Betcycles of 3

Introduction

3 friends (**Jurong** Joo, **Woodland** Woo & **Tampines** Tam) met for supper.

As they chatted, each of them boasted about **how bicycle friendly** their neighbourhoods are.

They agreed to bet against one another based on the following areas:

Jurong Area   **Woodlands Area**   **Tampines Area**   **Central Area**

(District 22)   **(District 25)**   **(District 18)**   **(District 1-4 & 6-9)**

ASMR Research Team

(**A**sher, **S**erChen, Zhi**M**in & **R**ichard)

3 Objectives:

1. Most HDB bicycle parking lots among them 3.

2. From lowest 2, most number of sheltered bicycle parking locations.

3. Which area has more bus stops with bicycle parking facilities including Central District (1-4 & 6-9).
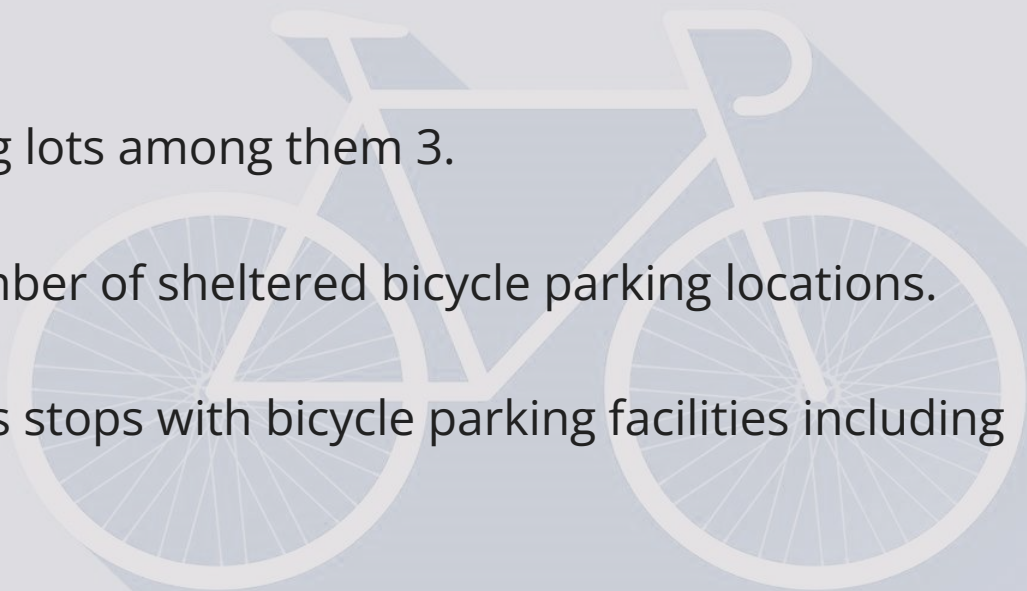
Data Source

- [LTA Mall](#) :
    - bike parking API

- [99.co](#) :
    - District, Area, first 2 Digits of Postal Code

- [Kaggle](#) :
    - Postal codes, latitude, longitudes
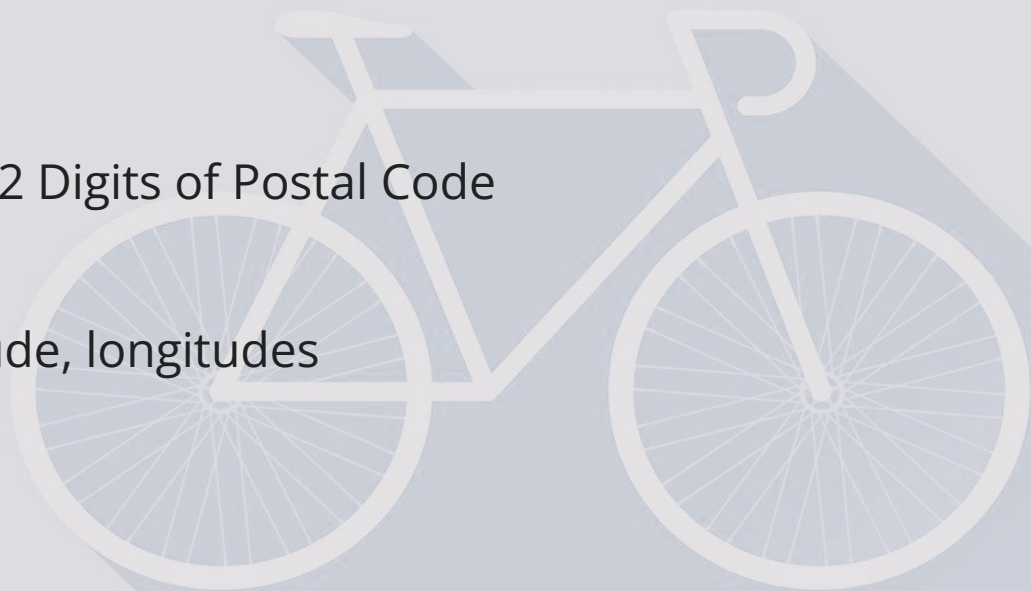
Methodology / Approach (Extract)

- **Extract data via:**
    - API
    - CSV file

- **Libraries used:**
    - Requests
    - Pandas
    - Numpy
    - Matplotlib.pyplot
    - sqlalchemy

Methodology / Approach (Transform)

- Transform raw data using Python Pandas

Original Data (kept)			Adding Columns		Combine	Dropping Columns	
postal	latitude	longitude	latitude_3dp	longitude_3dp	lat_long	searchval	blk_no
398614	1.312763	103.8835	1.313	103.884	1313104	# 1 LOFT	1
389407	1.313175	103.8836	1.313	103.884	1313104	# 1 SUITES	1
398534	1.312803	103.8838	1.313	103.884	1313104	1 BENOI ROAD SINGAPORE 629875	1

- Clean errors

RackType	RackCount
HBD_RACKS	8
HDB_RACKS	8
HDB_RACKS	10

Methodology / Approach (Load)

- Load transformed tables into postgreSQL
- Database created using sqlchemy and sqlalchemy_utils libraries
- Database ERD

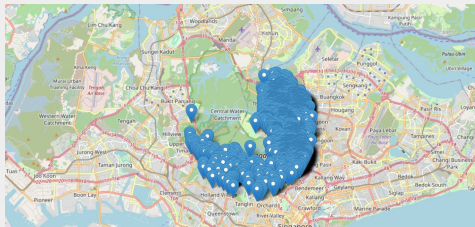# Challenges

	1	2	3
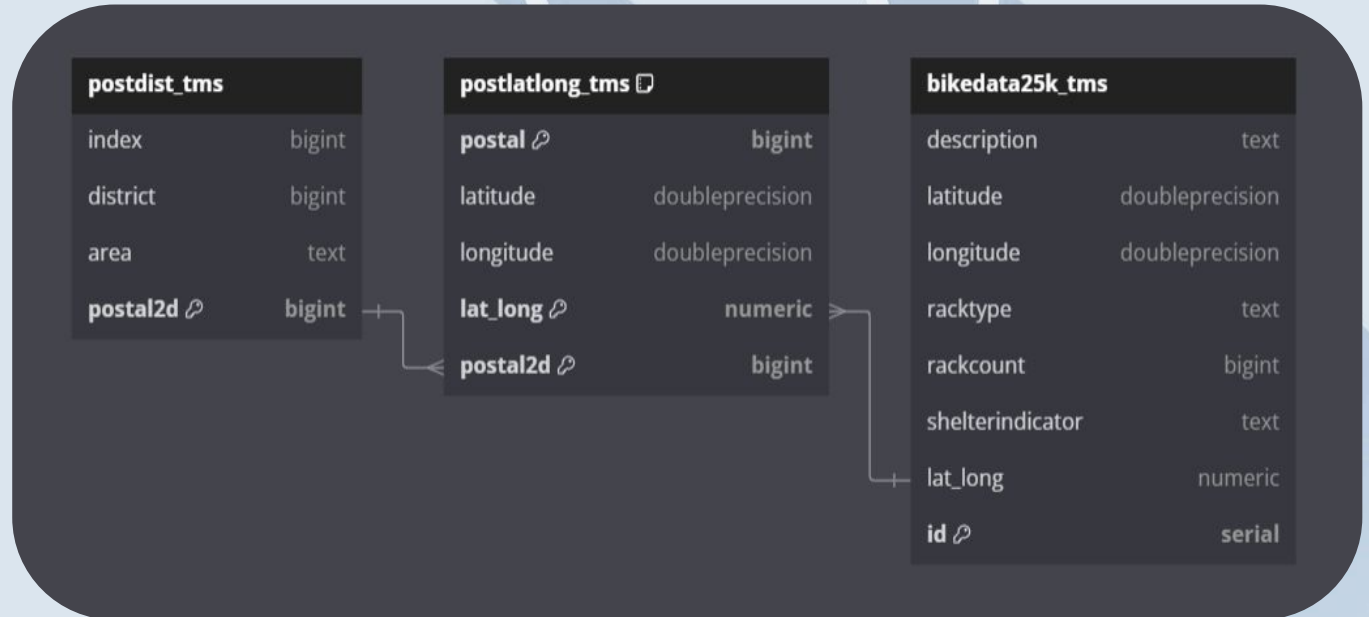
1
Data Sourcing

Jobs Portal: No APIs available, or insufficient volume and information

2
Ingestion of API

API limits by radius of coverage

3
Latitude/Longitude

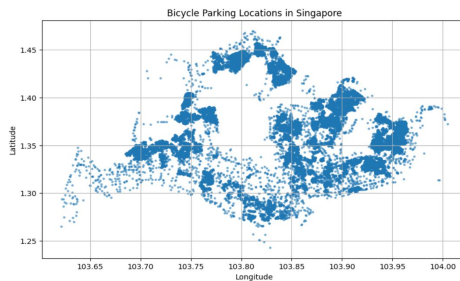Data values were too precise, unable match with other tables

Solutions

1
Data Sourcing

Searched for sources offering more data in API

2
Ingestion of Data

Loop a list of coordinates through API
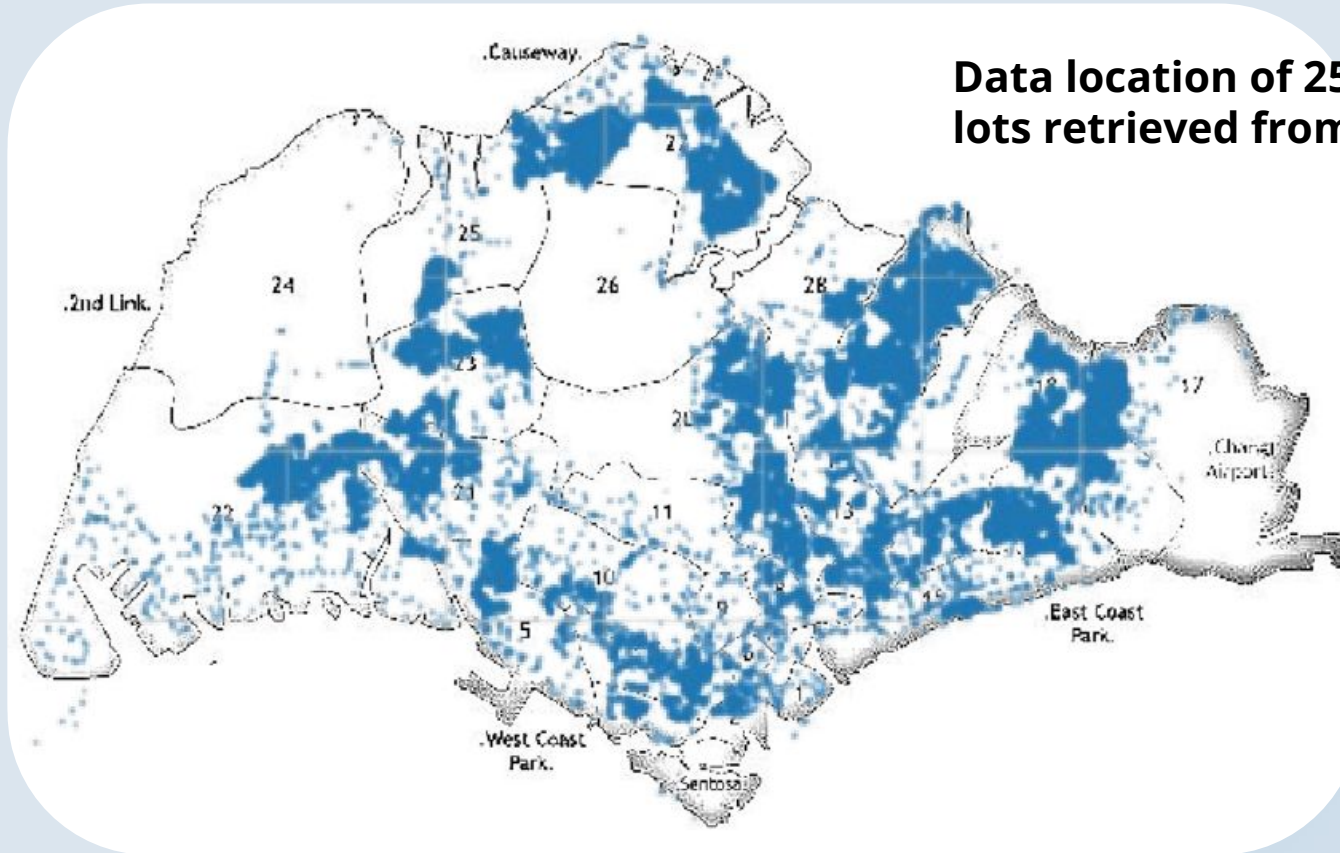

Bicycle Parking Locations in Singapore

3
Latitude/Longitude

Lower precision to 3 decimal places (approx 100m)

Limitation: Some locations may still be unidentified

Visualisation of all bicycle parking

Data location of 25k bicycle lots retrieved from LTA

Our Data Findings

21,000 bicycle parking locations with

208,000 parking slots

Over **25,000** postal codes covered, over 28 districts

19 types of bicycle parking

More than **85%** parking slots are sheltered

60% are in HDB flats

Analysis Approach

- All tables were created in pgAdmin via `.to_sql()` command using Pandas and sqlachemy
- Queries were done using PostgreSQL
- Tables were joined and CTE was created for ease of use
- Aggregate and Windows function were used in the queries

ASMR was tasked to provide:
1. Number of parking lots in HDB for 3 districts
2. Number of sheltered parking lots for 2 districts
3. Number of bus stops with bicycle parking lots for 3 districts and Central

Objective 1 :

Number of parking lots in HDB for 3 districts

District 18 has the most HDB bicycle parking lots

district bigint		area text		sum numeric
1	🏆 18	Tampines, Pasir Ris		19222
2	22	Jurong		11870
3	25	Kranji, Woodgrove, Woodlands		7937

Objective 2:

Number of sheltered parking lots for 2 districts

From lowest 2, **District 22** has the highest number of sheltered locations.

district bigint 🔒	area text 🔒	sum_location bigint 🔒	with_shelter bigint 🔒	no_shelter bigint 🔒
1	🏆 22	Jurong	2026	1786	240
2	25	Kranji, Woodgrove, Woodlands	1437	1340	97

Objective 3:

Number of bus stops with bicycle parking lots (in 3 districts and Central)

District 18 has the most bus stops with bicycle parking facilities

	district bigint 🔒	area text 🔒	bus_stops_with_parking bigint 🔒	total_bus_stop_parking_slots numeric 🔒
1	🏆 18	Tampines, Pasir Ris	132	1580
2	22	Jurong	86	893
3	25	Kranji, Woodgrove, Woodlands	50	528
4	[null]	Central Dist 1-4, 6-9	88	1087

Conclusion

- **Project Findings**

  Tampines is the most bicycle friendly! Mr Tam has won the bet!

- **ASMR Team's learnings**

  Understand the **availability and limitations of data in the real world**

  Understand the **challenges of working with geospatial data**

  Deepen understanding on **ERDs** and challenges of **table normalization**

Improvements / Next Steps

- Improvement of data ingestion, data transformation and database design
- More insightful queries from the rich data ingested
- Interactive queries to input address and receive parking location info
- Visualization of parking locations on map based on postal code
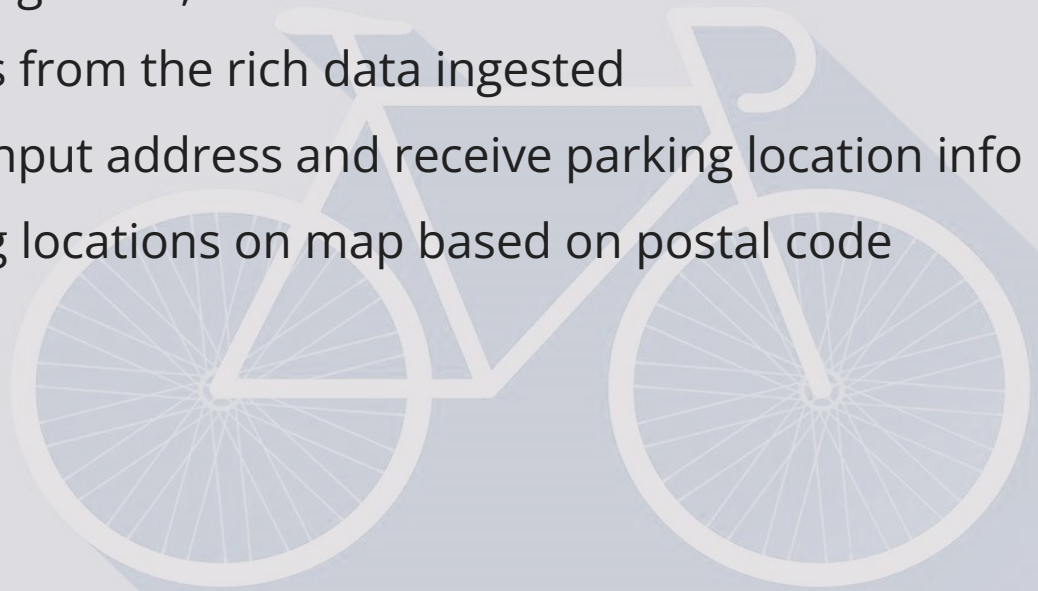
THANK YOU!

Credits

Research Team
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- SerChen
- Min
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Research Advisors
- Christine