YAO FU

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RESEARCH AREA

Natural Language Processing: **Large Language Models, Machine Reasoning, Text Generation**

Probabilistic Machine Learning: **Deep Generative Models, Latent Variable Models, Structured Prediction**

ACADEMIC EXPERIENCES

University of Edinburgh, School of Informatics, Edinburgh, UK
Ph.D. in Computer Science. Advisor: Prof. Mirella Lapata — Sep 2020 - Expected 2023

Cornell University, Tech Campus, New York, NY
Visiting Research Student. Advisor: Prof. Alexander Rush — Sep 2019 - Sep 2020

Columbia University, Department of Computer Science, New York, NY
M.S. in Computer Science. Advisor: Prof. John Cunningham — Aug 2018 - Dec 2019

Peking University, Department of Computer Science, Beijing, CN
B.S. in Computer Science. Advisor: Prof. Yansong Feng — Sep 2013 - Jun 2018

INDUSTRIAL EXPERIENCES

Allen Institute for AI. Seattle. — Jul 2022 -
Research Intern in Machine Reasoning. With Dr. Tushar Khot, Dr. Ashish Sabharwal, Dr. Hao Peng and Dr. Peter Clark

Alibaba DAMO Academy. Hangzhou. — Jan - Jul 2020
Research Intern in Structured Prediction and Text Generation. With Dr. Chuanqi Tan and Dr. Mosha Chen

Tencent AI Lab. Seattle. — May - Aug 2019
Research Intern in Structured Prediction. With Dr. Kun Xu and Dr. Dong Yu

Bytedance AI Lab. Beijing. — Jan - Aug 2018
Research Intern in Sequence Modeling and Sentence Generation. With Prof. Lei Li and Prof. Hao Zhou

PREPRINTS

12. Complexity-Based Prompting for Multi-Step Reasoning. *2022*
Yao Fu, Hao Peng, Ashish Sabharwal, Peter Clark and Tushar Khot
State-of-the-art reasoning performance on math word problems by prompting GPT3 with complex reasoning chains.

11. Decomposed Prompting: A Modular Approach for Solving Complex Tasks. *2022*
Tushar Khot, Harsh Trivedi, Matthew Finlayson, **Yao Fu**, Kyle Richardson, Peter Clark and Ashish Sabharwal
Decomposing complex task into simpler sub-tasks then solve each of them by prompting language models.

CONFERENCE PUBLICATIONS

10. Scaling Structured Inference with Randomization. ICML 2022
Yao Fu, John Cunningham and Mirella Lapata
A family of randomized dynamic programming algorithms for scaling up the inference of graphical models.

9. Data-to-Text Generation with Variational Sequential Planning. TACL 2022.
Ratish Puduppully, **Yao Fu** and Mirella Lapata
A sequential planning model for generating long documents given structured input data.

8. Noisy-Labeled NER with Confidence Estimation. NAACL 2021.
Kun Liu*, **Yao Fu***, Chuanqi Tan, Mosha Chen, Ningyu Zhang, Songfang Huang and Sheng Gao (*equal contribution)
A method for estimating the confidence of annotations under a noisy labeled learning setting.

7. Probing BERT in Hyperbolic Spaces. ICLR 2021.
Boli Chen*, **Yao Fu***, Guangwei Xu, Pengjun Xie, Chuanqi Tan, Mosha Chen and Liping Jing (*equal contribution)
A probing model for finding hierarchical information from contextualized representations in Hyperbolic spaces.

6. Prototypical Representation Learning for Relation Extraction. ICLR 2021.
Ning Ding, Xiaobin Wang, **Yao Fu**, Guangwei Xu, Rui Wang, Pengjun Xie, Ying Shen, Fei Huang, Hai-Tao Zheng and Rui Zhang
A contrastive learning method for pretraining relation prototype representations on hyperspheres.

5. Nested Named Entity Recognition with Partially Observed TreeCRFs. AAAI 2021.
Yao Fu*, Chuanqi Tan*, Mosha Chen, Songfang Huang and Fei Huang. (*Equal contribution)
A new masked Inside algorithm for learning partially observed TreeCRF.

4. Latent Template Induction with Gumbel-CRF. NeurIPS 2020.
Yao Fu, Chuanqi Tan, Mosha Chen, Bin Bi and Alexander M. Rush
A Gumbel-softmax based continuous relaxation method for reparameterizing structured VAEs for controllable sentence generation.

3. Paraphrase Generation with Latent Bag of Words. NeurIPS 2019.
Yao Fu, Yansong Feng and John Cunningham
An interpretable model with differentiable content planning and surface realization by gumbel-topk reparameterization.

2. Rethinking Text Attribute Transfer: A Lexical Analysis. INLG 2019.
Yao Fu, Hao Zhou, Jiaze Chen and Lei Li
An empirical study of existing text style transfer datasets and models to reveal critical changes during text style transfer.

1. Natural Answer Generation with Heterogeneous Memory. NAACL 2018.
Yao Fu and Yansong Feng
A key-value memory network for retrieving knowledge from various sources then generating answer sentences.

Workshop Publications

1. Just DREAM about it: Figurative Language Understanding with DREAM-FLUTE. The Third Workshop on Figurative Language Processing. In conjunction with EMNLP 2022
Yuling Gu, **Yao Fu**, Valentina Pyatkin, Ian Magnusson, Bhavana Dalvi Mishra and Peter Clark
Ranked top 1 in the task leaderboard. A mental model utilizing scene elaboration for understanding figurative language.

Blog and Open Source

Deep Generative Models for Natural Language Processing
A roadmap tracking past, present, and future about generative models for NLP. (link)

Compositional Generalization in Natural Language Processing
A roadmap tracking past, present, and future about generalization challenges in NLP. (link)

A Closer Look at Large Language Models Emergent Abilities
Scrutinizing Large Language Model Emergent Abilities to see if the paradigm is really shifting to in-context learning. (link)

Why S4 is Good at Long Sequence: Remembering a Sequence with Online Function Approximation
A blog post explaining the S4 model with function approximation theory. (link)

How to Write Variational Inference and Generative Models for Natural Language Processing
A tutorial about variational inference and deep generative models for NLP. (link)

INVITED TALKS

9. A Closer Look at Emergent Abilities of Large Language Models
Bytedance. Beijing — Dec 2022

8. Challenges and Opportunities in Large Language Model Regime
MIT-IBM Watson AI Lab. Cambridge — Oct 2022

7. Challenges in Encoding Long Documents.
Microsoft Research. Redmond — Aug 2022
Microsoft Research. Beijing — Sep 2022

6. Scaling Structured Inference with Randomization.
Tsinghua University. Beijing — Aug 2022
AI TIMES. Online — Jul 2022
Language at Edinburgh. Edinburgh — Mar 2022

5. Deep Structured Prediction: Inference, Reparameterization and Applications
Bytedance AI Lab. Beijing — Jun 2021

4. Language Technologies, Artificial Intelligence and their Implications
Huawei. Berlin — May 2021

3. Controllable Text Generation with Structured Latent Variables
Alibaba. Hangzhou — Sep 2020

2. Learning Structured Representations for Text
Peking University. Beijing — Sep 2020
Westlake Institute of Advanced Study. Hangzhou — Sep 2020

1. On the Evaluation of Text Generation Models
Interactions Inc. New York — Sep 2019

TEACHING

7. Natural Language Understanding, Generation, and Machine Translation
University of Edinburgh. Teaching Assistant. Edinburgh — Spring 2023

6. Text Generation with Neural Sequence Models
Peking University. Guest Lecture. Beijing — Spring 2022

5. Natural Language Understanding, Generation, and Machine Translation
University of Edinburgh. Teaching Assistant. Edinburgh — Spring 2022

4. Probabilistic Modeling and Reasoning
University of Edinburgh. Teaching Assistant. Edinburgh — Fall 2021

3. Text Generation with Neural Sequence Models
Peking University. Guest Lecture. Beijing — Spring 2021

2. Advanced Probabilistic Machine Learning Seminar
Alibaba DAMO Academy. Instructor. Hangzhou — Spring 2020

1. Applied Machine Learning
Columbia University. Course Assistant. New York — Spring 2019

SERVICE

ACL 2023 Student Research Workshop
Student Chair — 2022 - 2023

Edinburgh ILCC Poster Session
Organizer — Jun 2022

Edinburgh ILCC Seminar. ***Statistical Learning Theory***
Organizer — Summer 2021

Edinburgh ILCC Seminar. ***Combinatorial Categorial Grammar***
Organizer — Spring 2021

ICML 2022
Reviewer

NeurIPS 2021-2022
Reviewer

ICLR 2021-2023
Reviewer

ACL Rolling Review 2022
Reviewer

ACL 2019-2020
Reviewer

EMNLP 2018-2022
Reviewer

NAACL 2019-2021
Reviewer

EACL 2021
Reviewer

IJCAI 2021-2022
Reviewer

NeurIPS 2022 Math AI Workshop
Reviewer

ACL 2023 NL Reasoning and Structured Explanations workshop
Reviewer

HONORS

Alibaba Outstanding Intern of 2020
Alibaba Group — Dec 2020

Outstanding Undergraduate Dissertation Award
Peking University Jun 2018

Wangxuan Scholarship
Peking University Jun 2018

Elite Collegiate Award
China Computer Federation Jul 2017

C.X. Zhong & X.N. Xia Scholarship
Peking University Jun 2015, 2016, 2017

Scholarship of Exchange Program
China Scholarship Council Feb 2016

Xiangshang Scholarship
Peking University Sep 2015

Wusi Scholarship
Peking University Sep 2014, 2015