

CLEF 2024

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SimpleText@CLEF-2024

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SimpleText: Automatic Simplification of Scientific Texts

Task 2: What is unclear? Difficult concept identification and explanation (definitions, abbreviation deciphering, context, applications,..)

SINAI Participation in SimpleText Task 2 at CLEF 2024: Zero-shot Prompting on GPT-4-Turbo for Lexical Complexity Prediction



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1. Introduction

- Reading is a complex process.
- Information technologies make it possible for people to access abundant information.
- Scientific texts = Complex content + lack of prior knowledge.
- People take worthless information from the web and social networks.
- CWI is the task of detecting difficult words.
- Objective . **The goal of this task is to decide which concepts in scientific abstracts require explanation and contextualization in order to help a reader understand the scientific text.**

2. Methodology

Task 2: Identifying and explaining difficult concepts

Simple@Text 2024- The corpus of Task 2 is based on the sentences in high-ranked abstracts to the requests of Task 1.

- Create a database to store the data set.
- Applying zero-shot prompting to GPT-4 Turbo model, extracting the predictions from the generated sequence.
- Model parameters are:

Parameter	Value
Model	gpt-4-turbo
Temperature	0
Max_tokens	500
Top_p	1
Frecuency Penalty	0
Presence Penalty	0
Logprobs	5
Stop	"###"

The task has two steps:

- i) to retrieve up to 5 difficult terms in a given passage from a scientific abstract
- ii) to provide a definition or an explanation or both of these difficult terms.

We built 3 different versions of prompt for the execution of task 2.

Prompt task 2. 1 y 2.2
with Zero-Shot Learning Prompt
PRM_ZS_TASK2_V1

```
Performing the following actions according to a given text:  
Select a number from 1 to 5 terms within the sentence named text  
Assign the difficulty of the words: easy, medium and difficult, giving  
the initial letter of each difficulty as an answer ([e]ácil/[m]edium/[d]ifficul)  
Give the definition of each difficult term, add an explanation and use  
case according to context of the sentences.  
Provide the response in following JSON format:  
{  
  "word": <word>,  
  "difficulty": <word_difficult>,  
  "definition": "<definition>",&br/>  "explanation": <explanation>  
}
```

Response:

```
json
[
  {
    "word": "exploited",
    "difficulty": "m",
    "definition": "make full use of and derive benefit from (a resource)",
    "explanation": "In the context, 'exploited' refers to utilizing the new technological capabilities of mobile devices and applications to their full advantage, specifically in managing and combating wildfires.",
    "use_case": "The novel technologies can be exploited to improve the efficiency and effectiveness of wildfire management."
  },
  {
    "word": "confrontation",
    "difficulty": "m",
    "definition": "a hostile or argumentative meeting or situation between opposing parties",
    "explanation": "Here, 'confrontation' is used metaphorically to describe the act of dealing with wildfires, suggesting a direct and active engagement with the fires.",
    "use_case": "Mobile technologies are being used in the confrontation of wildfires, aiding in direct engagement and management."
  },
  {
    "word": "coordination",
    "difficulty": "m",
    "definition": "the organization of the different elements of a complex body or activity so as to enable them to work together effectively",
    "explanation": "In this context, 'coordination' refers to the organized management of personnel and vehicles to tackle wildfires efficiently, facilitated by mobile technology.",
    "use_case": "Effective coordination of personnel and vehicles is crucial for the successful management of wildfire incidents."
  }
]
```

The task has two steps:

- i) to retrieve up to 5 difficult terms in a given passage from a scientific abstract
- ii) to provide a definition or an explanation or both of these difficult terms.

Prompt PRM_ZS_TASK2_V2

Depending on the text, select up to 5 terms considered complex within the sentence, then assign the complexity of the terms to easy, medium and difficult using the first letter of each word, for example if the complexity is easy add the letter "e", If the complexity of the term is medium, add the letter "m", and if the complexity of the term is difficult, you should add the letter "d". Then, from each complex term generate its definition, an explanation and a use case according to the context of the sentence. Finally, provide the response in the following JSON format:

```
{  
  "word": <word>,  
  "difficulty" <difficult_word>,  
  "definition": "<definition>",  
  "explanation" : <explanations>  
}
```

Prompt PRM_ZS_TASK2_V3

Identify up to a total of 5 complex words in the sentence and determine the difficulty of each complex word by classifying it into the category of "easy", "medium" or "difficult". For the "easy" difficulty place the letter "e", for the "medium" difficulty place the letter "m", and for the "hard" difficulty place the letter "d". Furthermore, in the case of words identified as complex taking into account the context of the sentence, three things must be generated: a definition, an explanation, and a use case.

Finally, provide the response in the following JSON format:

```
{  
  "word": <word>,  
  "difficulty" :<hard_word>,  
  "definition": "<definition>",  
  "explanation" : <explanations>  
}
```

Results applying using a GPT-4 Turbo model in task 2.1 with Zero-Shot learning

Table 2

Predictions generated by applying GPT-4 Turbo with zero-shot learning in Sub-task 2.1-Prompt PRM_ZS_TASK2_V1.

Manual	Snt_id	Term	Difficulty
0	G01.1_1000902583_1	exploited	d
0	G01.1_1000902583_1	confrontation	m
0	G01.1_1000902583_1	coordination	m
0	G05.1_2914002216_4	CRISPR/Cas9	d
0	G05.1_2914002216_4	reagents	m
0	G05.1_2914002216_4	high-content screen	d
0	G07.2_2773680786_5	conspiracy	m
0	G07.2_2773680786_5	emergent	m
0	G07.2_2773680786_5	pervasive	d
0	G11.1_2946157960_5	consideration	m
0	G11.1_2946157960_5	applications	e
0	G11.1_2946157960_5	deployment	m
0	G11.1_2946157960_5	networked	d
0	G11.1_2946157960_5	emission	m

Table 3

Predictions generated by applying GPT-4 Turbo with zero-shot learning in Sub-task 2.2 - Prompt PRM_ZS_TASK2_V1

Snt_id: G01.1_1000902583_1

Abstract: Novel technological advances in mobile devices and applications can be exploited in wildfire confrontation, enabling end-users to easily conduct several everyday tasks, such as access to data and information, sharing of intelligence and coordination of personnel and vehicles.

term	difficulty	Definition/Explication
exploited	d	<p>Definition: make full use of and derive benefit from (a resource).</p> <p>Explication: In the context of the sentence, exploited refers to utilizing the new technological capabilities of mobile devices and applications to their fullest potential in managing and combating wildfires.</p> <p>Use case: The novel technologies can be exploited to improve the efficiency and effectiveness of wildfire management.</p>
confrontation	m	<p>Definition: hostile or argumentative meeting or situation between opposing parties.</p> <p>Explication: Here, confrontation is used metaphorically to describe the act of dealing with or managing wildfires, which are seen as the opposing party to human safety and property.</p> <p>Use case: technological advances aid in the confrontation of wildfires by providing better tools for managing the crisis.</p>
coordination	m	<p>Definition: the organization of the different elements of a complex body or activity so as to enable them to work together effectively.</p> <p>Explication: In this context, coordination refers to the organized management of personnel and vehicles, ensuring they operate in a synchronized and efficient manner during wildfire emergencies.</p> <p>Use case: Effective coordination of personnel and vehicles is crucial for rapid and efficient wildfire suppression.</p>

Prompt task 2.2 with Zero-Shot Learning

Table 4
 SimpleText results 2024 official results of task 2

runid	recall_overall	recall_average	recall_difficult_terms	precision_difficult_terms	bleu_n1_average	bleu_n2_average	bleu_n3_average	bleu_n4_average
AIIRLab_Task2.2_LLaMA	0.2792	0.3011	0.2642	0.6667	0.2883	0.1519	0.0497	0.0191
AIIRLab_Task2.2_LLAMAFT	0.0069	0.0056	0.0047	1.0000	0.2405	0.1171	0.0000	0.0000
AIIRLab_Task2.2_Mistral	0.4118	0.4415	0.1863	0.4907	0.2610	0.1338	0.0395	0.0128
Dajana&Kathy_SimpleText_Task2.2_LLAMA2_13B_CHAT	0.0118	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FRANE_AND_ANDREA_SimpleText_Task2.2_LLAMA2_13B_CHAT	0.0076	0.0066	0.0094	0.3636	0.0000	0.0000	0.0000	0.0000
ruby	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sharingans_Task2.2_GPT	0.4722	0.5302	0.5448	0.5954	0.2257	0.1039	0.0300	0.0160
SINAI_task_2_PRM_ZS_TASK2_V1	0.0868	0.0872	0.1014	0.5244	0.2545	0.1579	0.0821	0.0578
SINAI_task_2_PRM_ZS_TASK2_V2	0.1556	0.1636	0.1297	0.7746	0.2774	0.1574	0.0630	0.0443
SINAI_task_2_PRM_ZS_TASK2_V3	0.0951	0.1045	0.0472	0.8333	0.2144	0.1113	0.0377	0.0229
team1_Petra_and_Regina_Task2_ST	0.0042	0.0042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tomislav&Rowan_Task2.2_LLAMA2_13B_CHAT	0.0069	0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tomislav&Rowan_Task2.2_LLAMA2_13B_CHAT_1	0.0083	0.0084	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UAms_Task2-1_RareIDF	0.0854	0.0942	0.0259	0.0894	0.0001	0.0000	0.0000	0.0000
UboNLP_Task2.1_phi3-oneshot	0.5424	0.5620	0.3160	0.3743	0.0011	0.0000	0.0000	0.0000
unipd_t21t22_chatgpt	0.1340	0.1400	0.0825	0.6250	0.3045	0.1851	0.0905	0.0507
unipd_t21t22_chatgpt_mod1	0.2194	0.2371	0.1981	0.5957	0.3060	0.1783	0.0802	0.0430
unipd_t21t22_chatgpt_mod2	0.3146	0.3155	0.3420	0.6905	0.0302	0.0069	0.0031	0.0000

Simple@Text
 2024 official
 results of task
 2

Conclusions

- The model demonstrated strong performance in solving tasks 2.1 and 2.2 proposed in SimpleText@CLEF@2024.
- The model has proven to be able to generate robust responses based on the text or instruction (message)
- provided.
- We observe that GPT-4 Turbo analyzes the text, uses its extensive knowledge to identify words that can be considered complex, and categorizes them according to their complexity.
- Zero-shot learning has been successfully applied to large data sets, generating remarkable results in this area.
- Extremely large language models as GPT-4 can play an important role in the development of accessibility related solutions.



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Simple@Text 2024 - Task 2: Identifying and explaining difficult concepts

*Muchas
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