Tanmay Parekh | Curriculum Vitae

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Interests

Multilingual and Code-switching, Dialogue Generation, Interpretability of Models

Education

Carnegie Mellon University *Aug '19 - Jul '21*
Masters of Science in Language Technologies
GPA: 3.94/4.0

Indian Institute of Technology Bombay *Jul '14 - May '18*
Bachelor of Technology with Honors in Computer Science and Engineering
Minor in Applied Statistics and Informatics
GPA: 9.37/10.0

Publications

Politeness Transfer: Tag and Generate Approach:
Aman Madaan*, Amrith Setlur*, **Tanmay Parekh***, Barnabas Poczos, Graham Neubig, Yiming Yang, Ruslan Salakhutdinov, Alan Black, Shrimai Prabhumoye (* joint authors)
In Proceedings of *ACL, 2020* arXiv:2004.14257 [cs.CL]

Code-switched Language Models Using Dual RNNs and Same-Source Pretraining:
Saurabh Garg*, **Tanmay Parekh*** and Preethi Jyothi (* joint authors)
In Proceedings of *EMNLP, 2018* arXiv:1809.01962 [cs.CL]

Dual Language Models for Code Mixed Speech Recognition:
Saurabh Garg, **Tanmay Parekh** and Preethi Jyothi
Receipent of the ISCA Student Grant
In Proceedings of *Interspeech, 2018* arXiv:1711.01048 [cs.CL]

Automatic and Accurate Attribute Extraction for E-Commerce:
Tanmay Parekh, Sachin Farfade and Nikhil Rasiwasia
In Proceedings of *AMLC, 2019* (Internal Amazon Machine Learning Conference)

Experience

Studying Entrainment in Code-Switched Dialogues *Aug '19 - Jul '20*
Guide: Prof. Alan Black & Prof. Yulia Tsvetkov

- We propose a generalized goal-oriented multilingual dialogue framework that elicits code-switching and show its effectiveness by collecting a dataset for the language pair of Hindi-English
- We experiment with various agent strategies and study the impact on user conversations. We adapt pre-defined metrics to discover lexical and style accommodation with respect to language usage
- We study and provide an exploratory comparison of code-switching across Spanglish and Hinglish

Tartan: Alexa Socialbot Challenge *Jan '19 - Jun '19*
Guide: Prof. Alexander Rudnicky

- Developed an open-domain social chatbot for Alexa equipped to interactively converse with the users. Reached the **semi-finals** of the competition
- Designed a two-tier heirarchical framework based on commonsense knowledge decomposition and independently modeled mini-bots for everyday topics like news, music, food, movies and so on.

Tag and Generate Approach for Politeness Transfer *Aug '19 - Dec '19*
Guide: Prof. Graham Neubig & Prof. Alan Black

- Our work introduces a new task of politeness transfer providing a large dataset of nearly 1.4 million instances automatically labeled for politeness
- We design a tag and generate pipeline that identifies stylistic attributes and subsequently generates a sentence in the target style while preserving most of the source content
- Our model outperforms the state-of-the-art methods on automatic and human evaluation for grammaticality, meaning preservation and transfer accuracy. Our work was published at **ACL '20**

Language Modelling for Code-Switched Text (Undergraduate Thesis) *Jul '17 - May '18*

Guide: Prof. Preethi Jyothi

- Built a robust framework comprising of Dual Language Models (DLM), wherein we train two complementary n-gram language models and combine them in a probabilistic manner. Presented our work at **Interspeech '18**
- Designed a new DNN architecture comprising of a dual LSTM unit which combines two monolingual specialized LSTM units and improves upon the standard RNNLM architecture
- Explored the idea of same-source pre-training to further improve the models by providing better initialization using SeqGAN based generative model. Presented our work at **EMNLP '18**

Opponent Modeling in Scrabble *Autumn '17*

Guide: Prof. Shivaram Kalyanakrishnan

- Designed an Inferring Agent which would infer the opponent's rack throughout the game
- Built a Bayesian Inference based model which provides a space of possible opponent racks. Restricted this space further by using the opponent's previous space of possible racks in order to impose further consistency constraints
- Used the opponent's inferred rack in forward Monte Carlo simulations to make better moves. Obtained improvements over the standard agent without any inference

Improving Language Models using Cross-Scripted Text *December '17*

Guide: Prof. Preethi Jyothi (in collaboration with Microsoft Research India)

- Worked on building a robust language model using additional data in the form of transliterated cross-scripted text to counter limitation of native language data

Product Defect Detection from Reviews *Spring '17*

Guide: Prof. Pushpak Bhattacharyya (in collaboration with Accenture)

- The task was to identify defect lines from the online product reviews. Built a Defect Ontology (Knowledge Graph) using the existing knowledge of the product in order to capture defect-related phrases and words
- Used a simple pattern matching approach in order to find a semantic similarity between a new candidate sentence and any subset of the ontology. Explored POS and word based pattern-matching approaches

Industry Experience

Applied Scientist *Jul '18 - Jun '19*

Machine Learning Team, Amazon

- Worked on the identification and extraction of product attributes from the titles of product pages without the use of any human supervised data. Used distant supervision to procure data instead
- Modelled the problem as an NER task and developed state-of-the-art baselines. Introduced new regularization techniques and semi-supervised self-training based techniques to learn in the partially labeled data setting
- Published our work as a long paper at **AMLC '19**

Internships

Summer Analyst: Goldman Sachs *Summer '17*

Summer Intern: Philips Research *Summer '16*

Winter Intern: Edelweiss Securities Pvt. Ltd. *Winter '15*

Summer Analyst: Sportz Interactive *Summer '15*

Scholastic Achievements and Awards

- Recipient of the **ISCA Student Grant** for attending Interspeech '18 selectively awarded internationally to a handful of students
- Achieved **294th rank** among 1.5 million students in the examination of JEE Mains and **581st rank** among 0.15 million students in the examination of JEE Advanced
- Secured **within 100 ranks** multiple times in nation-wide scholarship examination for mathematics conducted by Institute of Promotion of Mathematics (IPM)
- Received **Letter of Appreciation** from the Education Minister for exemplary performance in grade 12

Key Academic Projects

Psi-Net: Deep Learning for Footprint Detection *Deep Learning*

- The task involved identification of shoeprints from footprints at crime scenes and corresponding retrieval from a pre-loaded database. The challenge lies in learning from scarce data and the presence of occlusions in images
- We propose Psi-Net, a localized patch-based Siamese-network architecture and new data synthesizing techniques to alleviate the data scarcity problem

Intelligent Agent for Bomberman *Reinforcement Learning*

- Designed a neural network for representing the Q-function and used Q-learning updates for training the agent
- Explored effects of human-based features on quality and time of convergence for approximation of Q-values
- Used the idea of Curriculum Learning to teach the agent complex tasks in a simpler and faster way

Audio-based Sentiment Analyzer *Speech Recognition*

- Designed an acoustic sentiment model to detect sentiment from audio files using the OpenEAR features extracted for the speech and a text sentiment analyzer using word embeddings of the speech-converted text
- Used an ensemble model to combine the two models and improved on the baseline

Agent for Pacman *Artificial Intelligence*

- Built an intelligent agent of Pacman and compared various heuristics like search, reflex agent, Minimax with pruning, Expectimax and use of evaluation functions to maximize the performance
- Explored cases wherein ghost position is unknown and inferred using Particle Filters and Dynamic Bayes Net

Key Courses of Interest

- Introduction of Machine Learning (PhD)
- Automatic Speech Recognition
- Foundations of Intelligent and Learning Agents
- Introduction to Probability Theory
- Statistical Inference
- Convex Optimization
- Seq-to-Seq Models and Machine Translation
- Neural Networks for NLP
- Probabilistic Models
- Regression Analysis

Leadership and Mentorship

Teaching Assistantship *Autumn '15, '16, '17, '19, '20, Spring '18*

- Calculus (MA 105) | *Prof. Vishnu Sharma* IITB - Autumn '15
- Linear Algebra (MA 106) | *Prof. Akhil Ranjan* IITB - Autumn '16
- Computer Architecture (CS 305, CS 341) | *Prof. Bhaskar Raman* IITB - Autumn '17
- Machine Learning (CS 419) | *Prof. Preethi Jyothi* IITB - Spring '18
- Speech Processing (11-692) | *Prof. Alan Black* CMU - Autumn '19
- Multilingual NLP (11-737) | *Prof. Alan Black, Prof. Graham Neubig, Prof. Yulia Tsvetkov* CMU - Autumn '20

Department Academic Mentor *Apr '17 - Present*

- Selected in the 20-member team for the Academic Mentorship program for Computer Science Department
- Responsible for guiding a group of 7 students with their academics, curriculum and internships

Data Journalist *Apr '16 - Mar '17*

- Part of the 6-member team in *Insight, Student Media Body of IIT Bombay* which is responsible for maintaining the data blog - Datagiri covering articles involving data and visualizations

Extra-Curricular Activities

- Won the **1st Place** in a data analysis competition *23rd Yard, Moneyball* conducted at Techfest, Asia's largest science and technology festival among 50+ shortlisted teams
- Part of the soccer teams which won the **1st place** in *Institute and Department Football League*
- Won the **1st and 3rd places** in High Jump and 100m Sprint respectively in the *Athletics Meet '15*

References

Prof. Alan Black
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Carnegie Mellon University
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Prof. Yulia Tsvetkov
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Carnegie Mellon University
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