Monisha Jegadeesan

Indian Institute of Technology Madras

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Education

2015-2020 **Dual Degree (B.Tech + M.Tech) in Computer Science and Engineering**
Master's Thesis: The Von Mises-Fisher Loss for Language Generation [Prof. Yulia Tsvetkov]
Indian Institute of Technology Madras, *Chennai* **CGPA: 8.66/10**

Research Projects

Sep 2019 - May 2020 **Paraphrase Generation with a Bilingual Model and Continuous Embeddings**
Dual Degree Thesis, *Prof. Yulia Tsvetkov*, Language Technologies Institute, Carnegie Mellon University
- Machinated a novel technique for paraphrase generation using the von Mises-Fisher (vMF) Loss on the encoder-decoder framework, realised through the transformer network
- Employed bilingual data to induce zero-shot paraphrasing using artificial tokens and parameter sharing, by training on a combination of translation and rewriting tasks
- Showed that the vMF loss is highly suitable for the paraphrasing task and produces superior paraphrases as compared to the log-likelihood model through various evaluation metrics
- Evaluated the model on the IWSLT'16 (in domain) and ParaNMT-50M (out of domain) datasets and observed semantically equivalent yet diverse paraphrases in both the cases

Aug - Dec 2018 **Leveraging Ontological Knowledge for Neural Language Models**
Course: Computational Models of Cognition, *Prof. Sutanu Chakraborti*, Indian Institute of Technology Madras
- Incorporated Weight Initialization in learning word embeddings using the WordNet Ontology for a task in the *Construction* domain, resulting in a faster convergence rate and better representation of domain-specific terms
- Designed three models that induce hierarchical relations between words in the embeddings using the structure of the ontology, specifically for domain transfer applications

July - Dec 2018 **Multimodal Dialogue Generation**
Course: Undergraduate Research in Computer Science, *Prof. Mitesh Khapra*, Indian Institute of Technology Madras
- Conceived and implemented a model to prove the hypothesis that integrating domain-relevant features improves the performance of image retrieval in multimodal dialogue systems in the *Fashion* domain
- Proposed and explored the performance of attention and memory-based models with appropriate adaptations for multimodal dialogue, along with domain knowledge integration - on the MMD dataset
- Explored the use of Graph Convolutional Networks for modeling the various components of multimodal dialogue

May - July 2017 **Cognitive Approach to Natural Language Processing**
Summer Internship, ***Prof. Veni Madhavan****,* ***Indian Institute of Science (IISc), Bangalore***
- Worked on a cognitive approach to Natural Language Processing that combines syntactic and semantic approaches
- Developed a cognitive parser which processes textual data into cognitive structure representation, that would be used as a feature extractor for various downstream tasks
- Demonstrated the correlation of the extracted cognitive features with both semantic and syntactic features

Professional Experience

May - July 2019 **Autocorrect Feature in Google Docs**
Summer Internship, ***Google India, Bangalore*** *[Received a Full-Time Pre-Placement Offer]*
- Developed a new feature comprising of user interface behaviour with corresponding actions for pre-existing autocorrect operations (such as capitalization), to alert the user that an autocorrect has occurred and provide an interface to undo it
- Worked on the implementation of an improved version of autocorrect that corrects automatically misspellings and grammatical errors
- Developed a feedback and logging mechanism for the autocorrect feature, engineered success metrics to assess the performance of the same, and devised a quality-testing design

May - July 2018 **Text to Scene Conversion in Augmented Reality**
Summer Internship, ***Adobe Research Labs, Bangalore*** *[Received an Internship-Callback Offer]*
- Conceptualized and developed a novel pipeline for converting natural language descriptions to 3D scenes in Augmented Reality, comprising of Natural Language Understanding components
- Utilized a machine learning model to predict the sizes and positions of objects, learnt from the Stanford Text2Scene dataset, and a scene augmentation algorithm learnt from the Visual Genome dataset
- Evaluated the system through human assessment of scenes generated from MS COCO captions, which substantiated its visual and empirical superiority over previous systems

Publications and Patents

[Submitted Paper] **Zero-Shot Paraphrasing by Generation into Embedding Spaces**
Monisha Jegadeesan*, John Wieting, Sachin Kumar, Yulia Tsvetkov*
Submitted to The 2020 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2020**)

[Publication and Poster] **Adversarial Demotion of Gender Bias in Natural Language Generation (Paper, Poster)**
Monisha Jegadeesan
In **ACM CODS-COMAD 2020** - Young Researchers' Symposium

[Poster] **ARComposer: Authoring Augmented Reality Experiences through Text (Poster)**
Sumit Kumar, Paridhi Maheshwari, ***Monisha Jegadeesan****, Amrit Singhal, Kush Kumar Singh, Kundan Krishna*
In ACM User Interface Software and Technology Symposium 2019 (**ACM UIST 2019**)

[Filed Patent] **Visualizing Natural Language through 3D Scenes in Augmented Reality**
Sumit Kumar, Paridhi Maheshwari, ***Monisha Jegadeesan****, Amrit Singhal, Kush Kumar Singh, Kundan Krishna*
Filed at the US PTO (Application Number: 16/247,235)

[Publication and Poster] **Leveraging Ontological Knowledge for Neural Language Models (Paper, Poster)**
Ameet Deshpande, ***Monisha Jegadeesan***
In **ACM CODS-COMAD 2019** - Young Researchers' Symposium

Course Projects

July - Dec 2019 **Graph Neural Networks for Extreme Summarization**
Course: Topics in Deep Learning, *Prof. Mitesh Khapra*, Indian Institute of Technology Madras
- Formulated and implemented appropriate graph-based deep neural models for the Extreme Summarization (XSum) task
- Experimented with inducing graph architectures in neural networks at the sentence-level and document-level, as well as at both the levels simultaneously
- Obtained better performance in summarization than simple recurrent and hierarchical models by 2-3 ROUGE points

March - April 2019 **Risk-Sensitivity in Multi-Armed Bandits**
Course: Multi-Armed Bandits, *Prof. L.A. Prashanth*, Indian Institute of Technology Madras
- Empirically surveyed the existing methods for risk-sensitivity in stochastic bandit problems, spanning risk measures such as Variance, Value at Risk (VaR) and conditional Value at Risk (cVaR)
- Implemented multiple risk-sensitive algorithms for each measure and performed a qualitative and quantitative analysis
- Introduced novel modifications of the Explore-Then-Commit algorithm for VaR and cVaR measures; both showing performance competent with existing risk-sensitive algorithms

Oct - Nov 2018 **Risk-Sensitive Reinforcement Learning**
Course: Reinforcement Learning, *Prof. L.A. Prashanth*, Indian Institute of Technology Madras
- Empirically analyzed the existing methods for risk-sensitive reinforcement learning, spanning risk measures such as Variance Bounds and Probability of Risk Bounds
- Tested the effectiveness of modified risk-sensitive versions of traditional algorithms such as Q-learning and SARSA
- Introduced a new risk measure accounting for the distance from error states in a Gridworld and devised a successful algorithm sensitive to the same

Feb - March 2018 **Summarization and Keyword Extraction using TextRank**
Course: Natural Language Processing, *Prof. Sutanu Chakraborti*, Indian Institute of Technology Madras
- Performed a detailed analysis of the TextRank algorithm for keyword extraction and text summarization
- Applied synctactic filters for keyword extraction and augmented the set of keywords extracted with TextRank through Explicit Semantic Analysis, and observed improvement in the F1 score by 1 point
- Explored various representation and similarity methods for summarization and found that keyword-based representation and intersection-based similarity gave the best performance with an F1 score of 48.7

Teaching Experience

Jan - May 2020 **Natural Language Processing - Course Teaching Assistant,** *Indian Institute of Technology Madras*

- Designed and evaluated theoretical and practical assignments on various topics in Natural Language Processing
- Presented lectures on the Edit Distance and the Cocke-Young-Kasami (CYK) algorithms, to a class of 70 students
- Mentored 16 pairs of students on research projects, with supervision through regular team-wise progress meetings

Courses

[Statistical Learning] Topics in Deep Learning, Deep Learning, Machine Learning, Natural Language Processing, Reinforcement Learning, Multi-Armed Bandits, Probabilistic Graphical Models, Computational Models of Cognition

[Curriculum] Computer Networks, Database Systems, Operating Systems, Data Structures and Algorithms, Object-Oriented Programming

[Mathematics] Probability-Statistics-Stochastic Processes, Discrete Mathematics, Linear Algebra, Graph Theory

Skills

Languages C, C++, C#, Java, Python, HTML, CSS, Javascript, SQL

Tools Unity, ARCore, Android Studio, Stanford CoreNLP, git, Bootstrap, jQuery, AngularJS

Libraries NLTK, django, scipy, pandas, sklearn, gensim, keras, tensorflow, pytorch

Positions of Responsibility

June 2019 **Organizer, Management Team,** *Tech Intern Connect,* Google, Bangalore

- Member of the central managing committee that organized a networking event hosting technology interns from the city

June - Dec 2016 **Technical Operations Coordinator,** *Shaastra 2017,* Indian Institute of Technology Madras

- Developed the front-end components of major websites and internal portals for the technical fest of IIT Madras

Extra Curricular Activities

Cultural Trained in and performed the classical dance form of Bharatanatyam for seven years

Sports Part of NSO (Institute Sports) Basketball during the first year of study (2015-16)