

# 周报

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## 1 Proof entailment 任务实验改进

- 对于 Beam search 的过程, 用一个 learned state evaluate 模块来代替原来模型中直接基于句子相关性的分数, 在 task\_1, task\_2 上实验结果有所提升. 在 4 项指标上超过了之前该数据集上的研究结果

```
Pred Tree [['sent2', 'sent1']]
Gold [['sent1', 'sent2']]
Pred [['sent2', 'sent1']]
{'leaves_f1': 1.0, 'leaves_correct': 1, 'steps_f1': 1.0, 'steps_correct': 1, 'inter_f1': 1.0, 'inter_correct': 1, 'inter_mean_bleurt': 0.8322556018829346, 'overall_ac': 1}

{'leaves_f1': 0.8667, 'leaves_correct': 0.4917, 'steps_f1': 0.5651, 'steps_correct': 0.45, 'inter_f1': 0.5834, 'inter_correct': 0.4118, 'inter_mean_bleurt': 0.3485, 'overall_ac': 0.1912}
Time consuming : 5724.135280609131
(nlproofs) root@e2690ae68c95:~/BackChain/EntailmentBank#
```

图 1: Results on task1

```
{'leaves_f1': 0.6791, 'leaves_correct': 0.1893, 'steps_f1': 0.3378, 'steps_correct': 0.2189, 'inter_f1': 0.5293, 'inter_correct': 0.4024, 'inter_mean_bleurt': 0.3336, 'overall_ac': 0.1627}
Time consuming : 9438.809687614441
(nlproofs) root@e2690ae68c95:~/BackChain/EntailmentBank#
```

图 2: Results on task2

- 考虑先把所有的中间结果生成出来, 再根据增强的知识集合给出推理过程, 正在实验中

## 2 AI for Math 论文阅读

关于 AI for Math 的文章阅读和整理, 综述一篇 + 两类研究方法的相关文献

- 方法 1 结合 ITP 和 ATP 的任务 [1] [2] [3] [4] 等:

利用机器学习模型学习在给定的状态下预测 tactic 或 proof, 模拟 human 和 ITP 交互的过程, (即在 ITP+human 的 loop 中, 用机器学习模型来代替 human), 是以 GPT-f 为首的一类工作的做法, 一般来讲可以从

- (1) 生成更高质量的 proofstep
  - (2) 设计新的 proofSearch 搜索算法 [4]
- 两个角度进行优化

- 方法 2 设计新的合成数据以及方法或者针对数学推理的预训练任务 [5] [6] 等

## 参考文献

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- [6] Yuhuai Wu, Markus N Rabe, Wenda Li, Jimmy Ba, Roger B Grosse, and Christian Szegedy. Lime: Learning inductive bias for primitives of mathematical reasoning. In Marina Meila and Tong Zhang, editors, *Proceedings of the 38th International Conference on Machine Learning*, volume 139 of *Proceedings of Machine Learning Research*, pages 11251–11262. PMLR, 18–24 Jul 2021.