

Statement of Purpose

Jaemin Cho

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Computer Science (Ph.D.)

I want to pursue a Ph.D. in Computer Science and plan to continue a career in research after graduation. My research interests broadly lie in **Sequence Modeling** and **Machine Learning**. I like topics about **Generative Models** in particular, but I'm open to a variety of interesting problems.

Research Experiences

I'm currently working on vision-language cross-modal representations at Allen Institute for AI (AI2). Prior to AI2, I worked on various NLP projects in both academia and industry including Seoul National University (SNU), Naver Corporation, and a chatbot startup DataNada. I also dealt with vision, audio, motion, code, and medical data during research internships at SNU, Hong Kong University of Science and Technology and Polytechnique Montréal. Below are two of my recent works on diversity and hierarchy in text generation.

Two-stage framework for Diverse Sequence Generation RNN Encoder-Decoder is good at learning a one-to-one mapping (e.g. machine translation), but often fails in one-to-many tasks where targets from a source sentence can be semantically diverse (e.g. question generation). For such tasks, I reformulated conditional sequence generation $p(y|x)$ into two stages: 1) one-to-many content selection $p(m|x)$ and 2) one-to-one generation $p(y|x, m)$, so that an encoder-decoder model can focus on learning a one-to-one mapping. This two-stage framework significantly improves accuracy and diversity in question generation and abstractive summarization. Along with collaborators at Naver, AI2, and University of Washington, I presented this work as the first author in **EMNLP 2019**¹.

Hierarchical VAE for Conversation Modeling To mitigate the posterior collapse problem of variational RNN models, I worked on a hierarchical VAE model. Storing different levels of information at global and local latent variables helps our model to learn long-term dependencies in conversations, which alleviates the posterior collapse problem. This work was done with collaborators at SNU Vision & Learning Lab and presented in **NAACL 2018**².

Research Interests

Below are some of the subjects I'm interested in, but my interests are not limited to these.

Generative Models I enjoy theoretical analysis and applications of generative models, especially for vision and language. There are many interesting topics, including arbitrary-order generation, semi-/non- parametric generation, controllable/interactive generation, and removing hallucination (causality).

Compositionality I believe any complex tasks can be represented as a combination of primitive operations. The problem is what the universal operations are and how to combine them. Incorporating hierarchical (e.g. graph, tree, program), informational (e.g. minimum description length), or modular (e.g. attention, memory) inductive biases reduces search space for this problem. I'm interested in making models learn to design and compose modules as well as hand-crafting modules.

Multi-modal Learning I'm interested in shared representation and alignments between different modalities (e.g. vision, language, audio, motion). Information from different channels makes predictions more robust, and the ability to translate across modalities provides myriad applications.

UNC-Chapel Hill has very strong research groups in machine learning. I'm especially fascinated by the projects of Profs. Colin Raffel, Mohit Bansal, Junier Oliva, and Shashank Srivastava, but I'm open to other areas as well. I believe that the Ph.D. program at UNC-Chapel Hill would be the perfect environment for me to explore my curiosities.

¹**Jaemin Cho**, Minjoon Seo, Hannaneh Hajishirzi, *Mixture Content Selection for Diverse Sequence Generation*, EMNLP 2019

²Yookoon Park, **Jaemin Cho** and Gunhee Kim, *A Hierarchical Latent Structure for Variational Conversation Modeling*, NAACL 2018 (Oral)