Wailing Wall or Tree Hole?

—— An AI Exploration of Mourning Behaviors for the Deceased on Chinese Social Media

Group Name: 550W | **Group Leader:** YU Minghao - 22439293 **Group Members:** ZHAI YONGQING – 22444211 | JIANG ZHUOHAO – 22434674 | SONG YIHUI – 22422382 | FANG YING – 22439382 | HE YUCHEN – 22427171

INTRODUCTION

Our usual custom for the deceased: grieve at the beginning and not mention it frequently afterwards. But on social media, certain mourning behaviors seem to have become a daily activity.

The most representative of these is Li Wenliang's Weibo comment area, and people call it as “Chinese Wailing Wall” .Even long after their pass, people are still flooding into their accounts and pouring lots of comments everyday. Moreover, they **not only mourn**, but also **share their own stories and emotions** in departed’s accounts.

Those with mourning, we have a perfect word for description: **Wailing Wall.**

Those with personal stories and emotions, we also have a well-known descriptive term: **Tree Hole.**

What **prompted** them to leave these messages?
Are there any common **characteristics** of these messages?
⇨ One media phenomenon worthy of exploration

METHODOLOGY

1 Task Refinement

Main Task: Words Classification

Specified the definition and classification criteria: Wailing Wall & Tree Hole

Category	Comments (True Examples)	Tree Hole	Wailing Wall
Unique Wailing Wall	天哟 不敢相信您已经离去的消息 中国好医生 我们爱您	No	Yes
Unique Tree Hole	准备要开始年后上班了 希望今年能挣到钱 晚安	Yes	No
Both	李医生 好久没来看你了 最近还好吗？ 我依旧处于不想包容人的社交的很烦中	Yes	Yes
None	微博没啥新闻看的时候就会来看看留言	No	No

2 Data Acquisition

Python - Use Weibo API

2020/2/7 - 2023/4/23

[MAIN CASE]
Li Wenliang
1,338,083 Comments

[Comparison GROUP]
Other 11 Accounts
3,193 Comments

Other cases of large-scale online mourning

3 Manual Labeling for training materials

Random sampling* of comments in the **[MAIN CASE]**

6,300 Rows
For manual labeling and codebook collection

4 Language Model Integration

1. Chinese-BERT-wwm Google HFL

2 separate models for classifying **Wailing Wall** & **Tree Hole** (yes or no)

2. Baidu's ERNIE 3.0 Bai du 百度

Word segmentation for further text exploration.

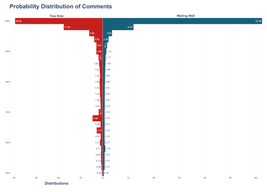
Pretrain + Model Training with Labeled Dataset

5 Bert Model Evaluation

Classifier Model Metrics

Model Types	Validation Loss	Validation Accuracy	MCC Accuracy**
Wailing Wall	0.30	0.89	0.83
Tree Hole	0.38	0.86	0.89

** 1 represents a perfect prediction, 0 no better than random prediction and -1 indicates total disagreement between prediction and observation 1.



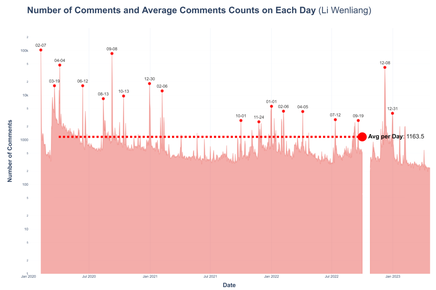
Above 90% probabilities:

- **Tree Hole model** : over **76%** of comments
- **Wailing Wall model** : over **82%** of comments

*Sampling Criteria: Stratified by **month** and divided into **5 layers** based on word counts (39 x 5 = 195 layers for accurate distribution) Each layers take 0.4% as samples*

FEATURE ANALYSIS ON MAIN CASE (LI WENLIANG)

Quantitative Features



Comments between October 2 and 25, 2022 are completely able to be obtain due to algorithmic interference.

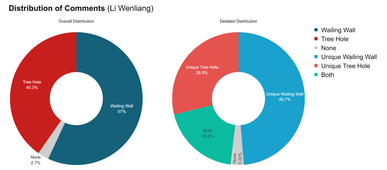
Overall,

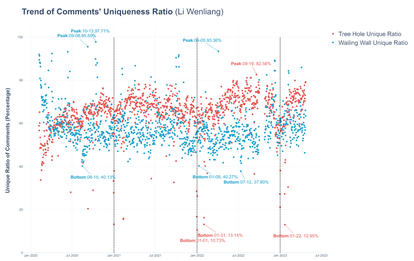
Average daily number of comments : 1163.5

- **Most of the counts** were **below the average**, but the **overall trend remained steady**.
- **18 peaks** - where the growth rate of comments sharply increase
- 4 types of possible cause event - researched by combining news and user comments
  - **Directly Related to Li Wenliang (n=9)**
  - **Festival (n=5)**
  - **Related to Epidemic (n=2)**
  - **Related to Media (n=2)**
  - (More detailed analysis are listed in our paper)

Overall,

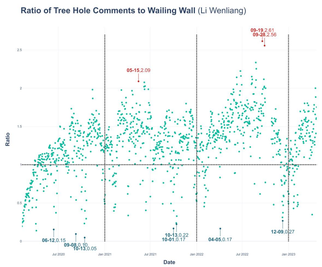
- Wailing Wall comments : Tree Hole comments = 3:2
- Wailing Wall comments accounts for the majority.
- Counts of Unique Tree Hole comments is around 60% of Unique Wailing Wall comments.





Overall,

- The uniqueness of the most time remains above 50%, most of them are purely for mourning or telling something (Purely motivated) .
- On normal days, users are more likely to make Tree Hole comments and generally do not express sadness.
- On special days, many users who may not usually come to the platform are more likely to express grief over Li Wenliang, resulting in a purer distribution of Wailing Wall comments.

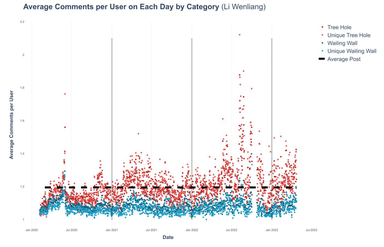


Overall,

- The ratio of Tree Hole comments to Wailing Wall is generally increase and Tree Hole comments have a denser distribution as time goes on.
- Considering Tree Hole comments, it has more special events at time peaks and peak period of the ratio of Wailing Wall comments to Tree Hole is much higher than the ratio of Tree Hole comments to Wailing Wall, illustrating that the overall dominate distribution is Walling Wall comments.

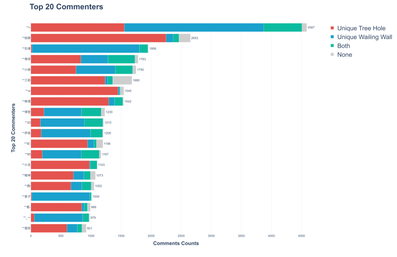
With the change of time, the proportion of Tree Hole comment is increasing, while the Wailing Wall is decreasing, and both fluctuate at special time points. Besides, the number and ratio of Wailing Wall and Tree Hole comments would be affected by peak time and special event attributes.

User Features



Overall,

- Users posted an average of 1.2 comments every day.
- The average of Tree Hole comments per user are significantly more than that of Wailing Wall on each day and even reached around 2.1 in August of 2021.
- Almost all the Wailing Wall comments is below the total average (1.2).



Overall,

- Totally 4587 comments (around 6 per day) are from the top 1 user.
- Among 20 most loyal users, the majority is Tree Hole users who have a very clear self-narrative purpose with the numbersof Tree Hole comments far greater than other types.

Wailing Wall comments always peaks in special days with prominently higher counts, Wailing Wall users are larger, more dispersed, more random, and easily affecting by special events. However, Tree Hole users who tend to post more comments every day show more sticker, loyal and stable characteristics.

Content Features

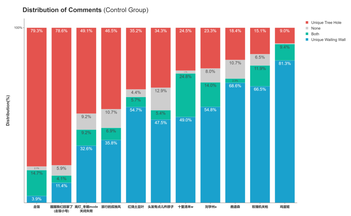
The top 60 distinctive words (using *Difference* Matric) with the highest frequency

"Difference" is a confidence metric used to measure the confidence level of a segmentation, in our study refers to the level of confidence in determining whether a sentence belongs to Wailing Wall or Tree Hole. The higher the difference value, the more confident the determination of the sentence's category.

In short, from the expression of respect and condolences to “You” (Wailing Wall), to blessings and daily greetings to “You” and “Me”, and then to more personal expression of “Me” (Tree Hole), the account (Li Wenliang) acts as an emotional tie, connecting the emotional extension and form transformation from the Wailing Wall to the Tree Hole.

COMPARISON GROUP

Quantitative Features



Based on the approximate time of the suicides, we assume that:

There would be more Unique Tree Hole comments and fewer Unique Wailing Wall comments due to the change of time.

Content Features

Through exploring word frequencies of individual accounts separately (not presented as a word cloud, but discussed in detail in the paper), we have found the following conclusions:

- On these 11 accounts, more positive words appear in Wailing Wall comments while Tree Hole comments could reflect more negative emotions, and the emotions reflected by users under the same account are similar.
- Wailing Wall comments involves more words about account persons names or titles and characteristics like social role, while Tree Hole comments reflect more personal things.

Generalization Performance Evaluation

Our model classifies the comparison group without introducing additional training sets, which is:

Wailing Wall 78% **Tree Hole 72%**

Its classification results **exhibit a relatively high degree of overlap with manual labelling**

DISCUSSION

Quantitative Features:

· Wailing Wall comments tend to appear on some special days. On the other days, the Tree Hole comments are relatively more and steadilier.
· The proportion of both categories can be affected by a combination of factors, including date, special events, media, etc, among which media is more significant.
· The proportion of Tree Hole comments in general tends to gradually increase over time, but it also is influenced by many other factors.

User Features:

· Wailing Wall users are dispersed and easily affected by events, while Tree Hole users have stronger user stickiness and discuss study and affection.
· Negative emotions are more prevalent than positive ones in Tree Hole comments, indicating that young people (especially students) face worries related to these topics.

Content Features:

· The Wailing Wall and Tree Hole have different characteristics in terms of content. The former is more personalized, while the latter tends to be similar across accounts.
· Tree Holes with a focus on deceased individuals tend to carry negative emotions and can exacerbate psychological problems.

Significance Outlook:

· Negative emotions can be easily fostered by comments related to Tree Hole, especially for those with triggering tags. This can lead to depression and even suicidal behavior. **Developing an effective detection and warning method can provide timely treatment**.
· Existing models already possess **high availability**, and more labeled datasets could lead to a **universal recognition model for psychological intervention**.

香港浸會大學 HONG KONG BAPTIST UNIVERSITY
傳理學院 School of Communication