

Enhancing Court View Generation with Knowledge Injection and Guidance

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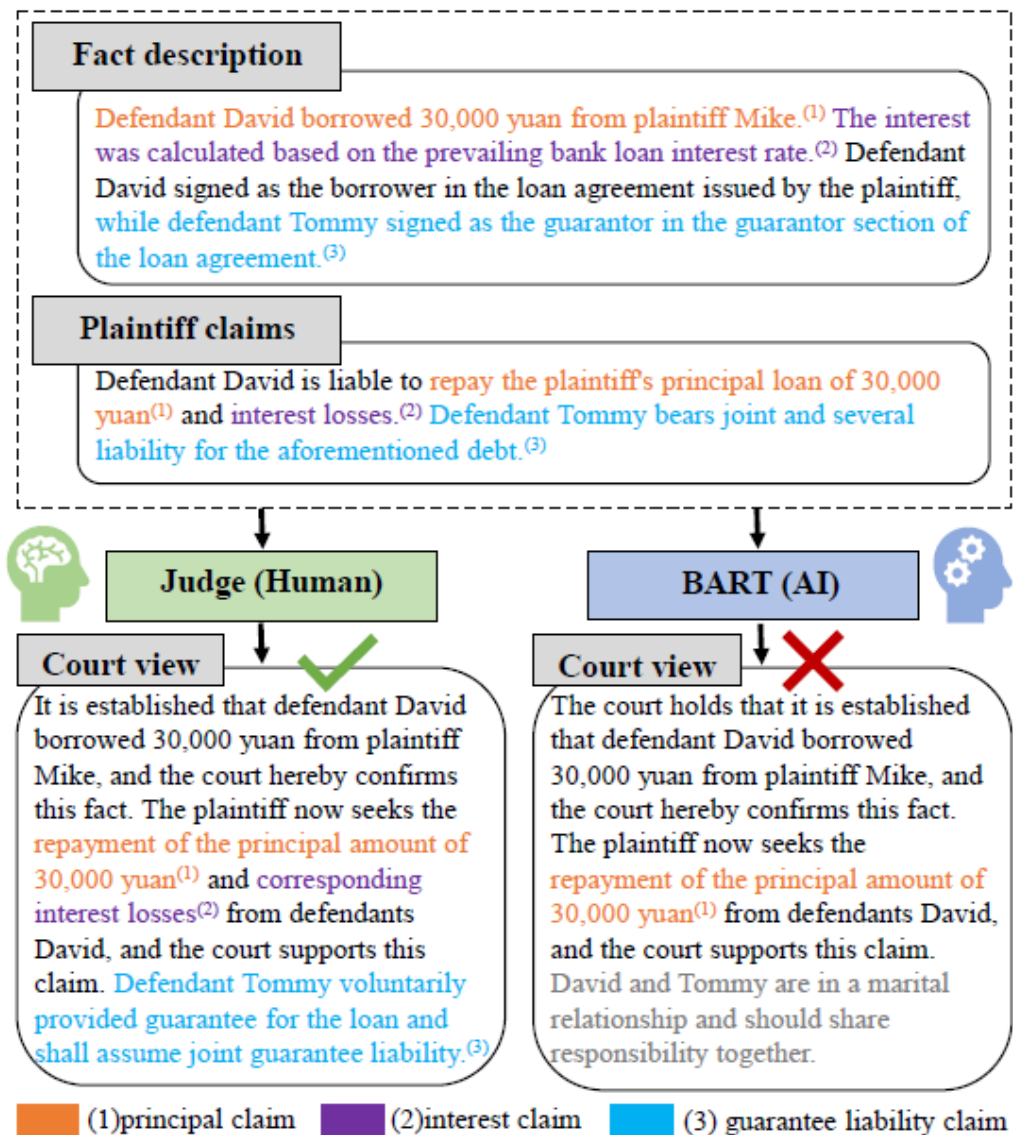
01



Introduction

Court View Generation (CVG)

01 Introduction: Task Definition



A real case in CVG

Input:

- Plaintiff Claims
- Fact Description

Output:



- Court View

- Judge provides accurately responds to the plaintiff claim
- BART lacks the response to the interest claim
- BART provides an incorrect response to the guarantee liability claim



Lack professional knowledge



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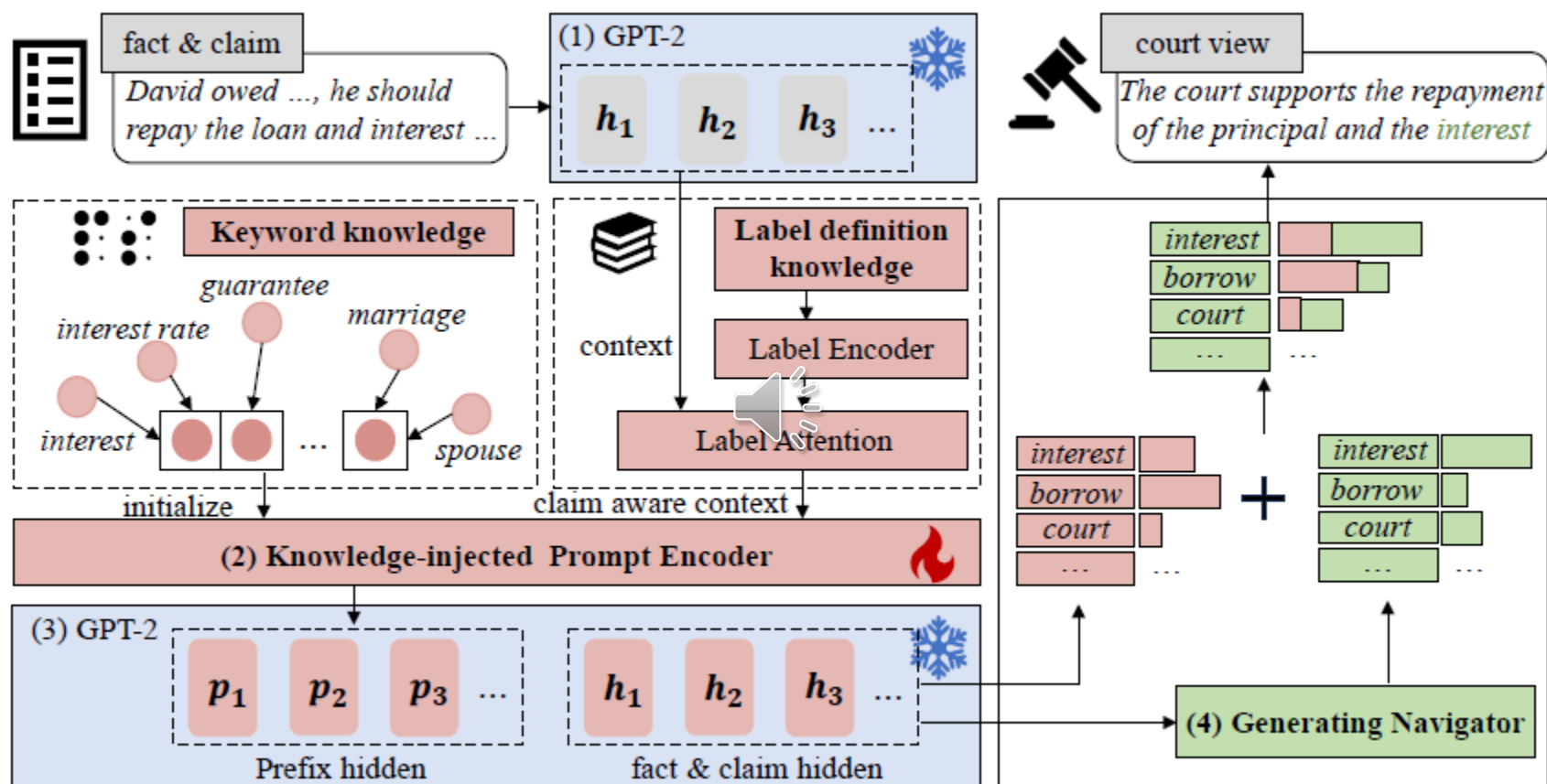
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Method

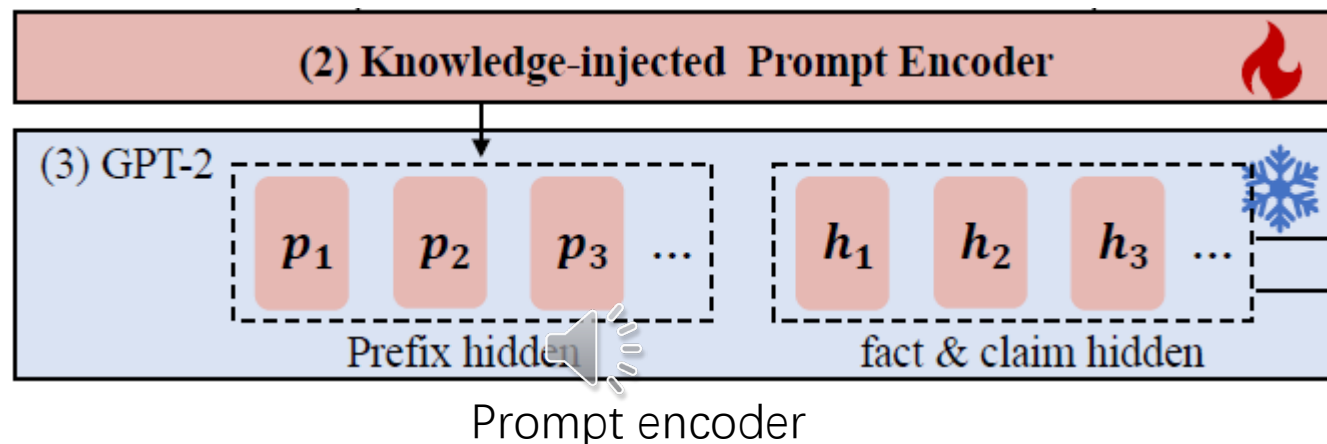
Knowledge Injection and Guidance (KIG)

02 Method: Overview of KIG



Overview of KIG

02 Method: Preliminary Prompt Tuning



$$h_i = \begin{cases} MLP_{\theta}(\mathcal{D}_p)[i, :], & \text{if } i < l_p, \\ PLM_{\phi}(x_i, h_{<i}), & \text{otherwise,} \end{cases}$$

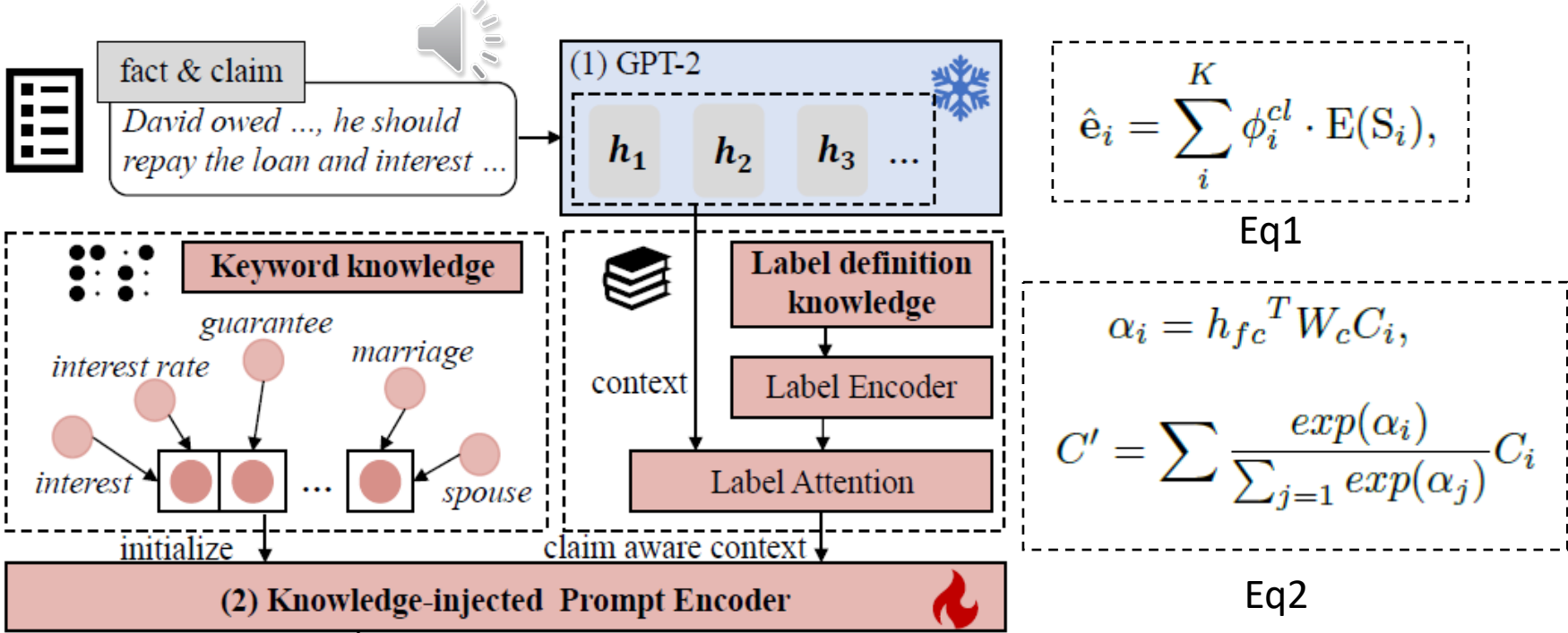
$$P(x_{i+1}|h_{\leq i}) = \text{softmax}(W_{\phi}h_i^n)$$

02 Method: Knowledge-injected Prompt Encoder

keywords and label definitions

Claim Labels	Keywords	Descriptions
Principal Claim	{“principal”, “debt”, “borrower”}	The requests for repayment of the initial borrowed or owed amount, excluding interest and additional charges.
Interest Claim	{“interest”, “interest rate”, “bank”}	A borrower requests to pay the interest on a owed amount, calculated based on the agreed-upon interest rate in the loan contract.
Spousal Joint Debt Claim	{“spouse”, “joint debt”, “property division”, “marriage”}	One spouse seeks to divide shared debts within a marriage, often occurring during divorce or separation when assets and debts are being split.
Guarantee Liability Claim	{“guarantor”, “guarantee”, “guaranty contract”}	A guarantor asks to fulfill their duties in a guarantee contract, typically because the borrower failed to meet their contract terms, leading to the guarantor paying the debt or fulfilling guaranteed responsibilities.

Knowledge-injected Prompt Encoder



02 Method: Generating Navigator

$$P(v|a) = \prod_{i=1}^{l_v} P(x_i|x_{1:i-1}, a),$$

$$P(x_i|x_{1:i-1}, a) \propto P(x_i|x_{1:i-1})P(a|x_{1:i}),$$

Eq3

$$\phi_i^s = \text{softmax}\left(\frac{|a_i \cap \hat{a}|}{|a_i \cup \hat{a}|}\right).$$

$$\tilde{\phi}_i^s = \frac{\phi_i^s}{1 + \exp((k - l)/\mu)},$$

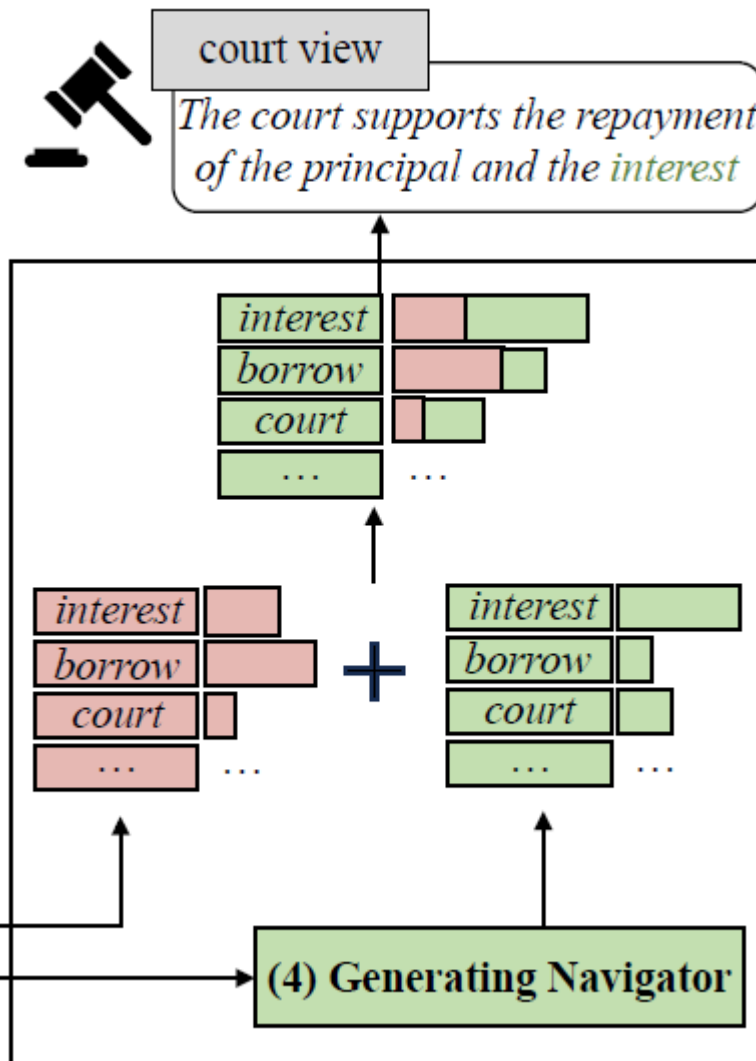
Eq4

$$\tilde{\phi}_i^g = \phi_i^g + \lambda \tilde{\phi}_i^s,$$

Eq5



Promptencoder + GPT





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03



Experiment



We use the following dataset for experiments:

- civil cases dataset: a Chinese civil lending cases dataset from the paper "De-biased Court's View Generation with Causality"

Evaluation Metrics

- Automatic Evaluation: BLEU, ROUGE, the F1 score (Mi-F, Ma-F) and Jaccard similarity coefficient (Mi-J and Ma-J)
- Human Evaluation: Fluency. Fitness.

Type	Result
# Sample	41693
Avg. # Tokens in Fact Description	177.5
Avg. # Tokens in Plaintiff Claims	76.3
Avg. # Tokens in Court View	205.7
Avg. # numbers of claim labels	2.13



03 Experiment: Experiment Results



Method	Similarity Metrics						Claim Response Metrics			
	B-1	B-2	B-N	R-1	R-2	R-L	Mi-F	Ma-F	Mi-J	Ma-J
Transformer	61.01	52.01	48.97	64.47	46.45	56.95	72.02	65.24	56.28	50.86
PGN	61.24	51.25	47.68	68.16	46.16	58.09	67.01	64.96	52.01	48.59
AC-NLG	61.72	52.61	49.71	68.57	49.46	59.97	69.03	66.03	54.70	51.59
Text-Davinci-003	50.02	35.29	29.11	50.87	20.32	30.39	73.26	62.55	57.80	49.34
GPT-3.5-Turbo	53.47	39.38	32.86	53.25	23.38	32.46	79.23	64.76	65.60	53.23
BART	64.48	55.72	51.75	72.12	51.11	61.89	76.23	71.47	61.59	58.54
T5	63.33	53.63	50.33	69.21	46.39	61.70	74.01	72.36	58.74	59.25
GPT-2	68.65	61.92	59.05	75.87	59.06	68.48	81.09	75.91	68.19	63.20
Prefix-Tuning	66.28	58.36	57.12	73.95	56.52	65.69	79.28	75.24	67.59	63.24
KIG	71.04	64.80	62.40	77.28	62.25	71.11	90.21	87.78	82.16	78.40
KIG w/o V	70.48	63.58	61.06	76.47	60.85	69.99	88.29	83.65	79.04	72.91
KIG w/o LA	69.32	63.16	60.86	75.89	60.68	69.85	88.63	86.48	79.58	76.39
KIG w/o N	70.45	64.34	61.96	77.05	62.09	70.96	88.08	85.04	78.70	74.22

Results of court view generation

Method	Similarity Metrics		Claim Response Metrics	
	B-N	R-L	Mi-F	Ma-F
Transformer w/ N	48.58(-0.39)	56.63(-0.32)	73.29(+1.27)	66.54(+1.30)
PGN w/ N	46.95(-0.73)	57.62(-0.47)	68.49(+1.38)	65.53(+0.57)
AC-NLG w/ N	49.51(-0.20)	59.57(-0.40)	70.24(+1.21)	67.42(+1.39)
BART w/ N	51.98(+0.23)	62.99(+1.10)	78.42(+2.19)	72.54(+1.07)
T5 w/ N	51.10(+0.77)	62.37(+0.67)	75.80(+1.79)	73.95(+1.59)
GPT-2 w/ N	60.31(+1.26)	69.26(+0.78)	83.55(+2.46)	79.02(+3.11)
Prefix-Tuning w/ N	58.66(+1.54)	67.33(+1.64)	81.44(+1.76)	77.05(+1.81)

Results of the baselines with the generating navigator

Method	Flu.	Fit.
AC-NLG	3.18	2.52
Text-Davinci-003	3.75	3.85
BART	4.44	3.64
KIG	4.52	4.02

Results of human evaluation

Model	Tuned Params	Storage Space	Training Time
Finetuning	118M	464M	1.4 hours
KIG	18M	72M	0.5 hours

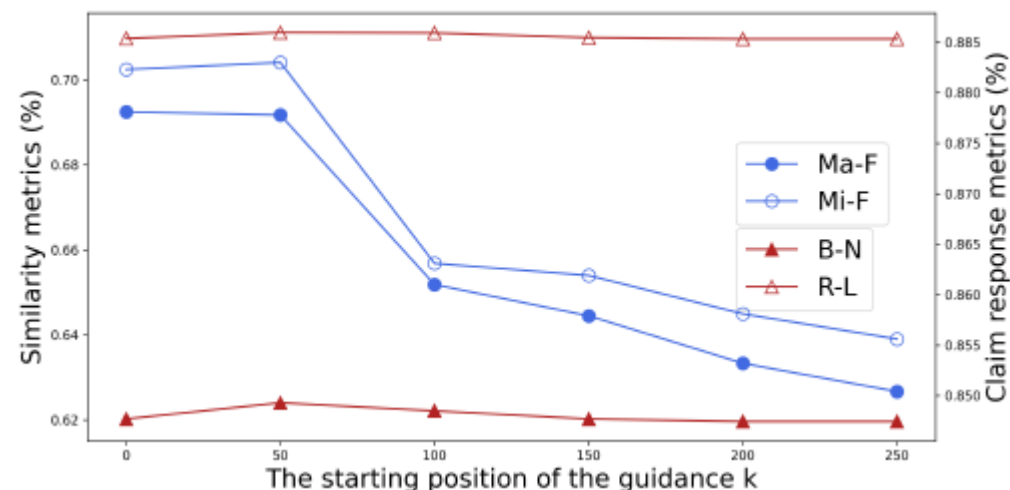
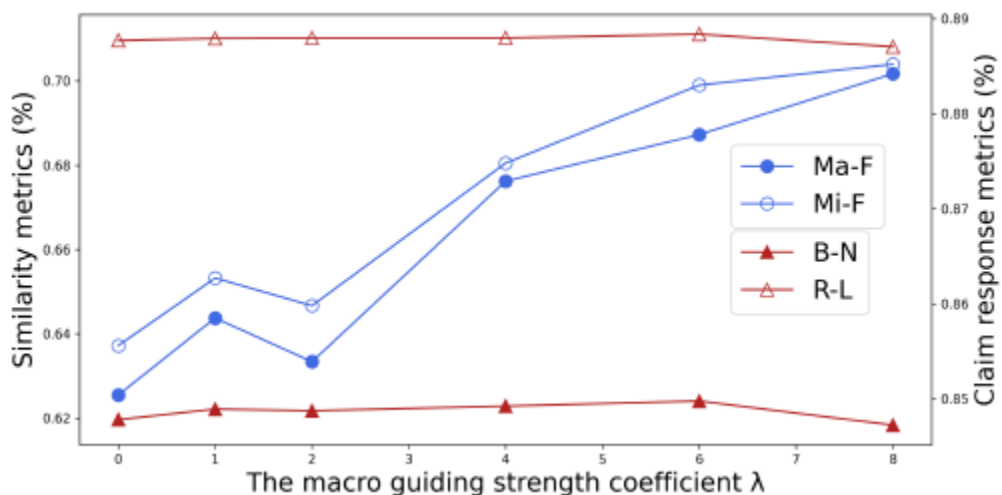
Efficiency Comparison of different methods on GPT-2.



03 Experiment: Other analysis

Fact Description	Defendant David borrowed 30,000 yuan from plaintiff Mike. ⁽¹⁾ The interest was calculated based on the prevailing bank loan interest rate. ⁽²⁾ Defendant David signed as the borrower in the loan agreement issued by the plaintiff, while defendant Tommy signed as the guarantor in the guarantor section of the loan agreement. ⁽³⁾ Subsequently, despite the plaintiffs repeated demands for payment, both defendants failed to make any payments, leading to the initiation of this lawsuit.
Plaintiff's Claims	Defendant David is liable to repay the plaintiff's principal loan of 30,000 yuan ⁽¹⁾ and interest losses. ⁽²⁾ Defendant Tommy bears joint and several liability for the aforementioned debt. ⁽³⁾
Court's View (BART)	The court holds that defendant David borrowed 30,000 yuan from plaintiff Mike, and the court hereby confirms this fact. The plaintiff now seeks the repayment of the principal amount of 30,000 yuan ⁽¹⁾ and corresponding interest losses ⁽²⁾ from defendants David, and the court supports this claim. David and Tommy are in a marital relationship and should share responsibility together. ⁽⁴⁾
Court's View (KIG)	The court has determined that defendant David indeed obtained a loan of 30,000 yuan from plaintiff Mike, and the court affirms this established fact. The plaintiff now requests the return of the principal sum of 30,000 yuan ⁽¹⁾ along with the associated interest losses ⁽²⁾ from defendant David, and the court upholds this demand. Defendant Tommy, of his own accord, offered a guarantee for the loan and shall share joint liability for this guarantee. ⁽³⁾
Court's View (REAL)	The court holds that it is established that defendant David borrowed 30,000 yuan from plaintiff Mike, and the court hereby confirms this fact. The plaintiff now seeks the repayment of the principal amount of 30,000 yuan ⁽¹⁾ and corresponding interest losses ⁽²⁾ from defendant David, and the court supports this claim. Defendant Tommy voluntarily provided a guarantee for the loan and shall assume joint guarantee liability. ⁽³⁾

■ (1) principal claim
 ■ (2) interest claim
 ■ (3) guarantee liability claim
 ■ (4) spousal joint debt claim





04

Conclusion



- We investigate the task of court view generation (CVG) by taking the domain knowledge into consideration.
- We propose a Knowledge Injection and Guidance (KIG) method, incorporating a prompt encoder for knowledge injection, along with a navigator for knowledge utilization guidance. The navigator holds transferability on other PLMs.
- We design claim response metrics for the CVG task. Experimental results on a real-world dataset demonstrate the effectiveness of our method



Thanks for
Listening!

