Problem

Small model domain adaptation with scarce datasets.[1]

Background

- **in-domain[2-4]**
  - SQuAD
  - NewsQA
  - Natural Questions
- **oo-domain**
  - DuoRC
  - RACE
  - RelationExtraction

Methods

- **Back translation**
  - Vanilla
  - Looped
- **Token perturbation**
  - Substitution
  - Insertion
  - Synonym
- **Answer length penalty**

Experiments

Original Text	Ray Eberle died of a **heart attack** in Douglasville, Georgia on August 25, 1979, aged 60.
Vietnamese	Ray Eberle qua đi t mt cn đau tim Douglasville, Georgia vào ngày 25 tháng 8 năm 1979, tui 60.
Back translation	Ray Eberle died from a **heart attack** in Douglasville, Georgia on August 25, 1979, at the age of 60.

Figure 1

Figure 2
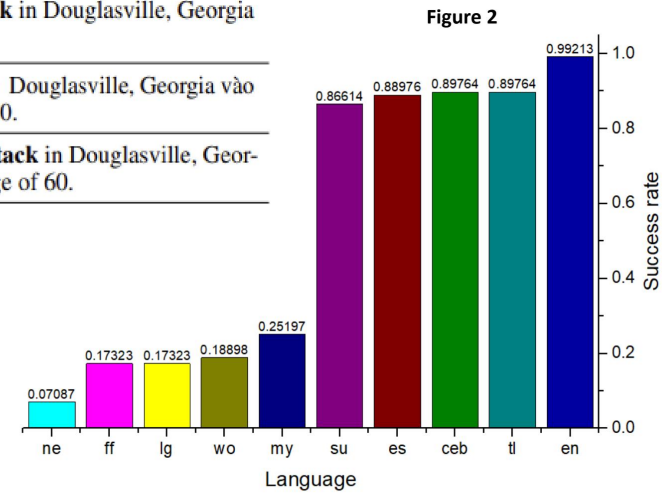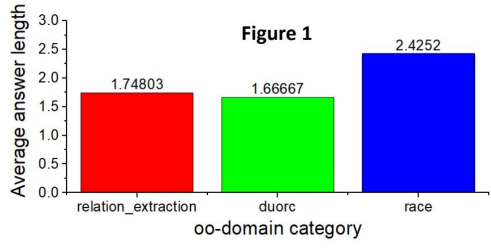
Analysis

Table 2. Model performance results (EM/F1)

Model	in-domain val	oo-domain val	oo-domain test
Baseline	52.97/69.11	31.68/47.38	
Baseline + oo-domain	53.01/69.04	32.23/48.64	
Vanilla back translation	54.35/70.71	36.65/51.27	
Looped back translation	54.17/70.08	37.17/**52.22**	**42.064/59.982**
Context substitution	54.25/70.88	31.94/48.52	
Context insertion	53.65/69.45	34.82/50.04	
Synonym replacement	54.66/70.88	33.51/49.73	
Length penalty + Looped BT	54.58/69.43	**37.43**/51.71	

Conclusion

- All approaches improve the model performance
- Back translation > token perturbation
- Augmentation for F1
- Length penalty for EM

References

1. Amar Prakash Azad, Dinesh Garg, Priyanka Agrawal, and Arun Kumar. Deep domain adaptation under label scarcity. In 8th ACM IKDD CODS and 26th COMAD, CODS COMAD 2021, page 101–109, New York, NY, USA, 2021. Association for Computing Machinery.
2. Pranav Rajpurkar, Jian Zhang, Konstantin Lopyrev, and Percy Liang. Squad: 100,000+ questions for machine comprehension of text, 2016.
3. Adam Trischler, Tong Wang, Xingdi Yuan, Justin Harris, Alessandro Sordoni, Philip Bachman, and Kaheer Suleman. Newsqa: A machine comprehension dataset, 2017.
4. Tom Kwiatkowski, Jennimaria Palomaki, Olivia Redfield, Michael Collins, Ankur Parikh, Chris Alberti, Danielle Epstein, Illia Polosukhin, Matthew Kelcey, Jacob Devlin, Kenton Lee, Kristina N. Toutanova, Llion Jones, Ming-Wei Chang, Andrew Dai, Jakob Uszkoreit, Quoc Le, and Slav Petrov. Natural questions: a benchmark for question answering research. Transactions of the Association for Computational Linguistics, 2019