Goal	To optimize push open rate of **Sunday Kiss** by designing a one-day app push schedule

Related Factors

Time	**Frequency**	**Content**	**Target Audience**
• Time includes **the hour of the day** and **the day of the week**. Pushing at the wrong time can disturb users. • We should look at the distribution of user active time to find the optimal time for push, and check if pushing on a specific day has effect on open rate.	• Sunday Kiss is a one-stop platform for parent-child education. Its main users are parents. It provides the most comprehensive parent-child counseling through articles. • For information acquisition apps, the push frequency should be between social apps and tool apps. • Calculate the **daily push frequency** from the data as a new variable and explore whether the frequency will affect the open rate.	• The content of push can be divided into the **length and the topic of push**. • Calculate the length of push from data as a new variable length. We need to explore what's the optimal length for push. • Tags can represent topics. We further aggregate tags into family, kids, entertainment, shopping, travel, cuisine, edu, weather, health. Ideally, we should let users choose which categories to subscribe to. Here we explore which category has a higher open rate instead.	• The general audiences are parents, but within parents, there are sub-categories including age range and gender of user and kids, platform (Android, IOS), etc. • All **demographics variables** have potential effect on open rate. In this case, since we do not have access to the data, we will ignore this factor temporarily.

Methods

Exploratory Data Analysis	**Decision Tree**	**Hypothesis Testing**
To find to basic properties and distribution of above-mentioned variables. Avg open rate = 0.3857%	To check if a certain variable has impact on open rate and find the feature importance. Topic and the hour of day are most important factors.	To identify optimal range of important factors, length and frequency of push.

Conclusion

Aggregate all optimal factors to design a one-day push schedule

Weather (8:00), Health (13:00), Edu (18:00), Entertainment (23:00)

This schedule is estimated to increase open rate by **14%**.

1 Decision Tree Result

Feature	Importance
Topic	0.36 (weather)
	0.13 (edu*)
Frequency	0.21
Time	0.20
Push Length	0.08

* edu includes 幼稚園、中小學、教育

- The decision tree result identifies 4 most important factors affecting the open rate. Day of week variable is excluded.
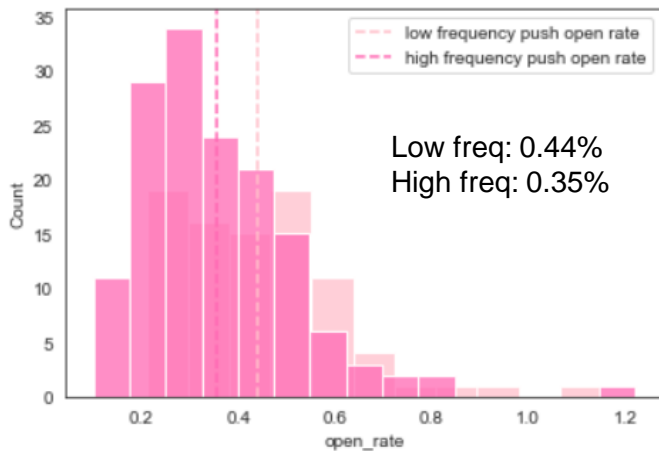- Examine four factors to design the schedule.

2 Topic Selection
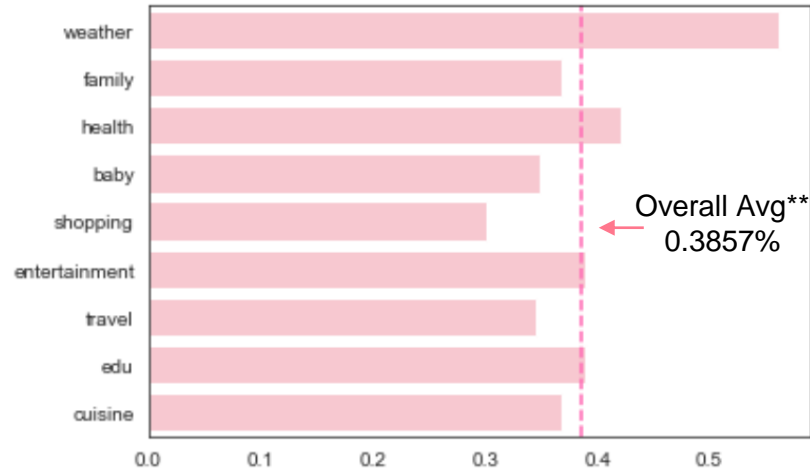
Average Open Rate by Topic

- By decision tree result, **weather** and **edu** are two most important topics hence should be included.
- To improve open rate as much as possible, we should only must include topics that are above average, which are **health** and **entertainment**.

3 Frequency

Low freq: 0.44%
High freq: 0.35%

- Split data into **low push frequency** and **high push frequency** groups. Calculate average open rate respectively.
- Welch's T-test p-value **0.00011 < 0.05** shows that **lower push frequency can increase open rate**.
- Set **4 as frequency**. One push per topic.

** the accurate average open rate is calculated by sum(total_sess_cnt)/sum(total_noti_push_cnt)

4 Push Length

Short push: 0.42%
Long push: 0.36%

- Split data into **short** and **long push** groups according to mean. Calculate average open rate respectively.
- Welch's T-test p-value **0.007<0.05** shows that **shorter push can increase open rate**..

Time	Average Open Rate
11:00	0.25%
16:00	0.29%
18:00	**0.45%**
23:00	0.14%

weather

Logically, weather forecast should be pushed at the start of the day.
The average open rate of weather push at 8:00 is 0.56%.

edu

Calculate average open rate of edu push by time.
Select the time with the highest open rate.
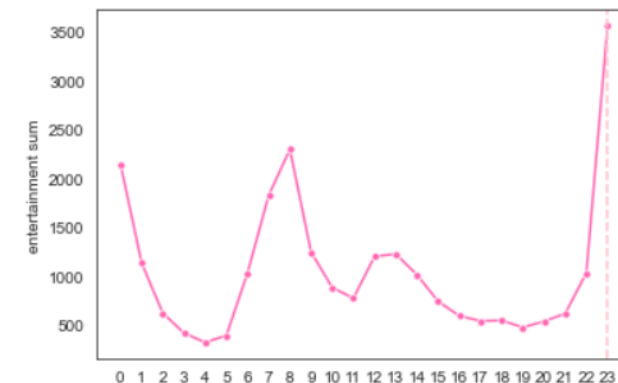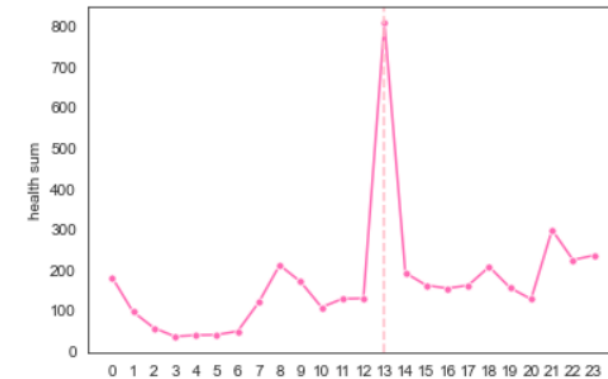The average open rate of edu push at 18:00 is 0.45%.

health

According to the histogram of health sector hourly traffic, the best pushing time is 13:00.
The average open rate of health push at 13:00 is 0.42%.

entertainment

According to the histogram of entertainment sector hourly traffic, the best pushing time is 23:00.
The average open rate of entertainment push at 23:00 is 0.34%.

health category hourly traffic

entertainment category hourly traffic

Time	Topic	Open Rate	Comparison
8:00	weather	0.56%	Current: 0.3857% Schedule*: 0.4428% Improvement: **14.81%**
13:00	health	0.42%	
18:00	edu	0.45%	
23:00	entertainment	0.34%	

*an approximation of accurate average open rate is to use the arithmetic average (approximately same denominators)