



# HKSTP Deep Tech Talents Training Programme Hackathon

## “You wanna secure a love ? Secure a parking space first”

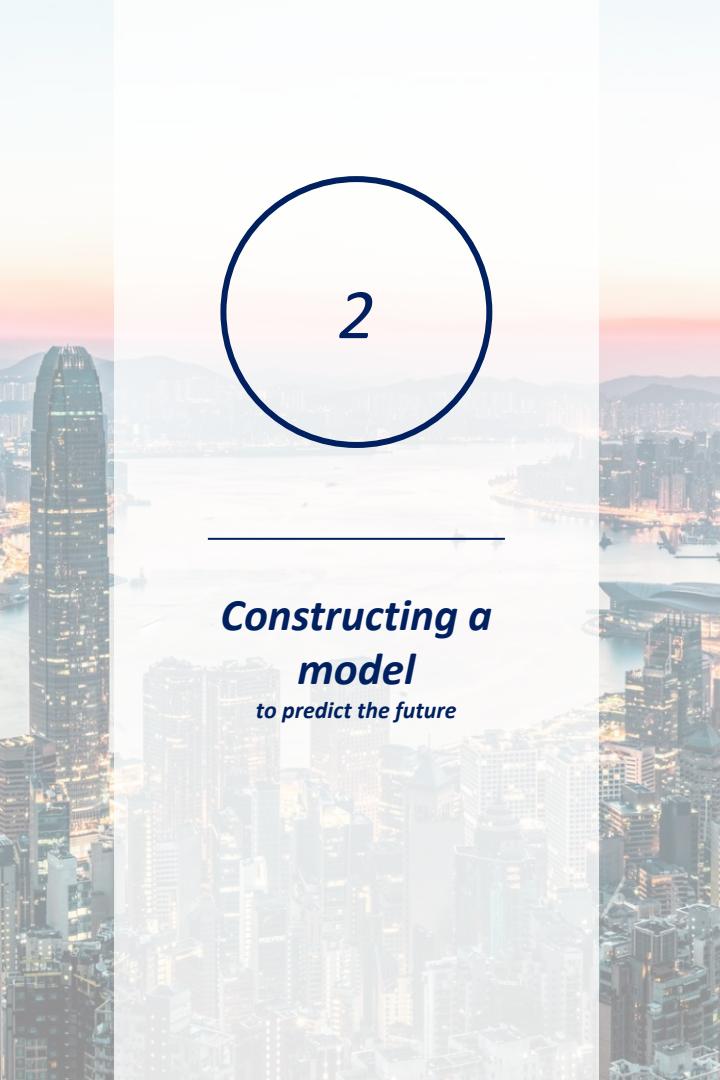
Presented by Alan Ngo, Dennis Lo, Harry Lee, Zach Ko



**1**

*Solving a daily  
problem*

*by providing a data-driven solution*



**2**

*Constructing a  
model*

*to predict the future*



**3**

*Deploying the  
model*

*In the business field*

# Embarrassed when you are in hurry but there is no parking spaces



Alan has been single since he was born



He was having the first dating with his dream girl Sonia at K11 Musea on Valentine's Day



However, when he drove Sonia to the shopping mall, he could not get a parking space due to the huge population that day



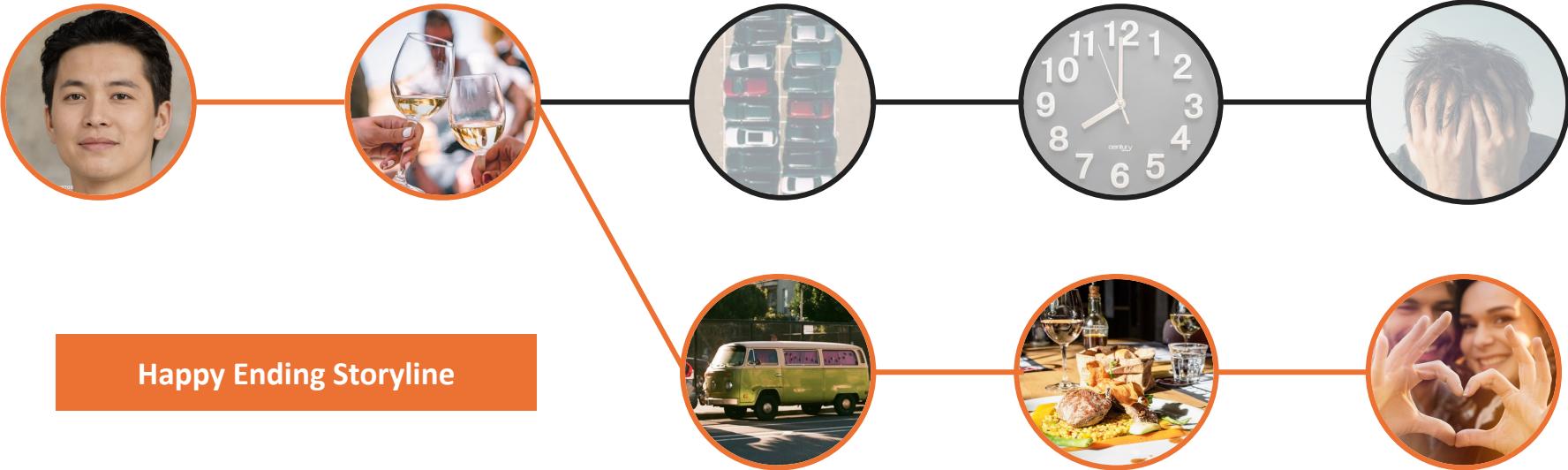
It finally took Alan an hour to find a parking space. All the items on his to-do-list was delayed and hampered



Sonia was extremely disappointed by Alan's performance. She decided not to date with Alan again.

**Car parking spaces runs out is a common but serious problem with lifelong consequences**

# The ending can be different, knowing the vacancy beforehand



- 1. A loyal man
- 2. A beloved lady
- 3. A holistic plan
- 4. **A parking space**

Vacancy of car parks around K11 Musea in a particular time frame on a specific date

A data-driven model that help us predict the vacancy.



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# Government APIs are used for data collection



Data Collection



Data Preprocessing



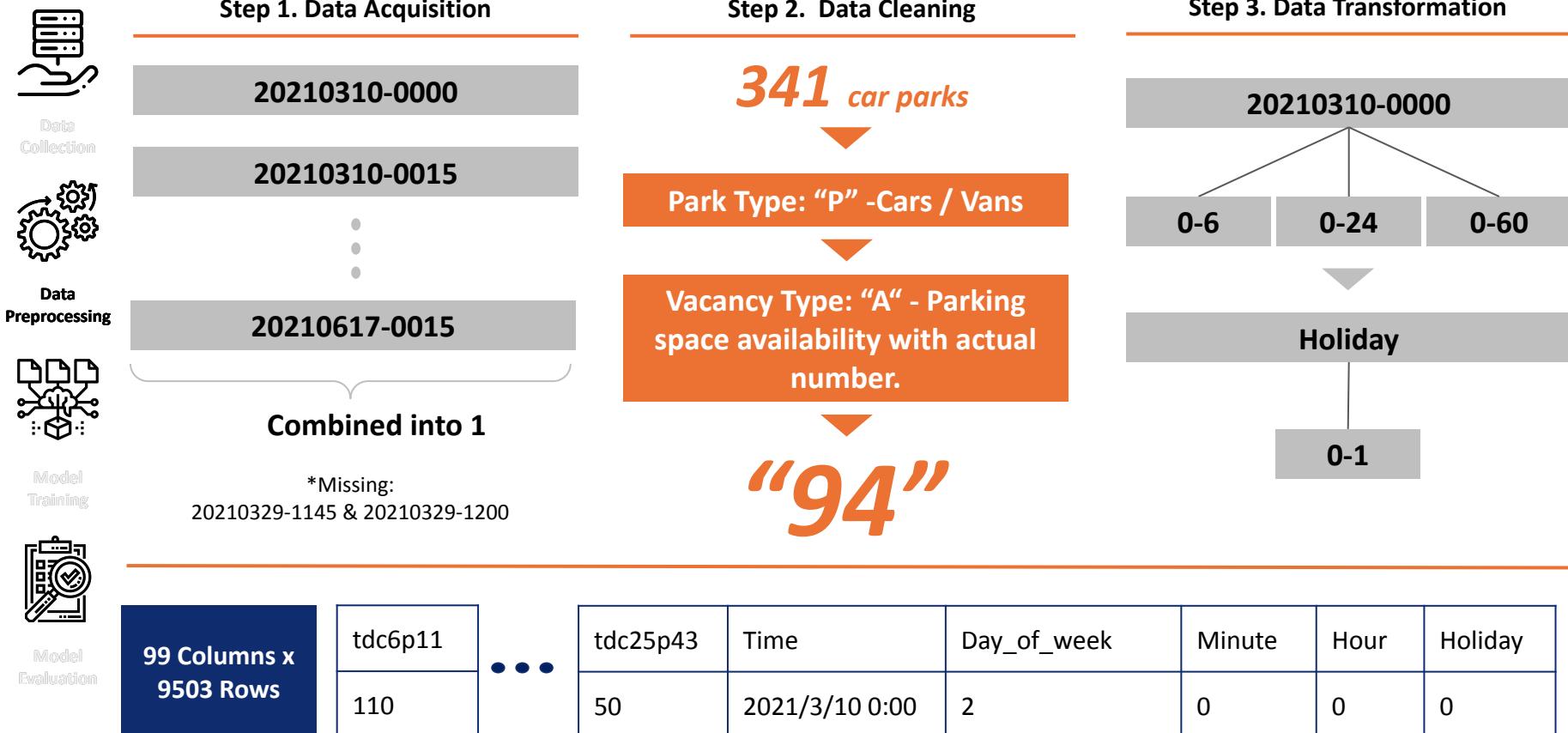
Model Training



Model Evaluation

	APIs	Selected Time frames	Relevant Data
	<b>Basic Info</b>	17/06/2021	1 File “Park ID”, “Park Address”
	<b>Parking Vacancy</b>	10/03/2021 -17/06/2021 (Data are available for only 3 months)	9609 Files (15 minutes intervals) “Park ID”, “Park Type”, “Vacancy Number”  Number of Involved car parks: 287-340 (increasing over the 3-month period)
	<b>Hong Kong Public Holiday</b>	17/06/2021	1 File “Holiday between 2020-2022”

Only 94 out of 340 car parks are applicable for our model



# Here is what Exploratory Data Analysis tells us



Data Collection



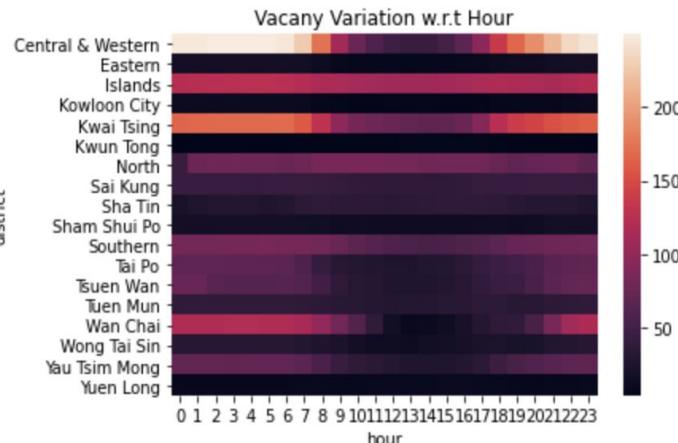
Data Preprocessing



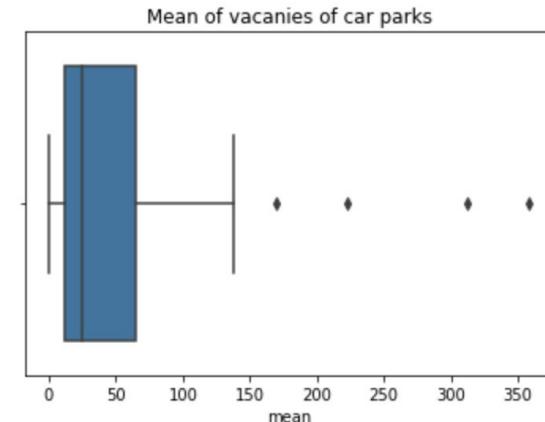
Model Training



Model Evaluation



Most districts become less available  
during 9:00-15:00



The mean vacancies of car parks are  
skewed to the left

# Here is what Exploratory Data Analysis tells us



Data Collection



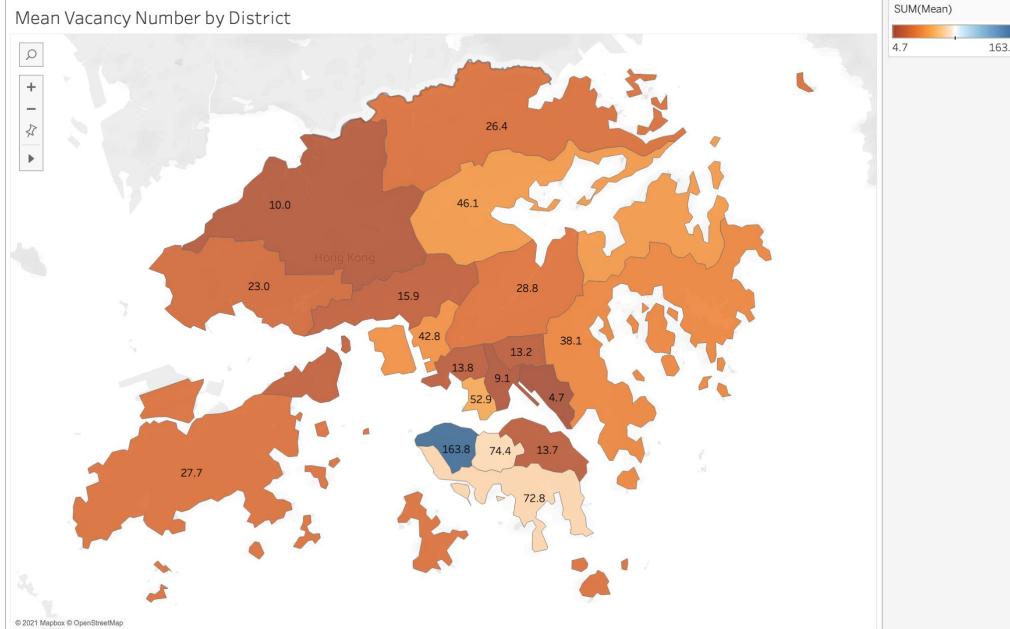
Data Preprocessing



Model Training



Model Evaluation



**Outstanding District indicates data collected from that district is more rich and reliable**

# Here is what Exploratory Data Analysis tells us



Data Collection



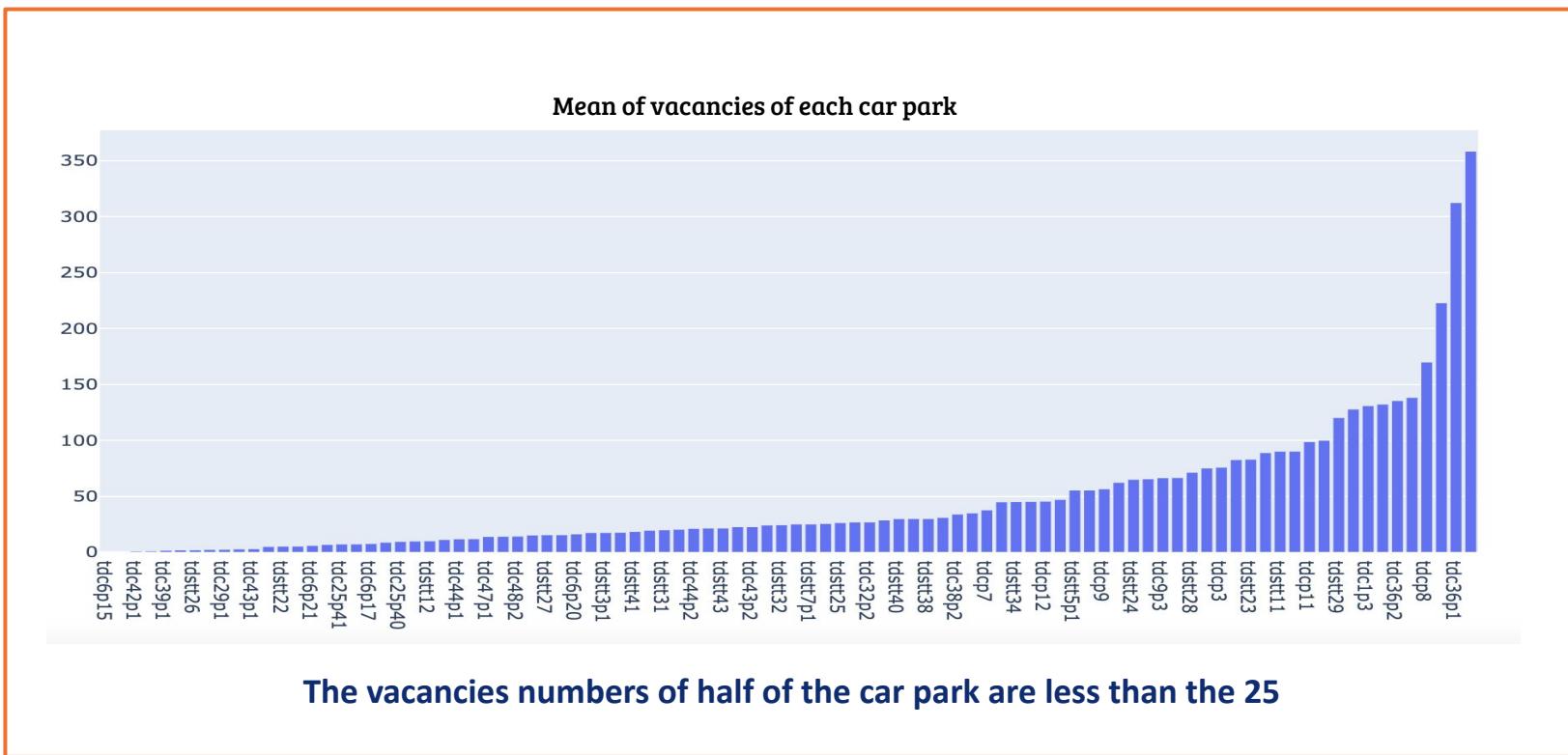
Data Preprocessing



Model Training



Model Evaluation



# Here is what Exploratory Data Analysis tells us



Data Collection



Data Preprocessing

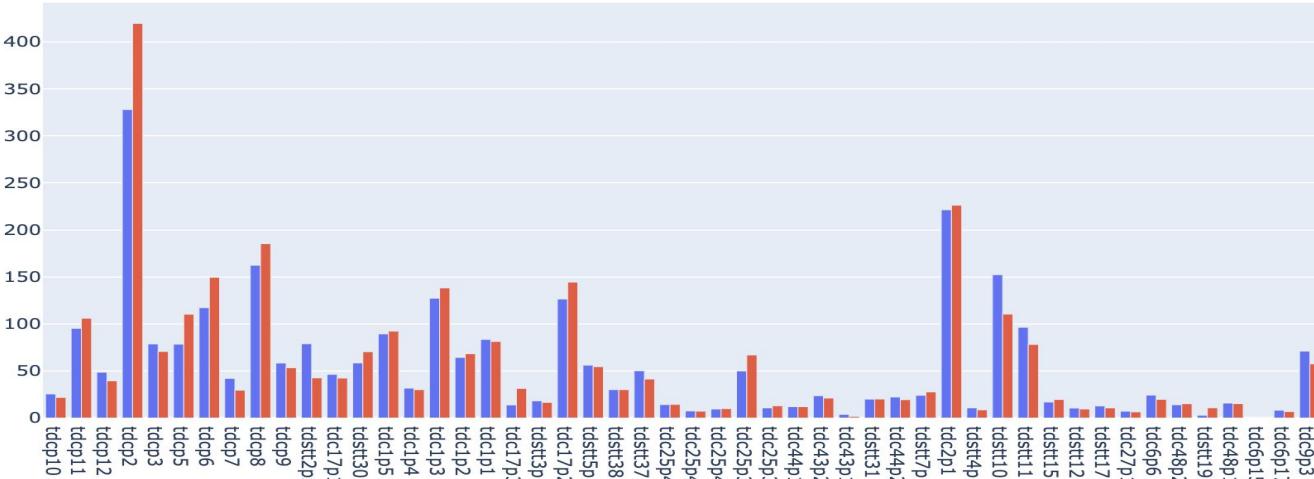


Model Training



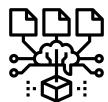
Model Evaluation

Mean of vacancies of each car park on holidays and weekdays



There is no much difference between the vacancies on holidays and normal days

# Feature of Time is our main focus



Three features:

Day of week

Time in hour

Time in minute

Holiday

Dataset

Training Size (75%)

Testing size (25%)

Model

Train-Test split:

2

For performance evaluation, 25% of data is reserved for testing

1

Features of holiday is dropped out because there's no significant impact on performance of result

3

Dummy  
Linear Regression  
Decision Tree Regressor  
Random Forest Regressor

# Four Models have been selected for performance comparison



Data  
Collection



Data  
Preprocessing

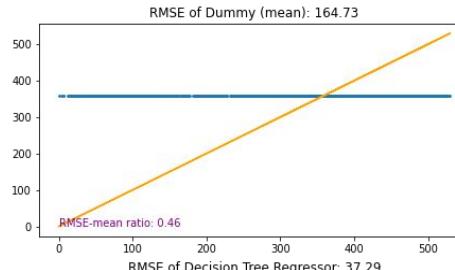


Model  
Training

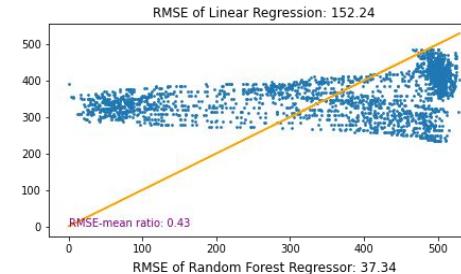


Model  
Evaluation

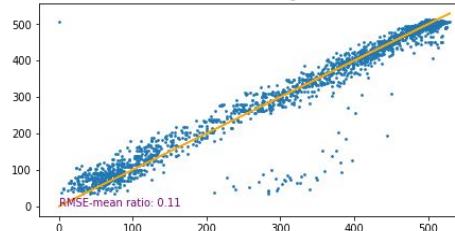
## 1. Dummy (mean model)



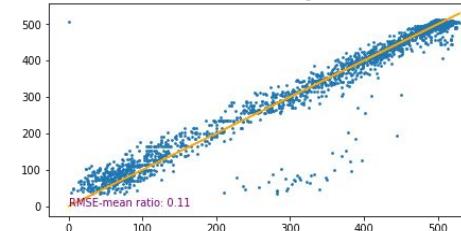
## 2. Linear regression



## 3. Decision Tree Regressor



## 4. Random Forest Regressor



The top two models are underfitting because data is not linearly separable.

Meanwhile, decision tree and random forest performance is similar and fit the data well, with some outliers though.

**Decision Tree Regressor has been chosen for our project because its lightweight model and decent performance.**

Fig: Rumsey Street Car Park



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## *Real-Time Parking Spaces Information*

**Check** the real-time parking space information of all car parks in the 18 districts of Hong Kong through SECURE

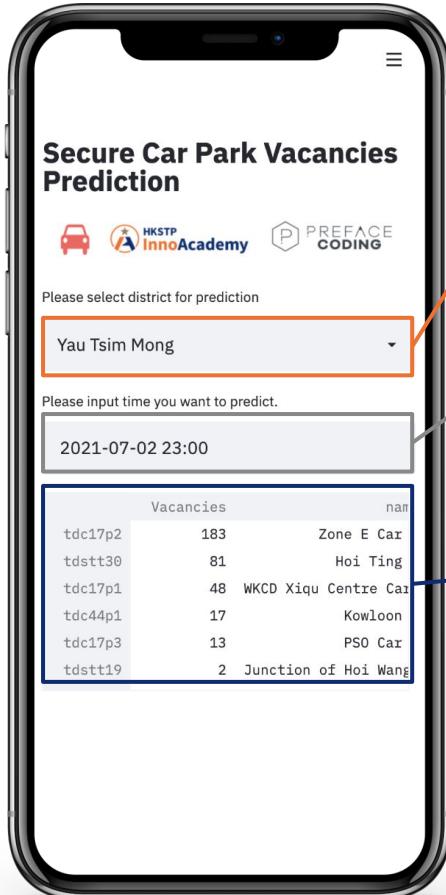
## *Accurate Vacancy Prediction*

**Find** the future car park vacancies at a particular car park on a specific date for planning a thorough tour

## *Excellent UI/UX Design*

**Enjoy** using the application with simple but informative interface.

# Here is the prediction function demonstration



## Step 1. Enter District

Select the targeted district among 18 districts in Hong Kong

## Step 2. Enter Time

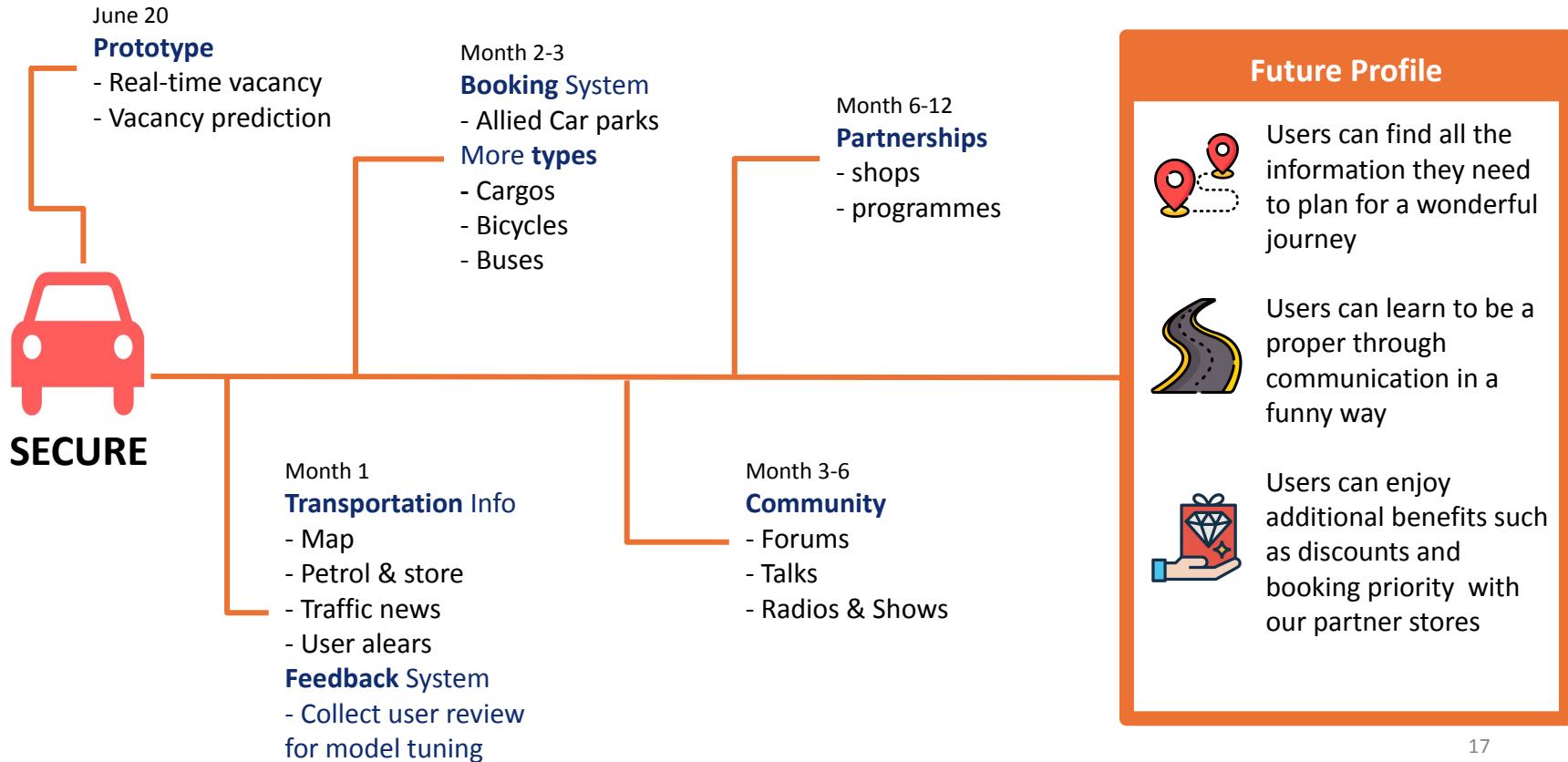
The prediction time can even be up to 10 years

## Step 3. Check The Result

The result will be ranked in descending order according to vacancy numbers



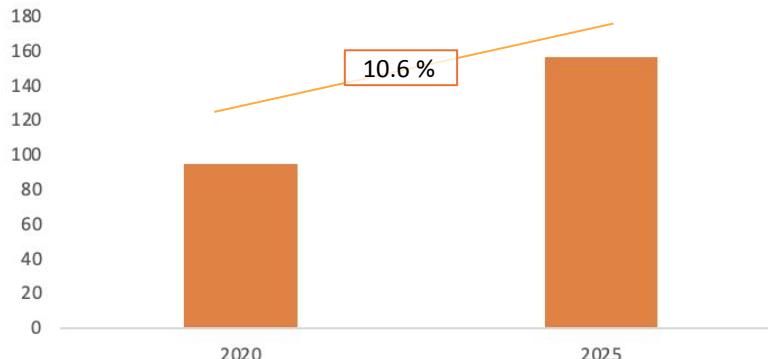
# The goal is an one-stop service platform for road users



# The current smart transportation market is not dominated

Application	SECURE
Target Market	Smart Transportation
Market Size	USD 94.5 billion in 2020
Market Segment	Roadways (The major segment)

Global Smart Transportation Market Size  
(in Billion USD)



Source: MarketsAndMarkets & Allied Market Research

## Four Key Market Drivers



Advancement in **technology and infrastructure**



Rise in demand for **efficient transportation networks**

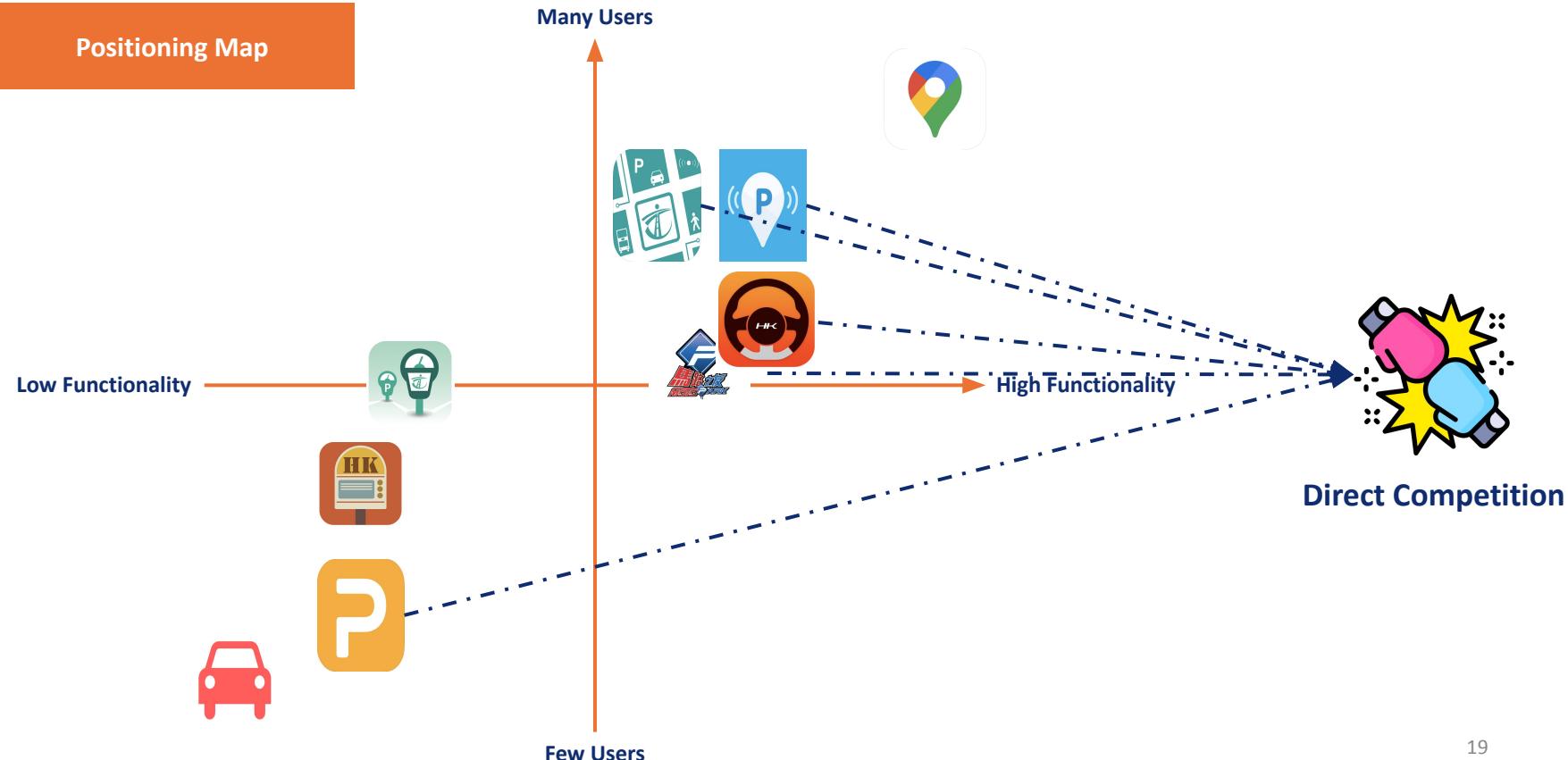


Encouraging the development and promotion of **green fuels**



Emergence of the concept of **Smart City**

However, the fact is that the competition in local market is fierce



# The market top player is defeatable

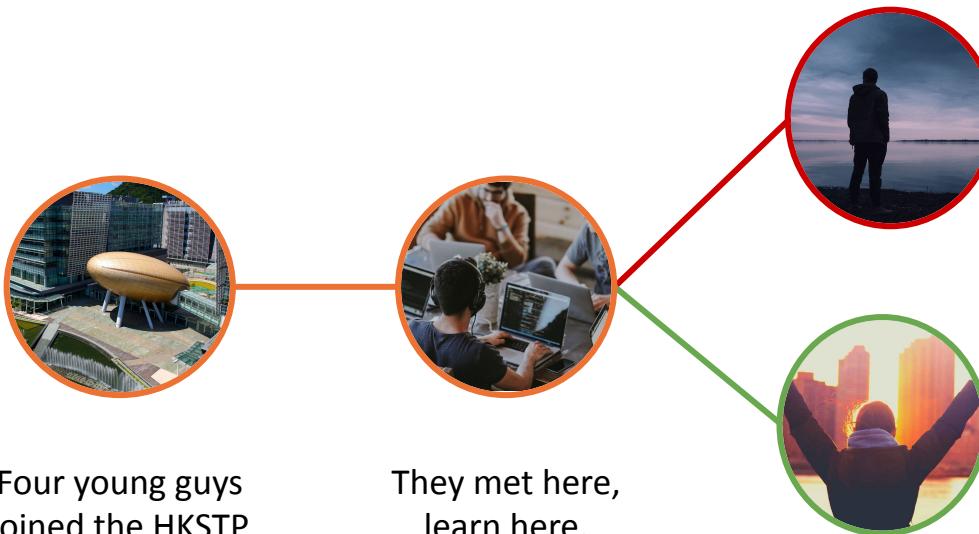
	Real-time Vacancy Enquiry	Transportation Information	Multiple Region Support	Vacancy Prediction
Secure				
PickPark				
Loudspeaker				
Google Map				

Despite the many competitors in the market, the gap between us and the top market player can be **overcome**"

# What we need is your kind support



# We wanna make our story a happy ending



## Less Desirable : Probably Lose

We sell the trained model to companies who are interested in add a new feature to their products.

## More Desirable : Win-Win

### For HKSTP Inno Academy:

- Fulfilling its vision and mission as nurturing entrepreneurs.
- Promoting the hugely supportive role of HKSTP and the Academy.

### For Us:

- Pursuing our dream when we are still young, passionate, and curious about the world

The background image shows a panoramic aerial view of the Hong Kong skyline during dusk or dawn. The city is densely packed with skyscrapers, illuminated by their lights. In the center-left, the International Finance Centre (IFC) building is prominent. To its right, the Central Plaza and other financial district buildings are visible. The Victoria Harbour is in the foreground, with the Kowloon side on the right and the Hong Kong Island side on the left. Distant mountains are visible under a clear sky.

**Thank you!**