

先端科学技術研究科 修士論文要旨

所属研究室 (主指導教員)	自然言語処理学 (渡辺 太郎 (教授))		
学籍番号	2311327	提出日	令和 7年 1月 21日
学生氏名	CAO ZHE		
論文題目	Exploring Intrinsic Language-specific Subspaces in Fine-tuning Multilingual Neural Machine Translation		
要旨			
<p>Multilingual neural machine translation models support fine-tuning hundreds of languages simultaneously. However, fine-tuning on full parameters solely is inefficient potentially leading to negative interactions among languages. In this work, we demonstrate that the fine-tuning for a language occurs in its intrinsic language-specific subspace with a tiny fraction of entire parameters. Thus, we propose language-specific LoRA to isolate intrinsic language-specific subspaces. Furthermore, we propose architecture learning techniques and introduce a gradual pruning schedule during fine-tuning to exhaustively explore the optimal setting and the minimal intrinsic subspaces for each language, resulting in a lightweight yet effective fine-tuning procedure. The experimental results on a 12-language subset and a 30-language subset of FLORES-101 show that our methods not only outperform full-parameter fine-tuning up to 2.25 spBLEU scores but also reduce trainable parameters to 0.4% for high and medium-resource languages and 1.6% for low-resource ones.</p>			