan. 2018*

## PUBLICATIONS

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1. Zhecan Wang, Junzhang Liu, Chia-Wei Tang, Hani Alomari, Anushka Sivakumar, Rui Sun, Wenhao Li, Md Atabuzzaman, **Hammad Ayyubi**, Haoxuan You, Alvi Ishmam, Kai-Wei Chang, Shih-Fu Chang, and Chris Thomas. Journeybench: A Challenging One-Stop Vision-Language Understanding Benchmark of Generated Images. *NeurIPS*, 2024
2. **Hammad Ayyubi**, Junzhang Liu, Zhecan Wang, Hani Alomari, Chia-Wei Tang, Ali Asgarov, Md Atabuzzaman, Najibul Sarker, Zaber Hakim, Shih-Fu Chang, and Chris Thomas. ENTER: Event Based Interpretable Reasoning for VideoQA. *NeurIPS MAR Workshop*, 2024
3. Ali Zare, Yulei Niu, **Hammad Ayyubi**, and Shih-Fu Chang. Rap: Retrieval-Augmented Planner for Adaptive Procedure Planning in Instructional Videos. *ECCV*, 2024
4. Xuande Feng\*, **Hammad A. Ayyubi\***, Junzhang Liu, Xudong Lin, James Wang, and Shih-Fu Chang. PuzzleGPT: Emulating Human Puzzle-Solving Ability for Time and Location Prediction. *In Submission NAACL*, 2024

5. Junzhang Liu\*, Zhecan Wang\*, **Hammad Ayyubi\***, Haoxuan You, Chris Thomas, Rui Sun, Shih-Fu Chang, and Kai-Wei Chang. Detecting Multimodal Situations with Insufficient Context and Abstaining from Baseless Predictions. *ACMM*, 2024
6. **Hammad A. Ayyubi**, Rahul Lokesh, Alireza Zareian, Bo Wu, and Shih-Fu Chang. Learning from Children: Improving Image-Caption Pretraining via Curriculum. *ACL Findings*, 2023
7. **Hammad A. Ayyubi**, Tianqi Liu, Arsha Nagrani, Xudong Lin, Mingda Zhang, Anurag Arnab, Feng Han, Yukun Zhu, and Jialu Liu. Video Summarization: Towards Entity-Aware Captions. *EMNLP*, 2024
8. **Hammad A. Ayyubi**, Christopher Thomas, Lovish Chum, Rahul Lokesh, Yulei Niu, Xudong Lin, Long Chen, Jaywon Koo, Sounak Ray, and Shih-Fu Chang. Beyond Grounding: Extracting Event Hierarchies from Multimodal Content. *AAAI*, 2024
9. Haoxuan You<sup>1</sup>, Rui Sun, Zhecan Wang, Long Chen, Gengyu Wang, **Hammad A. Ayyubi**, Kai-Wei Chang, and Shih-Fu Chang. Idealgpt: Iteratively Decomposing Vision and Language Reasoning via Large Language Models. *EMNLP Findings*, 2023
10. Long Chen, Yulei Niu, Brian Chen, Xudong Lin, Guangxing Han, Christopher Thomas, **Hammad Ayyubi**, Heng Ji, and Shih-Fu Chang. Weakly-supervised Temporal Article Grounding. *EMNLP*, 2022
11. Haoxuan You, Zhecan Wang, Alireza Zareian, Liunian Harold Li, **Hammad A. Ayyubi**, Kai-Wei Chang, and Shih-Fu Chang. Learning Knowledge-aware Multimodal Representation for Visual Commonsense Reasoning. 2022
12. **Hammad A. Ayyubi\***, Md. Mehrab Tanjim\*, Julian McAuley, and Garrison W. Cottrell. Generating rationale in Visual Question Answering. *arXiv:2004.02032* 2019, 2020
13. **Hammad A. Ayyubi**. Leveraging Human Reasoning to Understand and Improve Visual Question Answering. *MS Thesis, UC San Diego*, 2020
14. **Hammad A. Ayyubi**, Yi Yao, and Ajay Divakaran. Progressive growing of Neural Ordinary Differential Equations. *ICLR Workshop on Integration of Neural Networks and Differential Equations*, 2020
15. Md. Mehrab Tanjim, **Hammad A. Ayyubi**, and Garrison W. Cottrell. Dynamicrec: A Dynamic Convolutional Network for Next Item Recommendation. *Proceedings of the 29th ACM International Conference on Information and Knowledge Management*, 2020

## ACADEMIC RESEARCH & PROJECTS

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### Grounding User PDF Edit Requests with Multimodal LLMs

June. 2024 - Aug 2024

*Advisor: Dr. Vlad Morariu*

- Proposed a system to ground user PDF edit request spatially in the PDF with Multimodal LLMs.
- Instruction-Tuned the LLM for this purpose with synthetically generated data on a multi-node GPU cluster.

### Action Reasoning via State Changes in Videos

June. 2022 - May 2023

*Advisor: Dr. Oriana Riva and Dr. Jianwei Yang*

- Proposed a new task to predict actions and state changing objects from start state and end state frames in videos. Also, proposed counterfactual probe tasks to test action reasoning.
- Proposed a transformer based slot attention model to detect state changing object and predict action.

### Visual Commonsense Reasoning

Jan. - June 2019

*Advisor: Prof. David Kriegman*

- Task: Answer a question, given an image, and also provide a rationale.
- Proposed novel end to end joint learning of answer and rationale prediction by using softmax, gumbel-softmax and reinforcement learning approaches to tackle non-differentiability.
- Implemented in PyTorch; used Docker and Kubernetes cluster for running multi-GPU tasks.

## Generative Adversarial Network (GANs) Inspection

Apr. - June 2019

- Inspected latent manifold learned by DCGAN and PgGAN through various interpolation, extrapolation and vector arithmetics techniques.
- Proved that semantic relations are learned in the manifold.

## Optical Character Recognition using Deep Learning

Feb. - June 2018

*Advisor: Dr. Mohsen Malmir*

- Researched various CNN models - U-Net, DeepLab v3+ - to segment text from images and PDFs.
- Used novel multi-task learning approach to instance segment, recognize and detect words.
- Achieved a recall of 97.8% on train set and 95% recall on test set.

## Knowledge Distillation for Semantic Segmentation

July - Aug. 2018

*Advisor: Dr. Mohsen Malmir*

- Compressed U-Net into a much smaller model without decline in accuracy.
- Reduced model parameters by 84%, improved speed by 20% and reduced memory usage by 21%.

## SKILLS

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	<i>Expert</i>	<i>Intermediate</i>	<i>Familiar</i>
<b>Programming Languages</b>	Python, Java, Matlab	C, C++, Bash, MySQL	Clojure
<b>Libraries &amp; Framework</b>	PyTorch, Docker, Kubernetes, Ray, OpenCV, Numpy, Spring	Keras, Tensorflow, Hadoop	BOOST

## AWARDS & HONORS

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2019	Runner's Up Award	Computer Vision Poster Competition, SRI Princeton
2019	People's Choice Award	Computer Vision Poster Competition, SRI Princeton
2012	JN Tata Scholar	JN Tata Endowment for the higher education of Indians
2011	Top 0.1%ile	Computer Science, Central Board of Secondary Education

## PROFESSIONAL SERVICES

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2024	Reviewer	EMNLP
2024	Reviewer	ACL
2023	Reviewer	ACL
2022	Reviewer	EMNLP
2021	Reviewer	EMNLP
2021	Program Committee	Visually Grounded Interaction and Language (ViGIL), NAACL

## RELEVANT COURSEWORK

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<b>Graduate</b>	<b>Undergraduate</b>	<b>Online</b>
Computational aspects of Robotics	Algorithms & Data Structures	DeepLearning.ai
Computer Vision	Artificial Intelligence & Expert Systems	Machine Learning
Deep Learning for sequence data	Calculus	
AI - Probabilistic Graphical Models	Linear Algebra	
Statistical Learning		
Statistical Natural Language Processing		

## TEACHING ASSISTANT

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2022	COMS-4995	Deep Learning for Computer Vision	Computer Science Dept., Columbia Uni.
2020	CSE-291D	Advanced NLP	Computer Science Dept., UC San Diego
2020	CSE-250B	Introduction to AI: A Statistical Approach	Computer Science Dept., UC San Diego
2019	CSE-250A	AI - Probabilistic Graphical Models	Computer Science Dept., UC San Diego
2016	CS0 101	Computer Programming	Computer Science Dept., IIT BHU