



SG Bus Stop Network

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Overview

Overview



1. Objectives

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2. Getting the Graph

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3. Analysis & Discussion

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4. Conclusion



1. Objectives

To study the interconnectedness of
Singapore's bus stop network.



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Network type: Directed and weighted

Nodes = Bus Stops

Weighted edges = number of unique bus services between 2 bus stops



2. Getting the Graph

Obtained .JSON file
data from app
developer site



2. Getting the Graph

Bus Stop ID
Number

Bus Stop
Description

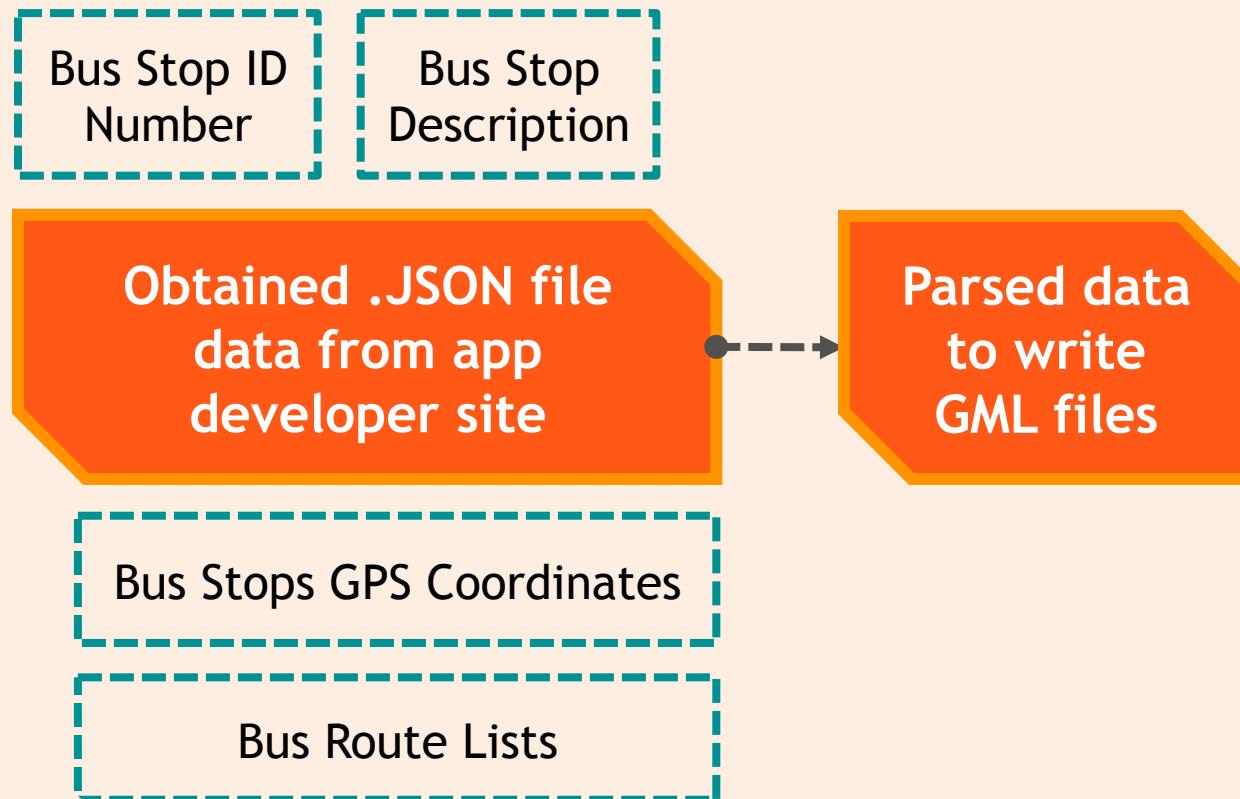
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Bus Stops GPS Coordinates

Bus Route Lists

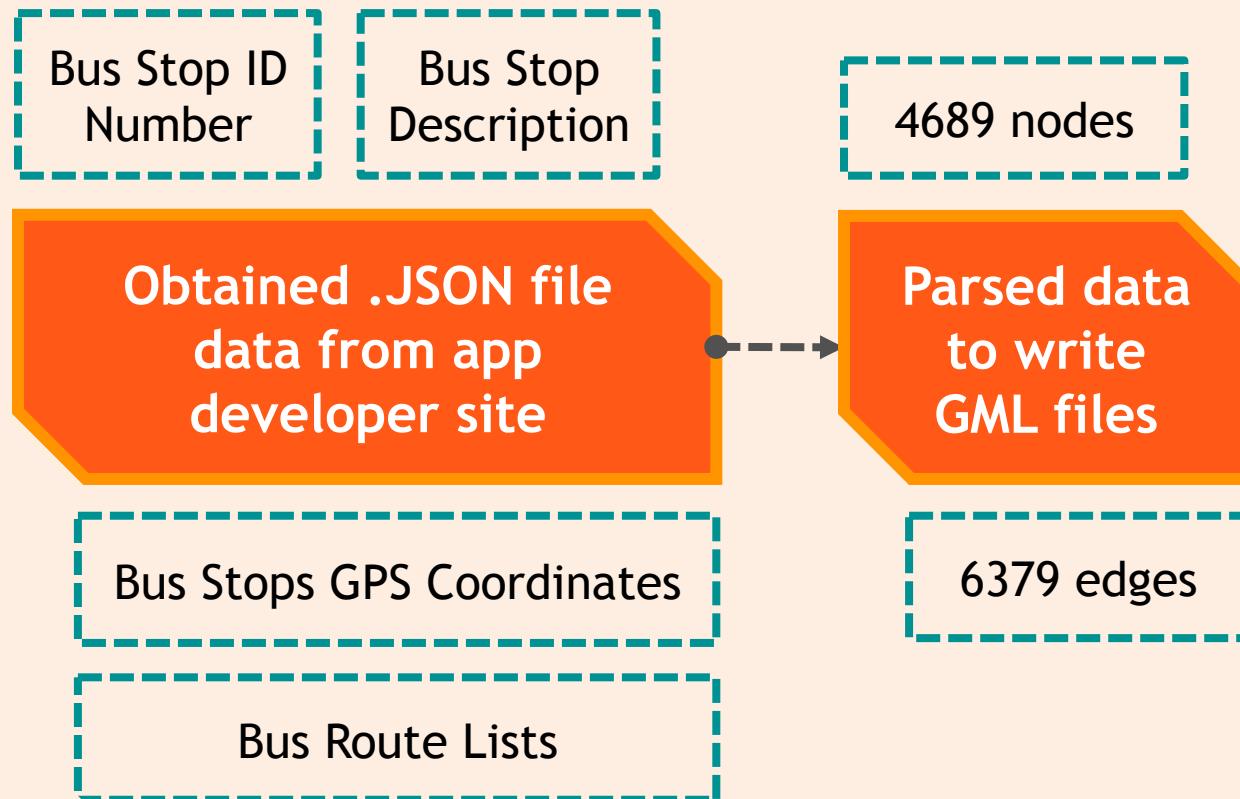


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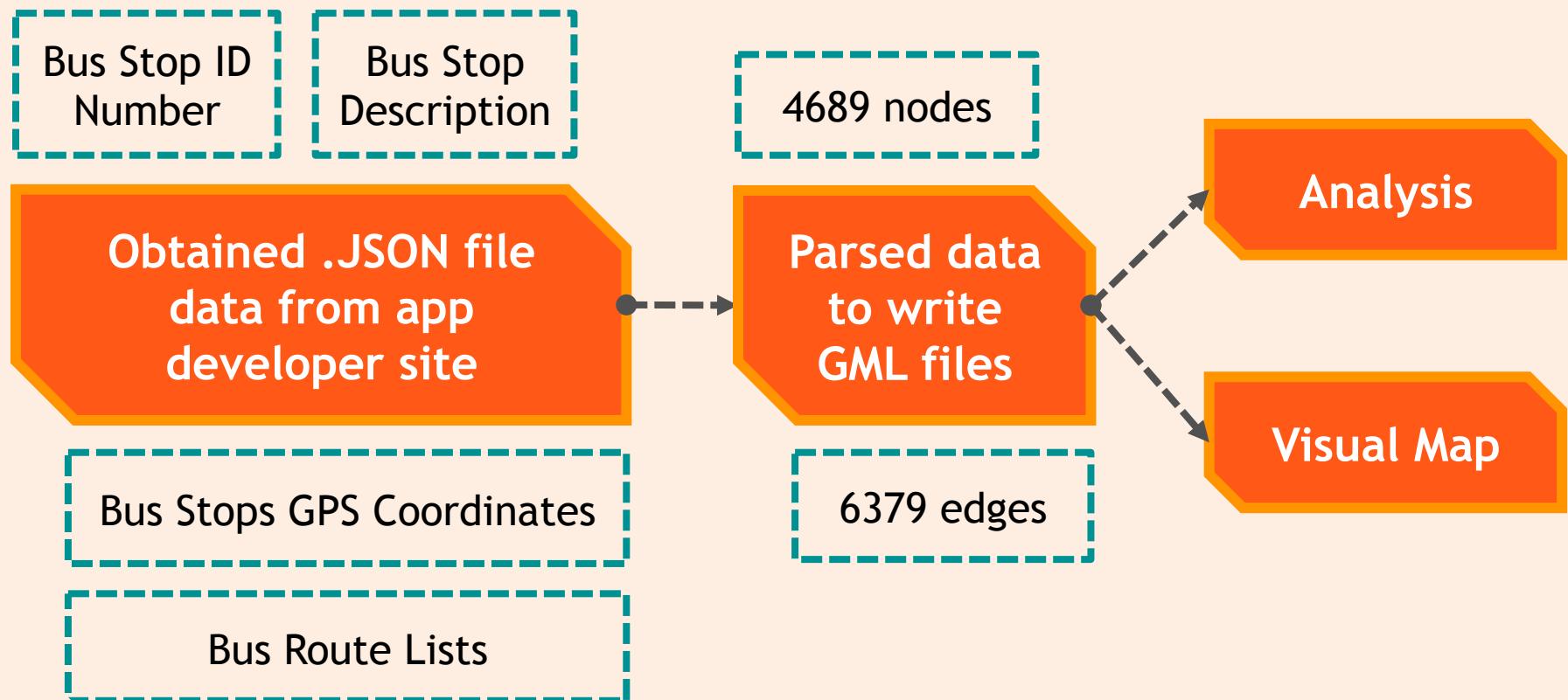


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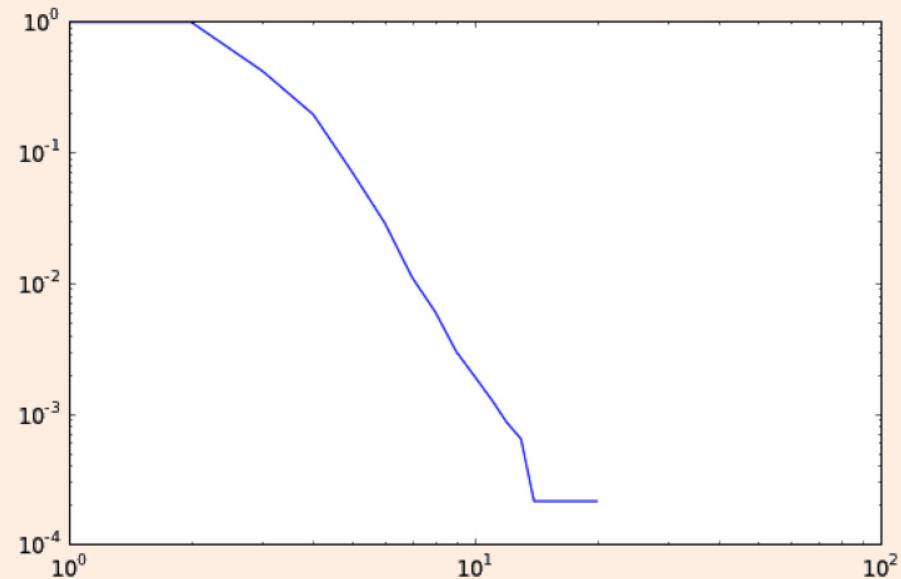
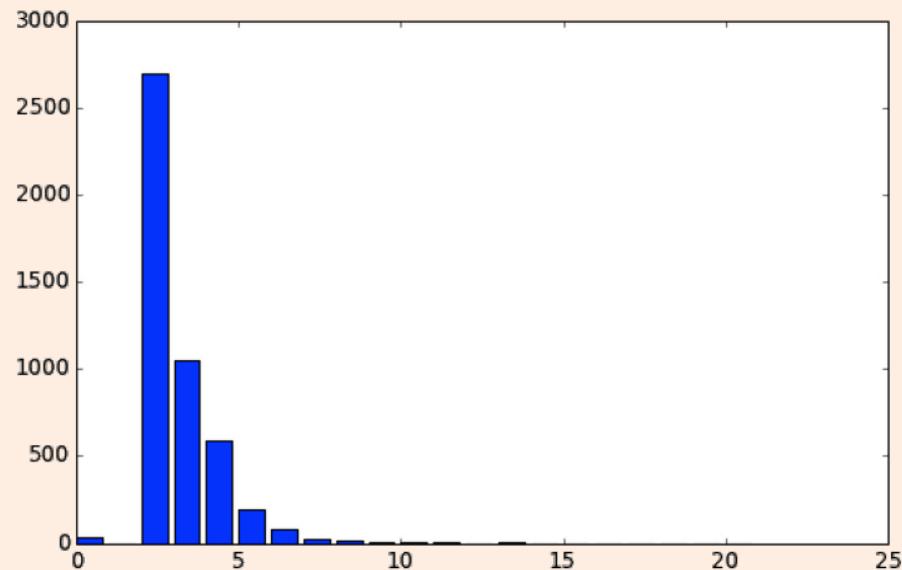


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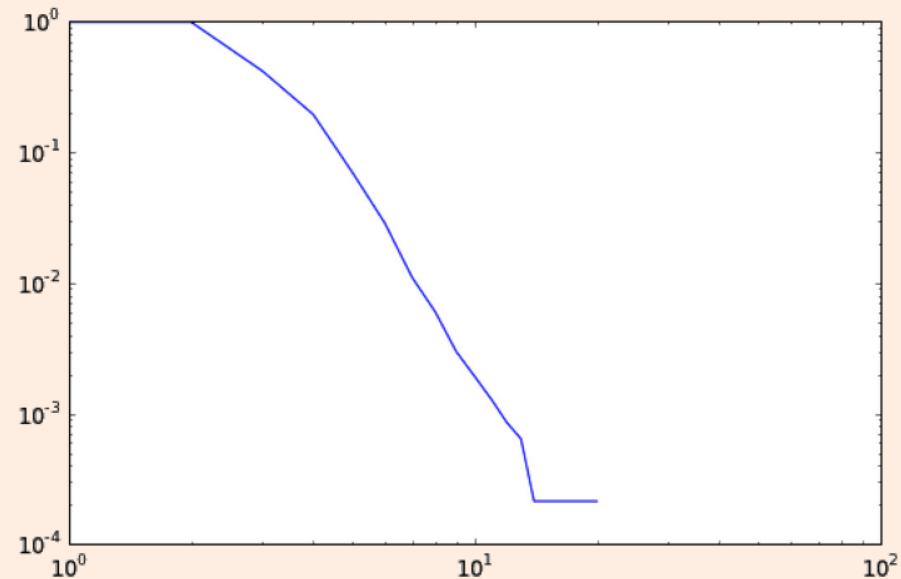
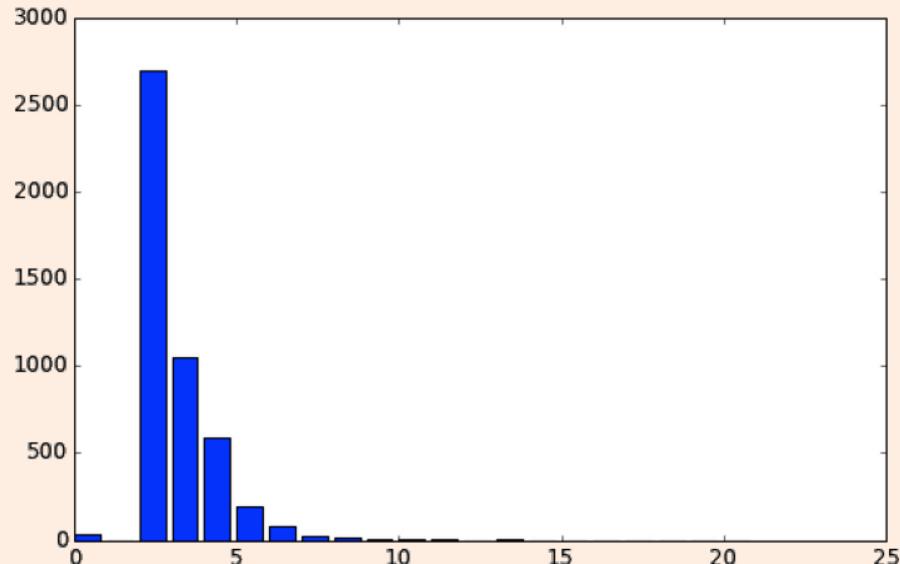


3. Degree Distribution





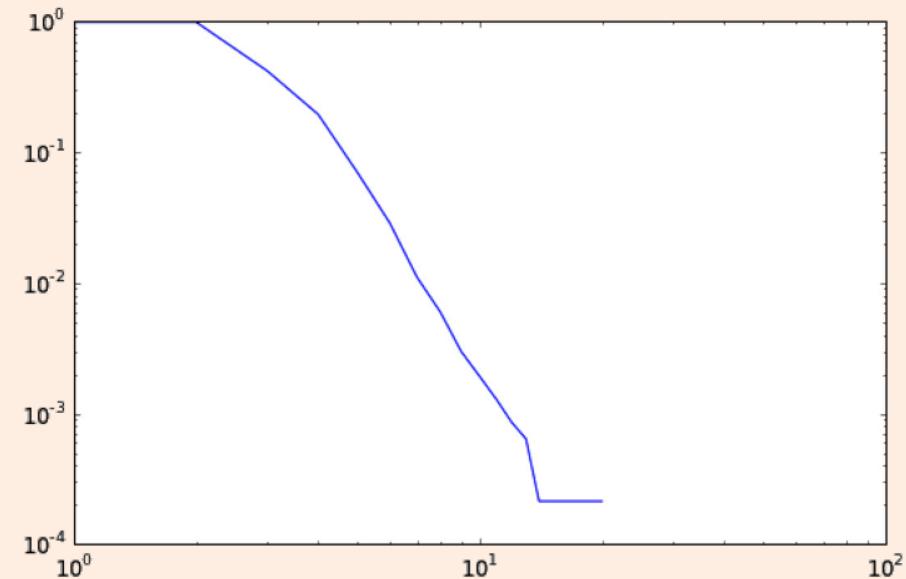
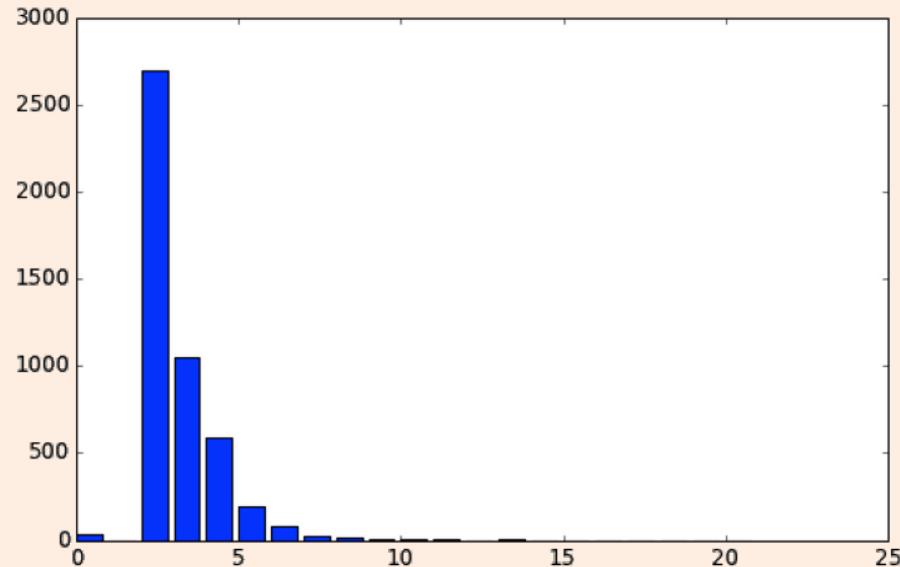
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Exponentially decreasing trend - very few nodes with high degrees



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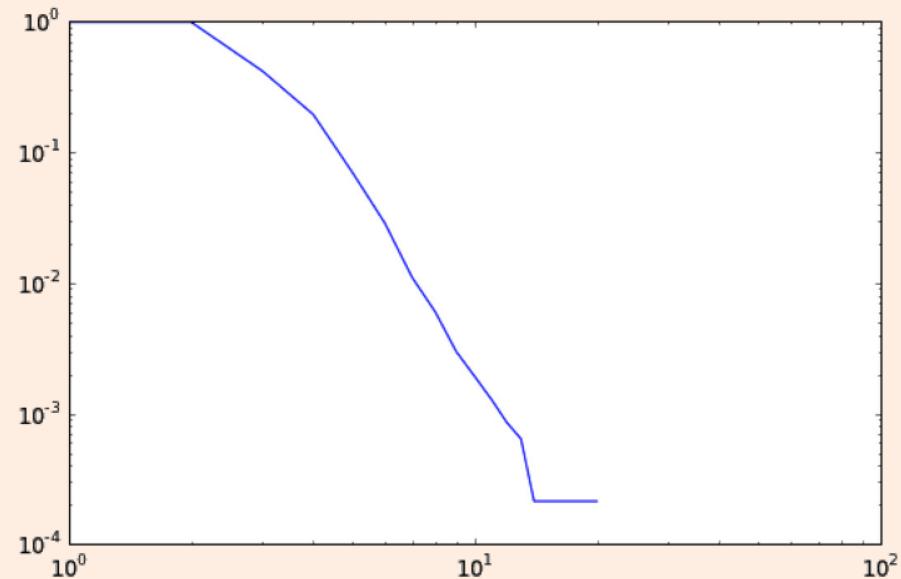
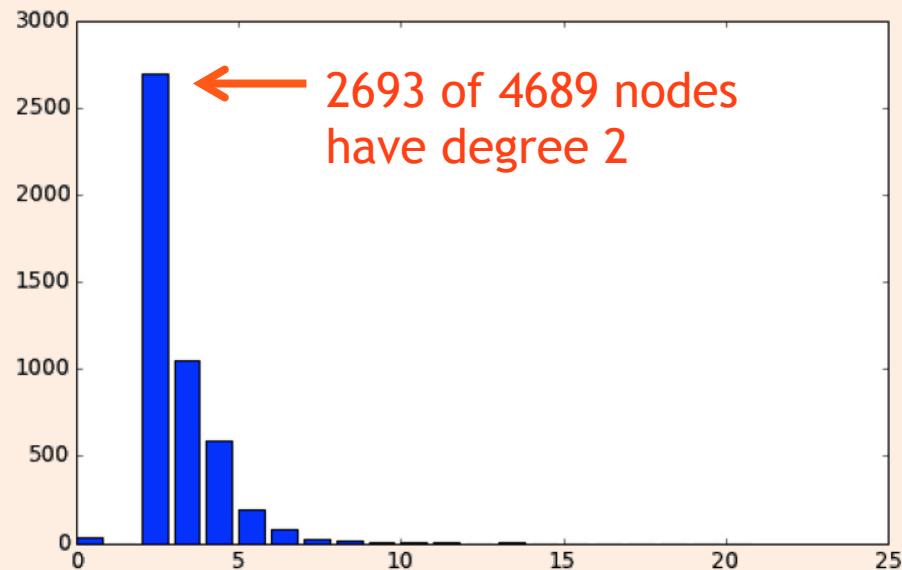


Exponentially decreasing trend - very few nodes with high degrees

Network is not scale-free

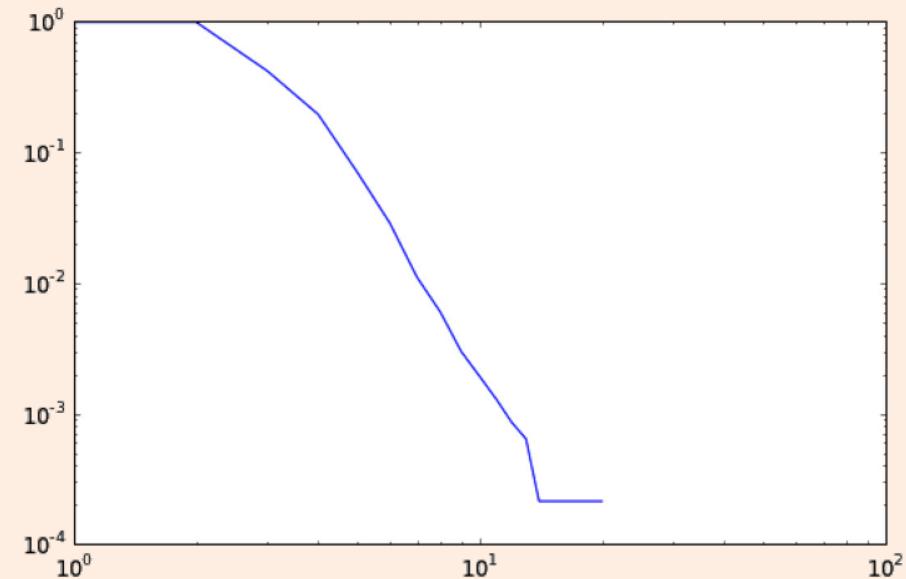
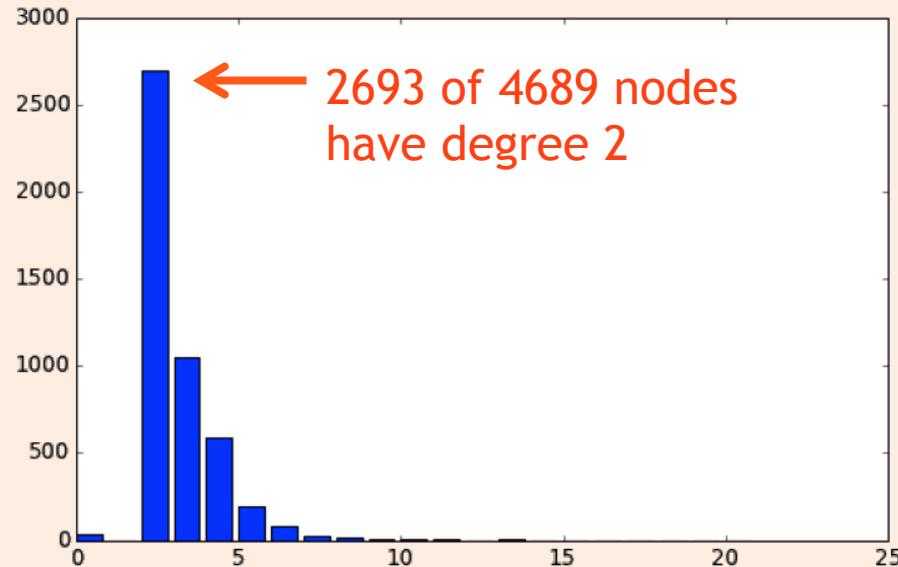


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Slightly more than half the bus stops in the network are located along a stretch.





4. Degree Centrality

Measures the sum of the weights of neighbouring edges

In our case it measures...

“the number of bus services going through a bus stop.”



4. Degree Centrality – Top 20

Rank	Bus Stop ID	Bus Stop's Description
1	22009	Boon Lay Int, Jurong West Central 3
2	46009	Woodlands Reg Int, Woodlands Reg Centre
3	84009	Bedok Temp Int, Bedok North Drive
4	75009	Tampines Int, Tampines Central 1
5	04121	SMU, Stamford Road
6	08041	YMCA, Orchard Road
7	52009	Toa Payoh Int, Lorong 6 Toa Payoh
8	08138	Concorde Hotel Singapore, Orchard Road
9	08057	Dhoby Ghaut Station, Orchard Road
10	08111	Winsland Hse, Penang Road
11	08121	Somerset Station, Somerset Road
12	59009	Yishun Int, Yishun Avenue 2
13	08069	Rendezvous Grand Hotel, Bras Basah Road
14	08031	Dhoby Ghaut Station, Penang Road
15	03129	UIC Building, Shenton Way
16	02049	Raffles Hotel, Bras Basah Road
17	52509	Opposite Toa Payoh Swim Cplx, Lorong 6 Toa Payoh
18	54241	Block 700B, Ang Mo Kio Avenue 3
19	04179	NTUC Income Centre, Bras Basah Road
20	52501	Toa Payoh Swim Cplx, Lorong 6 Toa Payoh

Legend

Bus Interchange

Central Region

Mature Estates



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Measures the sum of the weights of all edges between the nodes & its neighbors

Interchanges

Central Region
Bus Stops

Mature Estate Bus
Stops



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Demand for Transportation (To and From All Other Areas)

Mature Estate Bus Stops

Toa Payoh & Ang Mo Kio

Residential Area With Large Population

Relatively Near CBD Compared to Other Estates



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Bukit Timah

Habourfront /
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No MRT

Dense Residential Population

Concentration of Schools



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Habourfront /
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Industrial Estates

Sea Ports

Sentosa



5. Betweenness Centrality

Measures the extent to which a vertex lies on paths between other vertices



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In our case it measures...

“how likely are bus services going to pass through a bus stop.”



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Lines crossing map suggests buses travel by the expressway.



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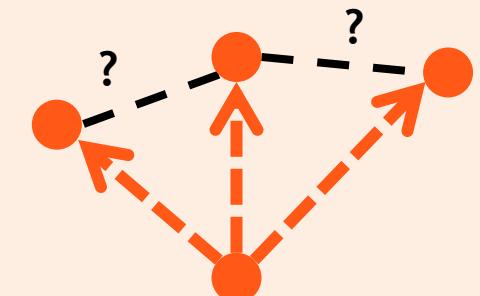
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“which neighbouring bus stops are connected with each other.”





6. Local Clustering

We would expect very few clusters because of the nature of the bus stop network

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Most of the clusters are located near bus interchanges
(Tampines, Woodlands, Boonlay, Hougang, AMK)



6. Local Clustering - Tampines Case

Bus Stop 76051 - Tampines Stadium



Daru Ghufran Mosque

Bus 291



Tampines Interchange

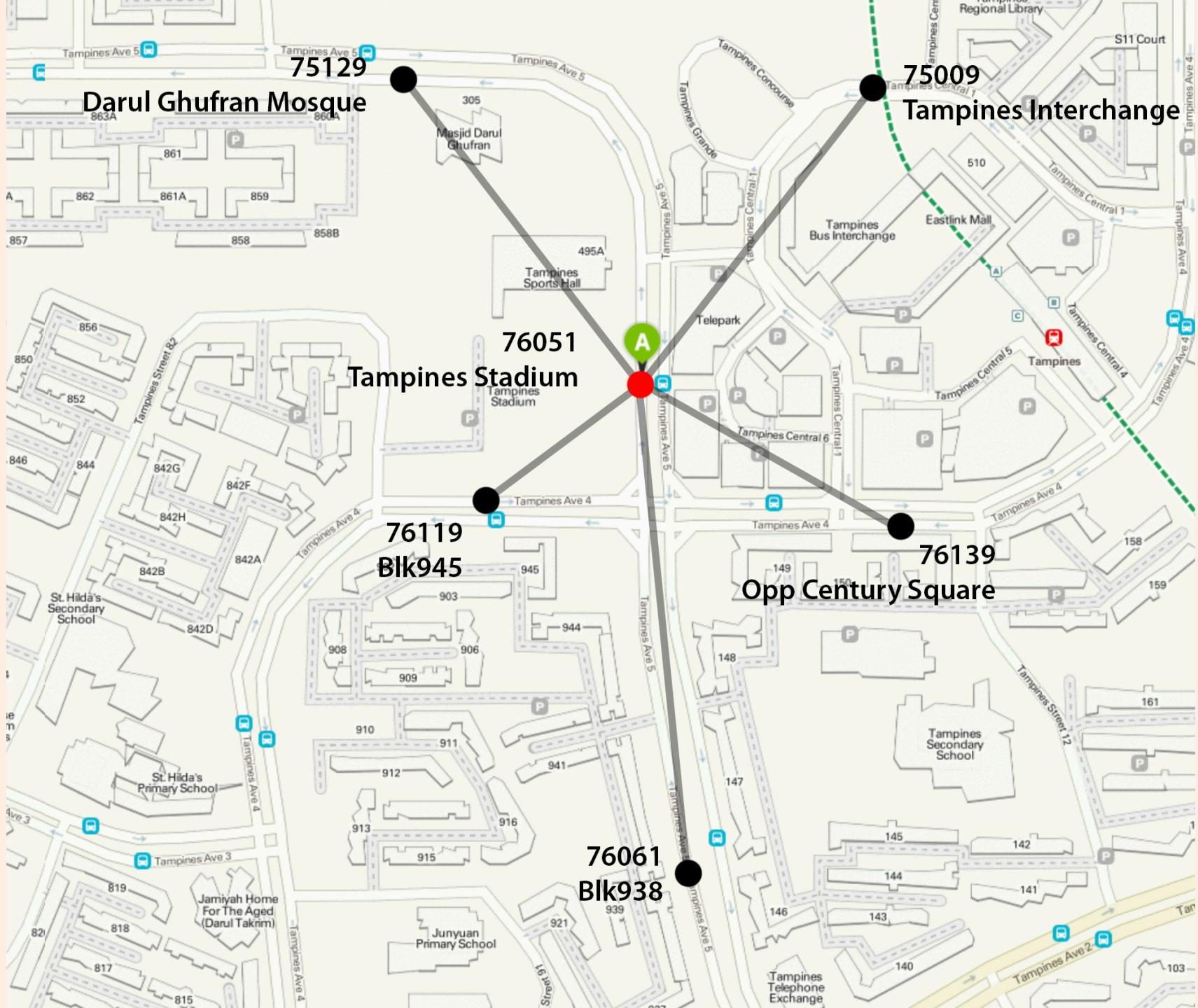
Bus 3



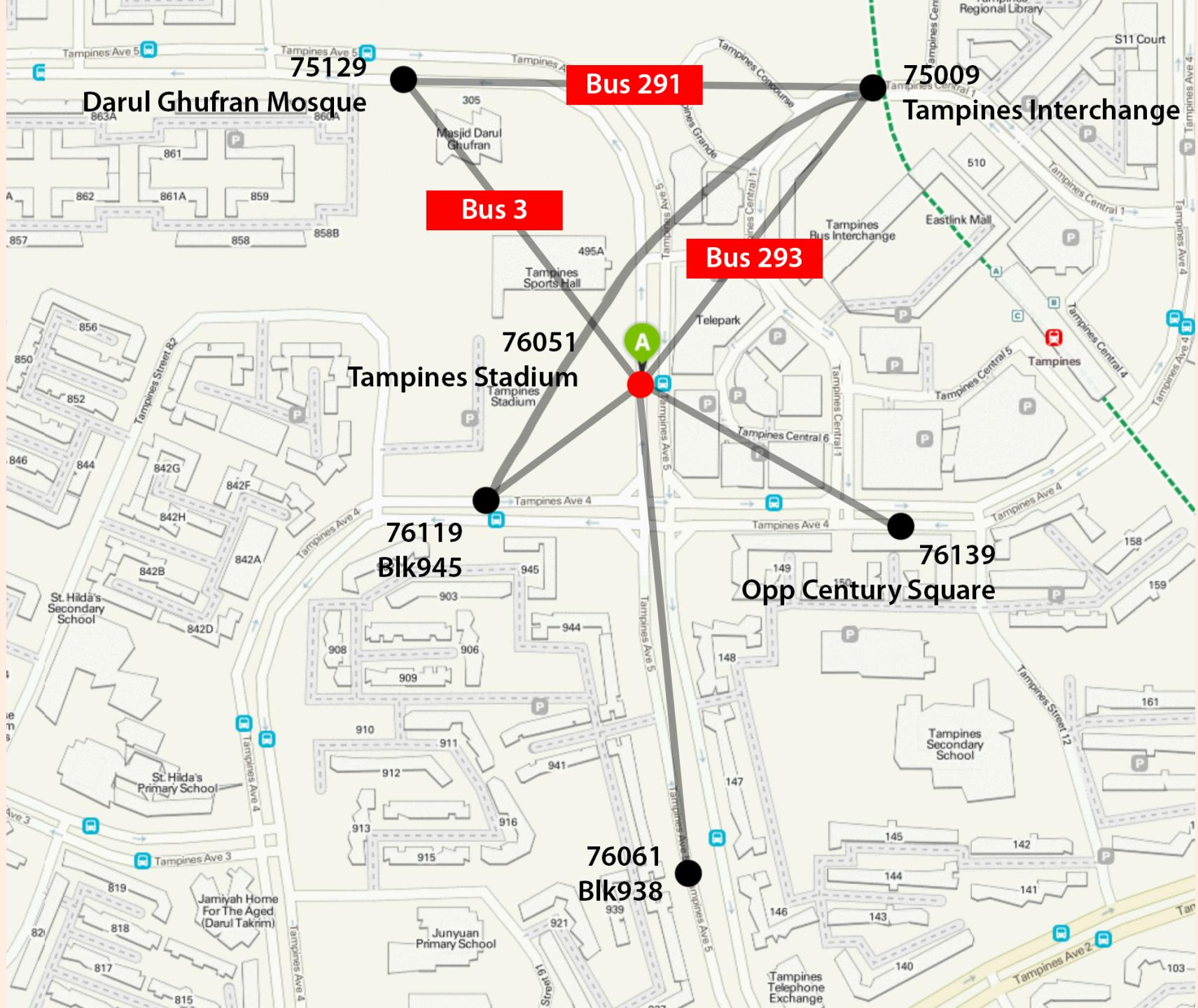
Tampines Stadium

Bus 293

Has 5 immediate
neighbours

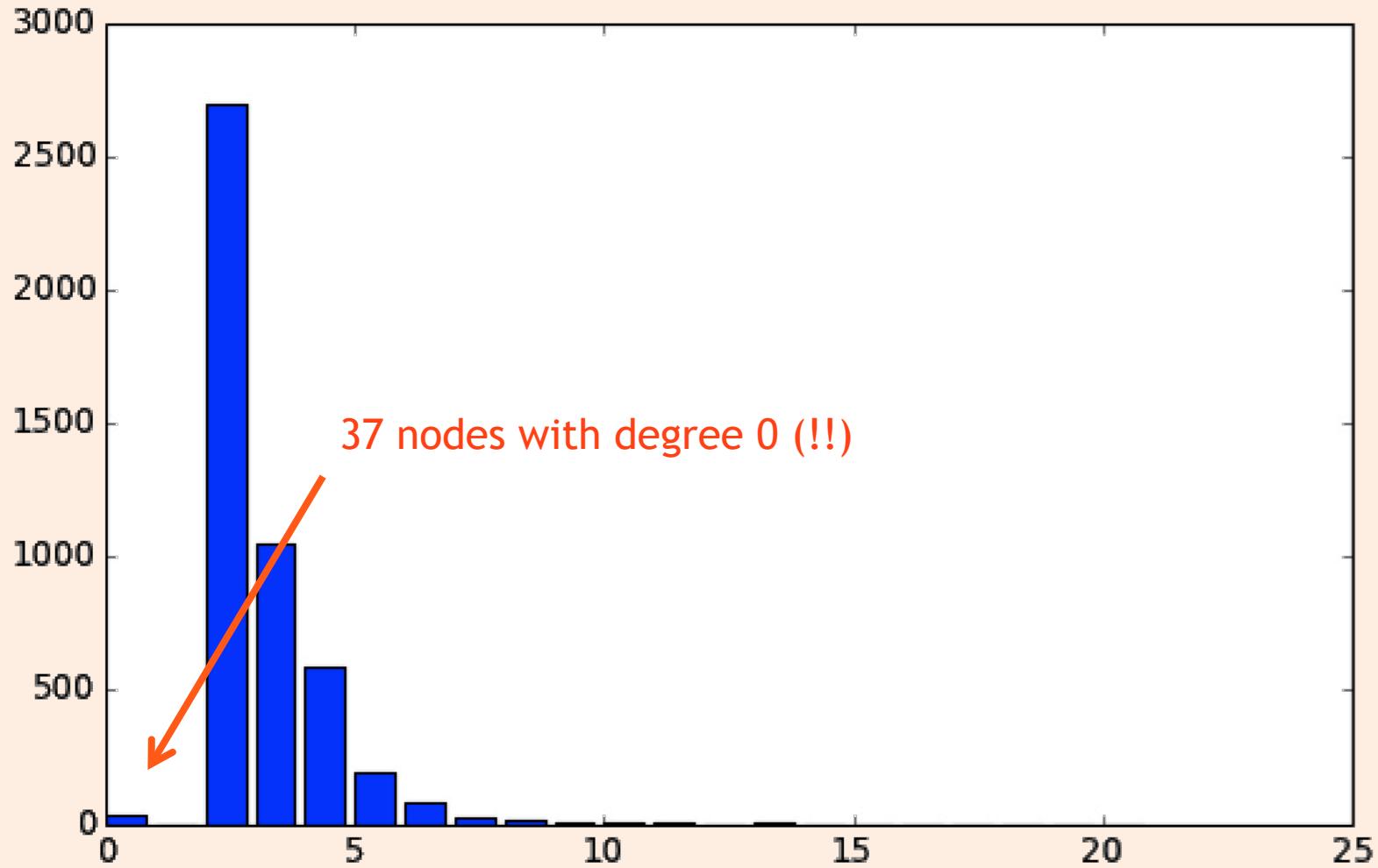






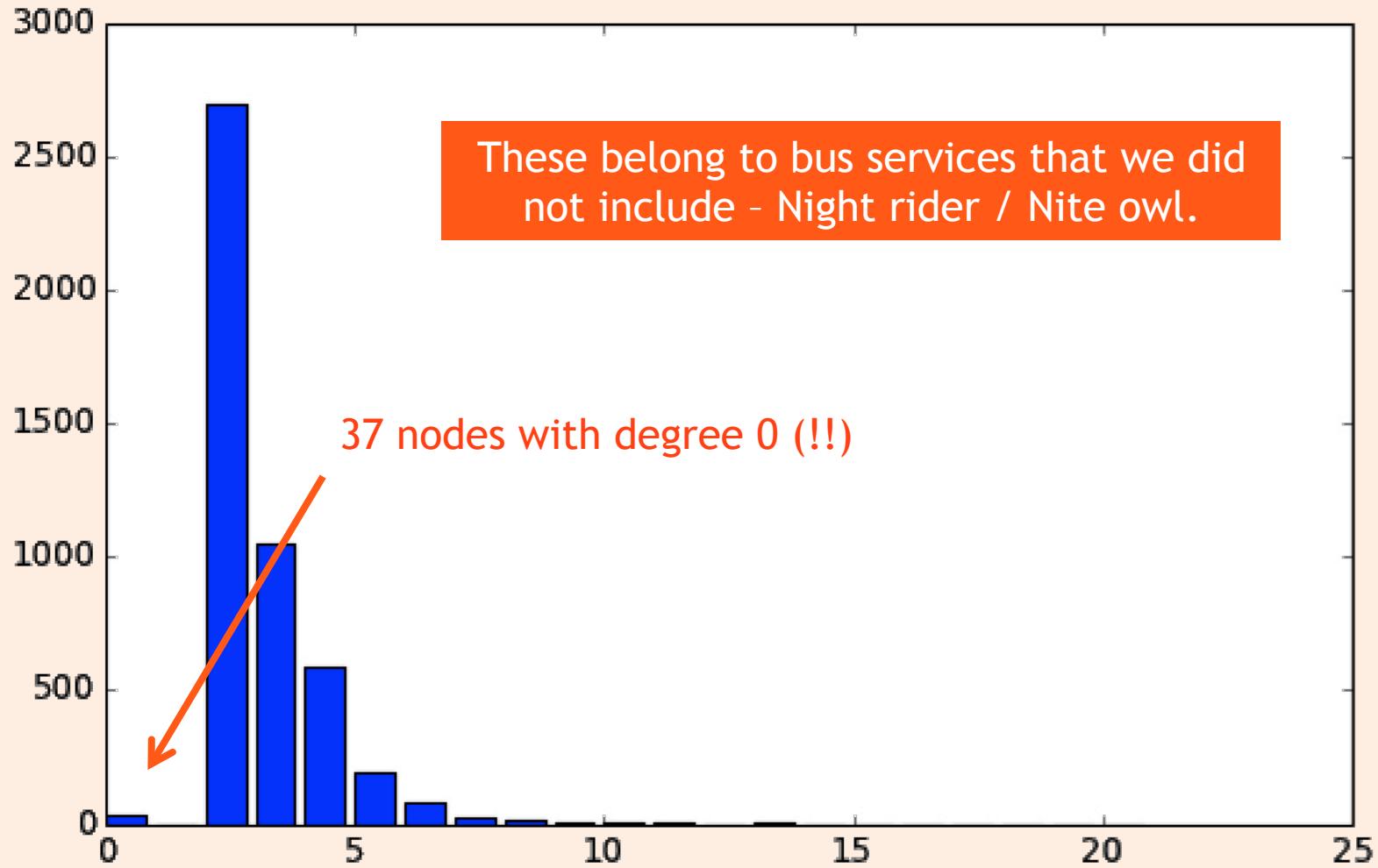


Degree Distribution





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7. Night Rider / Nite Owl Services

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6 Services

Midnight - 2am



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Degree Centrality shows the top 15 bus stops to be at town, with the top node being Boat Quay (where all the clubs/pubs are).



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But some estates do not have services - Punggol, Seletar, Sembawang. These estates are small with low populations.



8. Insights & Conclusion

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No, not in towns like Sembawang and Punggol



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We can infer which are the important bus stops that connect parts of Singapore.

Night Rider analysis shows that only 13 services are absolutely essential to connect Singapore to its major parts. So the 300 different daytime bus services serve to improve interconnectedness in other areas.



Questions?