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EMNLP
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Do Language Models Learn about Legal Entity Types during Pretraining?

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Do language model acquire any legal knowledge?

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- Language models learn the probabilistic structure of a language
- One hypothesis is that LMs acquire diverse **linguistic and semantic knowledge** during pretraining (Petroni et al, 2019, Jiang et al., 2020)
- **Domain oriented pretraining** and task specific pretraining enhance a model performance and adaptability (Gururangan et al., 2020)
- The **lack of resources** and updated annotated datasets is a notable bottleneck of the application of NLP in law

Research questions

What type of signals do LMs learn during pretraining?

Are those signals reliable enough to be used as a source of incidental supervision for downstream tasks in Legal NLP?

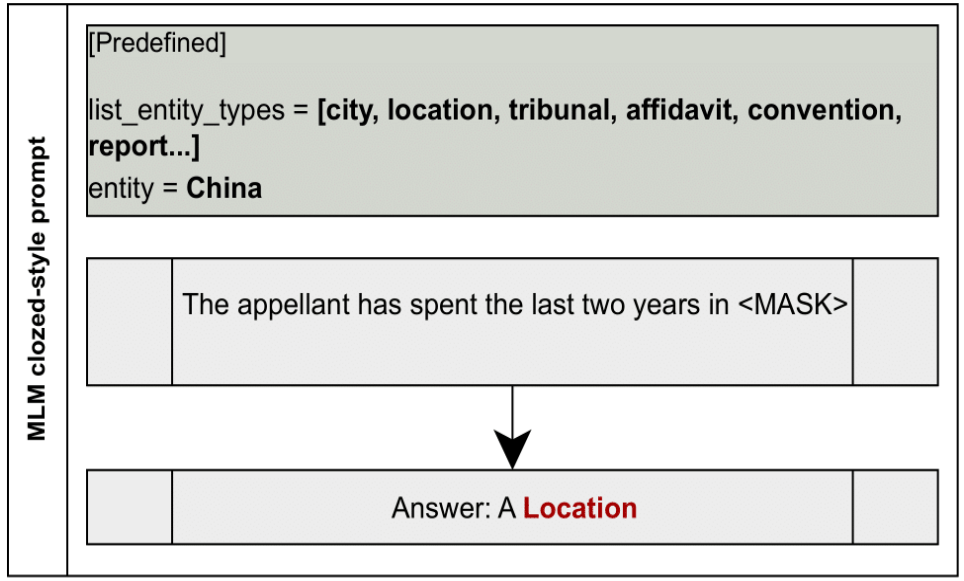
Legal entity typing is a foundation for:

(i) incidental supervision and text labelling
(ii) downstream tasks
(iii) text comprehension

Probing Legal Entity Types
A surrogate for legal knowledge

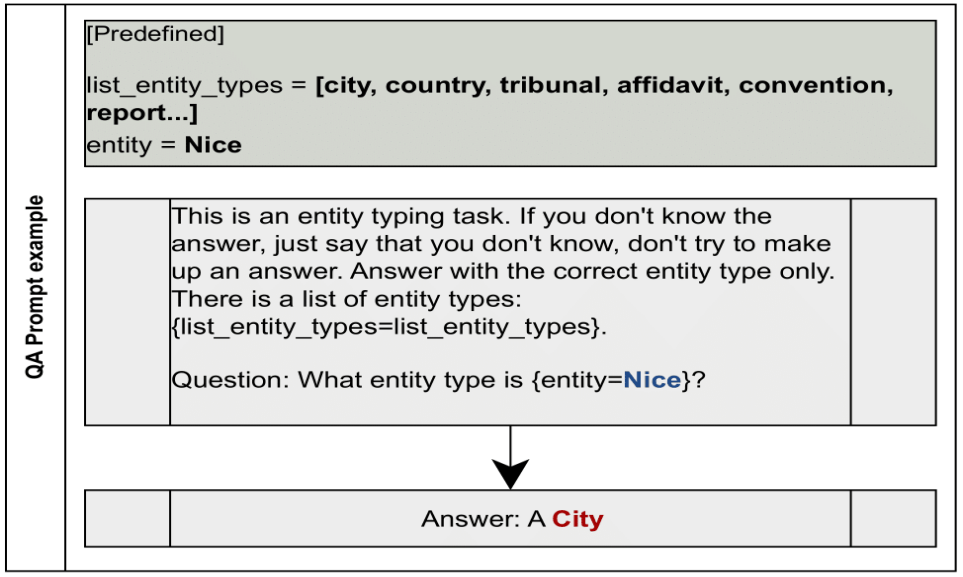
- Task: Entity Typing (predict the entity type), in a zero-shot setting, as a Multiple-Choice QA task
- Dataset: Asylex, a dataset of refugee status determination decisions
- Models: Encoder-only vs Decoder-only

1. MLM – Cloze prompts- with BERT-based models



RoBERTa, DeBERTav3, CaseHOLD, Pile of Law, LexLM

2. Llama2: QA style prompts



Llama2-7B

Experiments results

How proficient are Language Models at acquiring knowledge about domain-specific entities like legal entities during pretraining?

Averaged F1 scores

	Gen	CH	PoL	LexLM	Llama2
Generic	11.59	8.51	**20.42**	11.97	**63.26**
Gen Legal	17.98	**20.89**	15.40	12.48	**29.52**
Refugee Law	**10.01**	5.93	4.68	4.92	**13.03**

Gen groups the results of RoBERTa and DeBERTa-v3
CH refers to CaseHOLD

Generic: location, date, adjective location
Gen Legal: org, legal citation, claimant info, procedure, doc evidence, precedent case
Refugee Law: credibility, determination, explanation, legal ground, NGO reports

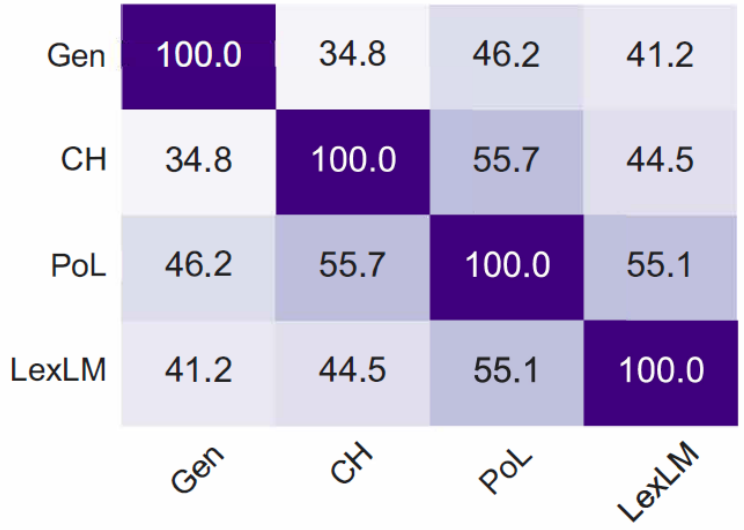
Experiments results: error analysis

	Error Type	Prompt example	Prediction	Gold	%
MLM	Random Prediction	under <mask> of the Republic of China, they cannot take on a second citizenship	lawsuit	`law`	70.71
	Contextually Accurate	the applicant has not returned to <mask> since 2008	employment	`location`	12.43
	Closely Related	my colleague relied on this <mask> in her conclusion	ngo report	`doc_evidence`	16.86
Llama2	Random Prediction	What is *Subsection 648*?	country	`law`	22.22
	Closely Related	What is *vietnamese*?	country	nationality (`norp`)	18.52
	False Negative	What is *female claimant*?	female claimant	gender (`claimant_info`)	33.33
	Prompt Error	What is *removal order*?	It is a type of judicial decision.	`procedure`	25.93

We compare:

- **Language models and corpora** →
- **Single-token vs Multi-token** → Not significant
- **Prompt templates** → Optimized templates
- **Entity Types** → Generic, Law, Refugee Law
- **Syntactic vs. Semantic Signals**

Vocabulary Overlap Matrix



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Thank you!

Link to the paper