Controllable Natural Language Generation

Research Progress: First Year

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Outline

Introduction

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NLG

- Generates Text Based on Structured Data

Controllable NLG

- Generating Realistic Sentences whose Attributes can be Controlled
  - Stylistic Attributes
    - Politeness, Sentiment, Formality ...
  - Personal Styles
    - Demographic Attributes, Gender, Age ...
  - Controlling Story Generation
    - Plot, Sequence, Ending, Persona ...
  - Others
    - Topic Sequence, Entities, Keywords, Information Ordering ...

Introduction

Attribute Transfer

- Rephrasing the Text to Contain Specific Attributes
- Without Changing the Intent or Affect within the Context

Examples

- Politeness
  - Shut up! the video is starting! → Please be quiet, the video will begin shortly.
- Sentiment
  - The food 's ok , the service is among the worst I have encountered. → The food is good , and the service is one of the best I 've ever encountered.
- Formality
  - The kid is freaking out. → That child is distressed.

Challenges

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- No Parallel Data Sets
- Hard to Detect Attributes
- Preserving the Structure and Meaning of the Input
- Automatic Evaluations

State of the Art

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- RNN
  - **Prabhumoye, Tsvetkov, et al. 2018**
  - **Rao and Tetreault 2018**
- VAE
  - **Shen et al. 2017**
  - **Xu, Cao, and Cheung 2019**
- Transformer
  - **Dai et al. 2019**
  - **Raffel et al. 2019**
- Pre-trained models
  - **Sudhakar, Upadhyay, and Maheswaran 2019**
  - **Dathathri et al. 2019**

Ongoing Research

Ongoing Research

Research Problem

- Multiple Attribute Text Transfer

Challenges

- Transfer of Multiple Attributes Together
- Content Preservation
- Trade off between Structure and Fluency
- Controlling the Degree of Some Attributes' Transfer
- Accuracy Metrics

Solution

Completed

- Highly Intense and Polarized Data
- Back Translation
- Transformer
- External Input of Style Token
  - <n> The food is tasteless. → <p> The food is delicious.
- Pre-trained Attribute Classifier

In Progress

- Style Embedding
- Content Preservation
- Multiple Losses
- Conditional Discriminator

In Pipeline

- Accuracy Metric: Structure, Style, Correctness

Future Work

Future Work

Research Work

- Unsupervised Text Style Transfer **He et al. 2020 Yang et al. 2018**
- Controllable Story Generation **Peng et al. 2018 Chandu et al. 2019**
- Controlling Topic Sequence **Prabhumoye, Quirk, and Galley 2019**
- Controlling Dialogue Generation Response **Niu and Bansal 2018 Jiwei Li et al. 2016**
- Domain Adaptive Text Style Transfer **D. Li et al. 2019**

Thank you!

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Used Data-Sets

- WMT14 EN-DE Translations **Neidert et al. 2014**
- IMDB Reviews **Lin, Matsumoto, and Mihalcea 2011**
- Yelp Reviews **Juncen Li et al. 2018**
- Amazon Reviews **Ni, Jiacheng Li, and McAuley 2019**