











MOTIVATION

Symmetrical Prompt Enhancement for Fact Probing

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Building better soft prompts from task symmetry

TASK AND DATASET

LAMA (Petroni et al. 2019)

- Question: how much knowledge are stored in pertained language models (PLMs)?
- Querying knowledge from PLMs using masked sentences (prompts).
- 41 factual relations from Wikidata.
- e.g. P19 place of birth
 - Dante was born in [MASK].

RESULTS

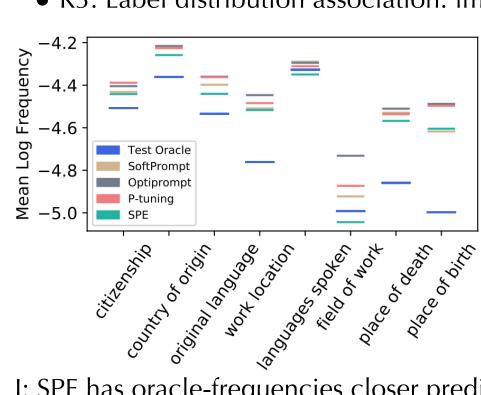
• SPE outperforms both discrete and continuous promptings.

Model	BERT-base			BERT-large			RoBERTa-base		
	P@1	P@10	MRR	P@1	P@10	MRR	P@1	P@10	MRR
Manual (Petroni et al., 2019)	31.1	59.5	40.3	28.9	57.7	38.7	22.0	36.0	25.0
LPAQA (Jiang et al., 2020)	34.1	62.0	43.6	39.4	67.4	49.1	21.7	36.0	27.7
AutoPrompt (Shin et al., 2020)	43.3	73.9	53.9	41.3	69.3	50.6	40.0	68.3	49.9
OptiPrompt (manual) (Zhong et al., 2021)	48.6	79.0	58.9	50.6	79.2	60.7	40.3	65.7	48.9
SoftPrompt (mined) (Qin and Eisner, 2021)	48.8	79.6	59.4	51.0	81.4	59.6	40.6	75.5	53.0
P-tuning (Liu et al., 2021)	48.2	78.1	58.6	49.9	80.6	60.6	43.5	73.9	53.8
SPE	50.3	80.5	60.9	53.1	82.4	63.4	47.0	75.8	56.2

- SPE is effective with frozen and fine-tuned PLMs.
- SPE is more than learning better shortcuts (Easy vs Hard).
- SPE develops gains from a larger candidate pool.

BENEFITS Spurious Associations Mitigation

- R1: Scope association: narrow but more accurate scope (e.g. *field of work*).
- R2: Entity-type association: entity with constraints (e.g. place of birth).
- R3: Label distribution association: imperfect label distribution (e.g. continent).



-1.30
-1.35
-1.40
-1.45
-1.45
-1.45

0.95 - SoftPrompt Optiprompt Opti

I: SPE has oracle-frequencies closer predictions (R1 + R2).

II: SPE has lower frequencies in top 10 predictions (R1 + R2).

III: SPE is less affected by imbalanced training objects (R3).





