Natural Language Processing

Notes taken by Runqiu Ye
Carnegie Mellon University

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Contents

1 Introduction

Below is a list of topics that will be covered in this note. The topics include fundamental theoretical knowledge in language processing and language modeling in the first few sections, as well as frontier research results in later sections.

1. Language modeling fundamentals
   (a) Representing words
   (b) Language modeling
   (c) Sequence modeling architectures
2. Training and inference models
   (a) Decoding and Generation Algorithms
   (b) In-context learning
   (c) Pre-training
   (d) Fine-tuning
   (e) Reinforcement Learning
3. Evaluation and Experimental Design
   (a) Evaluating Language Generators
   (b) Experimental Design
   (c) Human Annotation
   (d) Debugging/Interpretation Techniques
4. Advanced Algorithms and Architectures
   (a) Advanced Pretraining, Post-Training, and Inference
   (b) Retrieval and Retrieval-augmented Generation
   (c) Long Sequence Models
   (d) Distillation and Quantization
   (e) Ensembling and Mixture of Experts
5. NLP Applications and Society
   (a) Complex Reasoning Tasks
   (b) Language Agents
   (c) Multimodal NLP
   (d) Multilingual NLP
   (e) Bias and Fairness

2 Language Modeling Fundamentals