**Table A.1** presents the main parameters of the fine-tuned large language model.

**Table A.1 Fine-tuning Main Hyperparameters**

|  |  |
| --- | --- |
| Parameter Type | Specific Content |
| Training Method | LORA |
| Learning Rate | 2e-5 |
| Sequence length | 4096 |
| Number of Training Epochs | 5 |
| Dataset Format | Role（System, User, Assistant） |
| Early Stopping Metric | Validation Loss |
| Early Stopping Metric Change | 0.01 |
| Early Stopping Patience | 3 |
| Global Batch Size | 10 |
| Learning Rate Warmup | 0.1 |
| Weight Decay | 0.01 |
| Random Seed | 42 |
| Scheduler Type | constant |
| Period of Cosine | 0.5 |

**Table A.2** presents the main parameters of classifiers.

**Table A.2 Main Parameters of Classifiers**

| **Classifier** | **Main Parameter** |
| --- | --- |
| Random Forest | n\_estimators=200; max\_depth=25; min\_samples\_split=8; min\_samples\_leaf=3; random\_state=47 |
| SVM | kernel= ‘rbf’, C=1; gamma= ‘scale’; probability=True; class\_weight= ‘balanced’; random\_state=42 |
| LightGBM | n\_estimators=200; class\_weight= ‘balanced’; random\_state=42 |
| CatBoost | silent=True; iterations=200; learning\_rate=0.1; depth=6; auto\_class\_weights= ‘Balanced’ |
| XGBoost | n\_estimators=150; max\_depth=16; learning\_rate=0.05; colsample\_bytree=0.8; objective= ‘multi:softmax’; random\_state=107 |

**Table A.3** presents the selected Douyin book live streaming channels as detailed.

**Table A.3 The Selected Douyin Book Live Streaming Channels**

|  |  |
| --- | --- |
| Number | Name |
| 35 | Dangdang Social Sciences Hall People’s Literature City Fan Deng Fragrant Classics Reading Hall Not Late Book House CITIC Selected Books Sangyu Bookshop Tie Tie’s Bookshelf Lollipop Book Club Caiba South China Book Garden Mu A Houlang Literature and History Hall Designated Entrepreneurial Book Sales Edition New Oriental Reading Space Yuelu Book Club Pinewood Study Kind Words Book Club Peking University Press Writers’ List Classic Masterpieces 230K Fans Festival Director Wu’s Strict Book Selection Book Sea Treasures Pavilion Oriental Selection Books Writer’s Publishing House Flagship Store Warm Books CITIC Bookstore Live Room Chinese Academy of Social Sciences Press People’s Literature Publishing House Houlang Voice Good Book Planet Hebei Xinhua Bookstore Only Sells Good Books Pan Chaochaochao Guanxin Book Garden Get Up and Read Reader Official Flagship Store |

**Table A.4** presents the prompt templates used for the LLMs.

**Table A.4 Prompt Type and Content**

|  |  |  |
| --- | --- | --- |
| Prompt Number | Task | Specific Content |
| Prompt 1 | Book Name Extraction | **Role:** You are highly skilled at extracting key information from text and particularly proficient in extracting book information from live streaming texts. **Task:** I will provide you with real live streaming sales text. Please understand the host’s intent and identify which book is being introduced in the paragraph. If the book cannot be identified, please output “nonsense” directly. Ensure that the book name you output is correct, free of typos, and corresponds to a real, existing book.  The text to be analyzed is provided. Please directly give the final recognized book name in the label without explanation. |
| Prompt 1 | Book Name Correction | **Role:** Expert in grammatical and spelling correction for book names  **Goals:** Detect and correct spelling mistakes and other common writing errors in given book names.  **Constraints:**  -All obvious grammatical and spelling errors \*\*must\*\* be detected and corrected.  - Book names must be accurate and correspond to real-world existing names.  - Output only the corrected result, \*\*do not provide any explanations\*\*.  - If the content of “text” is “nonsense”, simply output “nonsense”.  **Skills:**  - Professional skills in grammar and spelling correction.  - Ability to understand and interpret book names.  **Output**  - Output format: corrected book name. |
| Prompt 2 | Social Support Classification | **Role:** You are a professional text classification expert. Please classify the input strictly according to the following rules. **Background:** In the context of book live streaming, there are three types of social support:  **Emotional Support** Emotional support primarily refers to the host providing care, encouragement, and comfort to meet the emotional needs of individuals. Emotional support also includes the host expressing their love for the book and emotional resonance.  **Informational support** Informational support involves the host providing information, knowledge, or advice to help the audience better understand a topic or issue. It also includes the host explaining the book’s content, expanding on the book’s information, or discussing the author’s history.  **Instrumental Support** Instrumental Support refers to the host providing practical help or resources, such as money, items, or services. It includes providing purchase guides and after-sales service information, such as stock information, purchase processes, and return/exchange policies.  **Requirements:**  1.If the text does not belong to one of the three categories (emotional support, informational support, or Instrumental Support), select “nonsense” (meaning meaningless conversation).  2.For single-choice questions, please only return one of [**Informational Support** / **Emotional Support** / **Instrumental Support** / **Nonsense**], without explanations or any additional content.  3.Do not create new categories. |

**Table A.5** presents the main parameters of non-LLM models in social support classification.

**Table A.5 Main Parameters of Non-LLM Models in Social Support Classification**

| **Model Name** | **Main Parameter** |
| --- | --- |
| Random Forest | n\_estimators=100; max\_depth=15; random\_state=42 |
| MLP | epochs=10, batch\_size=32 |
| BERT\_base\_Chinese | learning\_rate=2e-5; per\_device\_train\_batch\_size=16, num\_train\_epochs=3, weight\_decay=0.01, |
| SVM | kernel= ‘linear’, C=1 |
| CNN | pool\_size=2, 128, 5, activation= ‘relu’; 4, activation= ‘softmax’; Dropout=0.5; epochs=5; batch\_size=32 |
| Naive Bayes | alpha=1.0; fit\_prior=True |
| Logistic Regression | multi\_class= ‘multinomial’; solver= ‘lbfgs’; max\_iter=1000 |
| LSTM | output\_dim=100; epochs=10, batch\_size=32; LSTM (128); Dense (64, activation= ‘relu’); Dense (4, activation= ‘softmax’) |