

## A Appendices

### A.1 Appendix: Computational Experiments

Experiments involving open-source models (Qwen2.5-7B-Instruct, GLM-4-9B-Chat, Llama-3.1-8B-Instruct, and gemma-2-9b-it) and BERT fine-tuning baseline experiments were conducted on a GPU server equipped with 4 GPUs (16GB memory per GPU), utilizing two GPUs per run. All large language model experiments operated within their respective context length limits and maintained consistent generation parameters ( $max\_new\_tokens = 512$ ,  $temperature = 0.0$ ) to limit the length of newly generated label sequences and ensure stable BIO tagging decisions. Cross-validation experiments with two open-source models (Qwen2.5-7B-Instruct and GLM-4-9B-Chat) followed the same configuration. Closed-source models (Claude-3.5-Sonnet, GPT-4o-latest, and Gemini-1.5-Pro) were accessed via API. The total GPU runtime was approximately 30 hours. For BERT fine-tuning baseline experiments, the training process was configured with the following parameters:  $batch\_size = 16$ ,  $learning\_rate = 5e-6$ ,  $max\_sequence\_length = 224$ ,  $epochs = 5$ ,  $train\_size = 0.80$ . Implementation utilized Hugging Face Transformers, PyTorch, and Scikit-learn frameworks.

### A.2 Appendix: Zero-Shot Prompt

```
system_prompt = """
## Maritime Safety Term Annotation System
You are an expert in maritime safety domain. Analyse the provided text for
terms that are highly relevant to maritime safety, considering both "
lexicon-specificity" (whether only specialists understand the term) and "
domain-specificity" (whether the term is primarily used in maritime safety
contexts).

## Annotation Guidelines
To determine which terms should receive BIO tags, consider the following term
categories in maritime safety domain:
- Specific Terms: Terms that are both lexicon- and domain-specific; these terms
are specific to the maritime safety field
- Out-of-Domain Terms (OOD): Technical terms that may be lexicon-specific (
understood by specialists) but are not primarily related to maritime safety
- Common Terms: Terms that are commonly understood but have a particular or
specific meaning within maritime safety field
- Named Entities: Proper names of real-world objects, such as locations,
organizations, countries, or ship names

## BIO Tagging Scheme
After identifying relevant terms based on the above categories, annotate them
using only:
- B: Beginning of a term
- I: Inside a term
- O: Not a term

## Important Rules:
- Only output labels ["B", "I", "O"] for each word.
- Do not output the category names (e.g., "Specific Terms", "Common Terms", etc
.).
- Each word must have exactly one label: "B", "I", or "O".
- No recursive annotation: Do not consider nested terms within already
identified terms
- Do not assign BIO tags to standalone numerical expressions, including time
references, measurements, and distance values

## Input Format:
word / word / word ...

## Output Format:
word|label / word|label / word|label ...

## Example:
Input: Collision / between / Accolade / II / and / Sandgroper
Output: Collision|B / between|O / Accolade|B / II|I / and|O / Sandgroper|B"""
```

### A.3 Appendix: Exclusive Terms Extracted by Nested Annotation

Term	Type	Appears in Larger Terms
bulk carrier	Common Terms	self-discharging bulk carrier, self-unloading bulk carrier
working frequency	Common Terms	VTS working frequency
broadcasts	Common Terms	port radio broadcasts, ship broadcasts
masthead	Specific Terms	masthead light
pilotage	Specific Terms	pilotage exemption certificate, pilotage areas
mooring station	Specific Terms	forward mooring station, aft mooring station
stern	Specific Terms	propulsion full astern, full astern, stern light
gear	Common Terms	fishing gear, cargo gear
Australia	Named Entities	South Australia
harbours	Common Terms	Outer harbours, Port Adelaide Inner and Outer Harbours
radios	Common Terms	VHF radios
officer	Common Terms	watchkeeping officer
receiver	Common Terms	AIS Class B receiver
ship-to-shore	Common Terms	ship-to-shore calls
AIS stations	Specific Terms	shore-based AIS stations
domestic commercial vessel	Specific Terms	class 3B domestic commercial vessel
navigational audits	Specific Terms	annual navigational audits
transmitter	OOD Terms	transmitter unit
voyage	Common Terms	voyage data recorder, return voyage, sea voyage
full astern	Specific Terms	propulsion full astern
broadcast	Common Terms	VHF broadcast