Meghana Holla

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Research Interests

Areas Vision and Language, Neuro-Symbolic ML, ML with Limited Supervision.

Current Focus Commonsense knowledge integration to *Natural Language Processing* and *Computer Vision tasks*.

Education

Aug'21–May'23 **MS, Computer Science**, *Virginia Tech*, Blacksburg, VA

Aug'16–May'20 **B.Tech, Computer Science & Engineering**, *PES University*, Bangalore, India
Specialization: Data Science

Awards and Honors

2022 Grace Hopper Celebration (GHC) 2022 Student Scholarship

2021 Full Tuition Scholarship, *Virginia Tech*

2016–2019 Prof. CNR Rao Merit Scholarship, *PES University (6x recipient)*

Publications

[1] **Meghana Holla** and Ismini Lourentzou. Commonsense priors for Zero-Shot Language Video Localization. Under Review, 2022.

[2] Malaika Vijay*, **Meghana***, Nishant Aklecha*, and Ramamoorthy Srinath. Dialog Driven Face Construction using GANs. In *2020 IEEE 32nd International Conference on Tools with Artificial Intelligence (ICTAI)*, 2020.

[3] **Meghana Holla** and Bhaskarjyoti Das. Detection of Emphasis Words in Short Texts – A Context-Aware Label Distribution Learning Approach. In *Advanced Informatics for Computing Research*. Springer Singapore, 2021.

[4] **Meghana Holla***, Nishant Aklecha*, Ornella Irene Dsouza*, and Bhaskarjyoti Das. Polarity Estimation in a Signed Social Graph Using Graph Features. In *2020 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS)*, 2020.

[5] Vinay A*, Nishant Aklecha*, **Meghana Holla***, K.N. Balasubramanya Murthy, and S Natarajan. On Detectors and Descriptors based Techniques for Face Recognition. In *International Conference on Computational Intelligence and Data Science*. Procedia Computer Science, 2018.

* - **Equal Contribution**

Academic Service

2022 **Reviewer**, *EMNLP 2022 - Main Conference & Industry Track*

Experience

Research

Aug'21–present **Graduate Research Assistant**, *Perception and Language Lab*, Virginia Tech, Blacksburg, VA
Advisor: Dr. Ismini Lourentzou

- Leading research on neuro-symbolic methods for zero-shot language video localization by leveraging commonsense information for cross-modal understanding. Manuscript [1] under review.
- Investigating semantically grounded masking strategies for pretraining multimodal (vision+text+audio) Transformers.

Aug'17–Dec'19 **Undergraduate Researcher**, *PES Center for Pattern Recognition & Machine Intelligence*, Bangalore
Advisor: Dr. Subramanyam Natarajan
- Proposed facial recognition methods that leverage key-point detectors, feature aggregation, and ML; Resulted in published work [5].

Teaching

Aug'21–Dec'22 **Graduate Teaching Assistant**, *Computer Science Department, Virginia Tech*
- *Fall 2022, Fall 2021* - CS2505 Computer Organization (Class size: 460, 366)
- *Spring 2022* - CS1114 Intro to Software Design (Class size: 404)

Responsibilities: Held office hours, led weekly labs, graded assignments/projects & provided actionable feedback.

Industry

Summer 2022 **Machine Learning Intern**, *Bloomberg LP*, New York City, NY
- Investigated neural methods for entity extraction on financial documents with a focus on lightweight model size for resource-constrained deployment.
- Achieved 20 points increase in F1 Score with DistilRoBERTa with a Token Classification head (PyTorch).

Aug'20–Aug'21 **Technology Associate**, *Morgan Stanley*, Bangalore, India
- Programmed Python frameworks for Solr document parsing and real-time indexing using SolrAPI.
- Accomplished 50% reduction in search times for applicable cases by optimizing query pipelines in SolrJ.
- Architected a real-time trade reconciliation system handling 100,000 updates/day (Kafka, KSQL, Java).

Jan'20–Jul'20 **Technology Analyst Intern**, *Morgan Stanley*, Bangalore, India
- Designed & developed a dashboard for aggregating data from systems involved in the trade lifecycle.
- Reduced wait time from 3 hours to 5 minutes by building a self-service utility for ad-hoc client requests.

Summer 2019 **Summer Intern**, *Morgan Stanley*, Bangalore, India
- Refactored the in-house risk visualizer to a plug-and-play highly configurable framework (Java, Angular).

Summer 2018 **Machine Learning Intern**, *MapMyIndia (CE Info Systems Ltd.)*, Bangalore, India
- Researched and evaluated CNN variants for semantic segmentation for localization of salient street footage, e.g., frames containing objects such as roads, trees, and automobiles (TensorFlow).
- Achieved over 92% Jaccard Index score on test data with a Dilation10 architecture.

Selected Projects

Fall 2022 **VEQA: Visual Entailment from the lens of Visual Question Answering**, Virginia Tech, [pdf][code]
- Formulated Visual Question Answering (VQA) as a Visual Entailment (VE) task by using an image as the premise and joint representation of question and answer as a hypothesis.
- Identified and interpreted robustness and latent biases in multimodal datasets and models for VE/VQA.

Fall 2022 **Attribute-enhanced Multimodal Entity Linking**, Virginia Tech, [pdf]
- Proposed a method that integrates attribute/metadata information into entity and mention representations for enhancement of entity disambiguation in multimodal entity linking.

Fall 2021 **Trip Duration Prediction and Analysis in Bike Sharing Systems**, Virginia Tech, [pdf][code]
- Designed and developed a change-agnostic method for duration prediction that employs novel coarse-grained station encoding based on station location and purpose.
- Analyzed the necessity of drop-off stations in trip prediction tasks.
- Achieved a 10 points increase in Adjusted R-squared metric over traditional models that use fine-grained station information and a 3x increase with drop-off station's representation included in the feature set.

Spring 2020 **Dialog-driven Human Face Generation using GANs [2]**, PES University
- Proposed an interactive approach for face generation guided by iterative natural language user feedback.
- Trained a cascade of two conditional Generative Adversarial Networks (GANs) conditioned on natural language descriptions extracted from a speech2text model, followed by a natural language parser.
- Achieved 73% mean maximum relevance score when tested on a retrieval task.

Fall 2020 **Emphasis Detection in Short Texts [3]**, Independent Research
- Proposed novel deep learning approach for identifying segments of text that need emphasis.
- Accomplished performance boost of 10% over the state-of-the-art by training bi-directional LSTMs & employing Label Distribution Learning (LDL) paired with word and sentence level embeddings.

Skills

Programming	Proficient: Python, C, Java | Familiar: R, JavaScript, MATLAB
AI/ML	PyTorch, Keras, scikit-learn, Pandas, NLTK, Spacy, OpenCV
Software Dev	Angular, HTML/CSS, Apache Solr, Docker, Kafka, KSQL
Others	Git, Latex

Relevant Coursework

Undergraduate	Deep Learning, Machine Learning, Natural Language Processing, Data Science, Data Analytics, Data Structures & Algorithms, Advanced Algorithms, Software Engineering, Operating Systems, Cloud Computing, Computer Networks, Linear Algebra, Discrete Mathematics and Logic.
Graduate	Advanced ML, Advanced NLP, Data Analytics, Research Methods in Computer Science, Models and Theories of HCI, Urban Computing.