# Pengyu Cheng

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## Introduction

I am currently a senior researcher at Tencent AI Lab, primely working on dialogue systems and controllable text generation. I also have a broad interest in machine learning methods to improve the controllability, interpretability, and fairness of deep models.

## Education

**Duke University** 08/2017 – 05/2021
*Ph.D.*, Electrical and Computer Engineering *Adviser: Lawrence Carin*

**Tsinghua University** 08/2013 – 07/2017
*B.S.*, Mathematics and Statistics *Adviser: Jiwen Lu*

## Experiences

**Tencent AI Lab** 08/2022 – Present
*Senior Researcher* *Supervisor: Zhengyou Zhang*
Dialogue systems, controllable text generation, and interpretable language understanding.

**Tencent Interactive Entertainment Group (IEG)** 06/2021 – Present
*Senior Researcher*
NLP applications (dialogue systems, controllable text generation) in gaming scenarios.

**Information Initiative at Duke (iiD)** 08/2017 – 03/2021
*Research Assistant* *Adviser: Lawrence Carin*
Probabilistic and information-theoretic learning methods , and applications in natural language processing.

**Microsoft Cloud and AI** 06/2020 – 08/2020
*Research Internship* *Mentor: Jingjing Liu*
Improving self-supervised multi-view contrastive learning with learnable data augmentations.

**NEC Laboratories America** 05/2019 – 08/2019
*Research Internship* *Mentor: Martin Renqiang Min*
Improving disentangled text representation learning with information-theoretic guidance.

## Selected Projects

**Dialogue System for Virtual Characters in Games** 08/2021 – Present
*Role: Project Leader*
Built from scratch a dialogue system for virtual characters in gaming scenarios.
- implemented the intent detector based on **JointBERT** to jointly detect intents and fill slots; designed a data collection pipeline for fine-tuning detector with **game-related** intents and slots.
- designed a **objective-oriented knowledge** module for virtual characters to remember and update knowledge with respect to particular games.
- constructed a multi-style template-based generator to response with different sentiments and characteristics.

**Text Style Transfer for Virtual Characters Speaking** 10/2021 – Present
*Role: Project Leader*

Constructed a web application for transferring virtual characters speaking content with target style attributes.
- designed a style transfer models based on **synonym** words replacement *w.r.t* word usage frequencies of styles.
- filtered transferred text samples by the **perplexity** score calculated by the target style language models.
- Supported style transfer tasks in virtual character dialogue and game intelligent commentary.

**Controllable User Nickname Generation** 06/2021 – 12/2021

*Role: Project Leader*

Constructed a controllable nickname generation pipeline with pretrained language models.
- implemented vanilla nickname generation model by finetuning GPT-2 on user nickname data.
- discovered **stylized** nickname generation, by pre-training GPT-2 with stylized text then finetuning model on nickname data; generated nicknames in poem, lyric, and Kung-fu styles.
- designed **keyword-based** nickname generation via masked language models with GPT-2, T5 and BART.

## Selected Publications

- **P. Cheng***, W. Hao*, S. Yuan, S. Si, L. Carin, "FairFil: Contrastive Neural Debiasing Method for Pretrained Text Encoders", In *ICLR*, 2021
- S. Yuan*, **P. Cheng***, R. Zhang, W. Hao, Z. Gan, and L. Carin, "Improving Zero-Shot Voice Style Transfer via Disentangled Representation Learning", In *ICLR*, 2021
- **P. Cheng**, W. Hao, S. Dai, J. Liu, Z. Gan, and L. Carin, "CLUB: A Contrastive Log-ratio Upper Bound of Mutual Information", In *ICML*, 2020
- **P. Cheng**, M. Min, D. Shen, C. Malon, Y. Zhang, Y. Li and L. Carin, "Improving Disentangled Text Representation Learning with Information-Theoretic Guidance", In *ACL*, 2020
- **P. Cheng**, Y. Li, X. Zhang, L. Chen, D. Carlson, L. Carin, "Dynamic Embedding on Textual Networks via a Gaussian Process", In *AAAI*, 2020 Oral
- **P. Cheng***, D. Shen*, D. Sundararaman, X. Zhang, Q. Yang, M. Tang, A. Celikyilmaz, and L. Carin, "Learning Compressed Sentence Representations for On-Device Text Processing", In *ACL*, 2019 Oral
- **P. Cheng**, C. Liu, C. Li, D. Shen, H. Ricardo, and L. Carin, "Straight-Through Estimator as Projected Wasserstein Gradient Flow", In *NeurIPS* Workshop, 2018 Spotlight

## Services & Awards

- Reviewer/Program Committee for ICML, NeurIPS, ICLR, AAAI, IJCAI, ACL, EMNLP, NAACL, ARR.
- Fellowship of Electrical and Computer Engineering at Duke 08/2017
- First in Duke-Tsinghua Machine Learning Summer School (1/112) 08/2017
- Academic Excellence Award of Tsinghua University (top 30%) 10/2014
- Top 5 in the 18-th "Sogou Cup" Artificial Intelligence Programming Contest (5/200) 04/2014
- Silver medal in the 28-th Chinese Mathematical Olympiad (CMO) 01/2013
- First Prize in Chinese National Olympiad in Informatics in Provinces (NOIP) 11/2012

## Technical Strengths

**Computer Languages** : Python (Tensorflow, Pytorch), R, C/C++, Java

**Software & Tools** : LaTeX, Emacs, Mathematica, MATLAB, Excel, Markdown