HAMMAD A. AYYUBI

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EDUCATION

Columbia University — New York, NY
PhD in Computer Science, GPA: 3.97/4.0 — *Sep. 2020 - Present*
Advisor: Prof. Shih-Fu Chang

University of California, San Diego — San Diego, CA
Master of Science in Computer Science, GPA: 4.0/4.0 — *Sep. 2018 - June 2020*
Advisor: Prof. Manmohan Chandraker, Prof. Gary Cottrell

Indian Institute of Technology, Banaras Hindu University — Varanasi, India
Bachelor of Technology in Electrical Engineering, GPA: 8.7/10 — *May 2012 - May 2016*

PUBLICATIONS

1. 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. *In submission to ACL*, 2022
2. **Hammad A. Ayyubi***, Md. Mehrab Tanjim*, Julian McAuley, and Garrison W. Cottrell. Generating rationale in Visual Question Answering. *arXiv:2004.02032 2019*, 2020
3. **Hammad A. Ayyubi**. Leveraging Human Reasoning to Understand and Improve Visual Question Answering. *MS Thesis, UC San Diego*, 2020
4. **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
5. 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
6. **Hammad A. Ayyubi**, Md. Mehrab Tanjim, and David J. Kriegman. Enforcing reasoning in Visual Commonsense Reasoning. *arXiv:1910.11124*, 2019

WORK EXPERIENCE

SRI International — Princeton, NJ
Machine Learning Research Intern — *June 2019 - Sep. 2019*

Time Series Forecasting From Irregularly Sampled Data
- Worked with Yi Yao and Ajay Divakaran on Neural Ordinary Differential Equations research.
- Proposed a novel progressive learning approach where we gradually learn functions of increasing frequencies with training progress; implemented in PyTorch.
- Achieved a performance improvement of over 64% over vanilla Neural ODEs for predicting California traffic data in Bay area.

Soroco India Pvt. Ltd. — Bangalore, India
Software Engineer - Deep Learning & Computer Vision — *Feb 2018 – Aug 2018*

Optical Character Recognition using Deep Learning
- 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 - "Dark Knowledge" - for Semantic Segmentation
- Compressed U-Net into a much smaller model without decline in accuracy.

- Implemented in PyTorch and Python on Jupyter Notebook.
- Reduced model parameters by 84%, improved speed by 20% and reduced memory usage by 21%.

Citicorp Services India Pvt. Ltd. Pune, India
Software Developer *July 2016 – Jan. 2018*

Asynchronous Java application for real-time data update
- Developed a Java application to listen asynchronously on TIBCO queue, process the incoming message on multiple threads and finally ingest the data into MS SQL database.
- Worked independently on application design, development, testing and saw it through to production.

ACADEMIC RSEARCH & PROJECTS

M2E2HR: MultiModal Event-Event Hierarchical Relations June 2021 - Present
Advisor: Prof. Shih-Fu Chang
- Proposed a new task - M2E2HR - to detect text to video hierarchical event relations.
- Collected a large scale news article-video pair dataset (>550k) to support research on this task.
- Proposed a weakly-supervised, open-domain method, aided by commonsense from ConceptNet, to detect such hierarchical multimodal relations.
- Under preparation for submission to ECCV'22.

Novel Object Recognition using Self-Supervision and Curriculum Sep. 2020 - May 2021
Advisor: Prof. Shih-Fu Chang
- Given an image caption dataset, the task was to learn to align words to objects in images.
- Learning advanced through a simple curriculum using a curriculum aware contrastive loss function.
- The model was later tested for object recognition in a zero-shot setting.

Visual Commonsense Reasoning Jan. 2019 - June 2019
Advisor: Prof. David Kriegman
- The task was to 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.
- Implemented using Tensorflow; used Docker and Kubernetes cluster for training/testing model.

AWARDS & HONORS

Runner's Up Award	2019	Computer Vision Poster Competition, SRI Princeton
People's Choice Award	2019	Computer Vision Poster Competition, SRI Princeton
JN Tata Scholar	2018	JN Tata Endowmnet for the higher education of Indians
Top 0.1%ile	2011	Computer Science, Central Board of Secondary Education

SKILLS

	Expert	*Intermediate*	*Familiar*
Programming Languages	Python, Java, Matlab	C, C++, Bash, MySQL	Clojure
Libraries & Framework	PyTorch, Docker, Kubernetes, OpenCV, Numpy, Spring	Keras, Tensorflow, Hadoop	BOOST

PROFESSIONAL SERVICES

2021	Reviewer	ACL
2021	Program Committee	Visually Grounded Interaction and Language (ViGIL), NAACL

RELEVANT COURSEWORK

Graduate	**Undergraduate**	**Online**
Deep Learning for sequence data	Algorithms & Data Structures	DeepLearning.ai
AI - Probablistic Graphical Models	Artificial Intelligence & Expert Systems	Machine Learning
Statistical Learning	Calculus	
Statistical Natural Language Processing	Linear Algebra	

TEACHING ASSISTANT

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 - Probablistic Graphical Models	Computer Science Dept., UC San Diego
2016	CS0 101	Computer Programming	Computer Science Dept., IIT BHU