Simulation Project

Team B

Improve Throughput of the Main Road

Hannoversche Str. / Diesdorfer / Ummendorfer Str.

Milestone 4

Presented by

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Overview

1. Data required
2. System
   2.1 Histogram and QQ-plots
   2.2 Goodness of fit-chi square test
3. Data required for validation
4. Difficulties encountered
5. Limitation on accuracy and validity of data
6. Lessons learned

Data required

Input data

- Probability of turning to different lanes.
- Capacity of places
- Average length of vehicles (Taken as 5 metre)
- Inter-arrival time of vehicles

Output data

- Number of vehicles exiting the node
- Average time spent by vehicles in the system

System


Ummendorfer
Hannoversche Straße
Kümmelsberg
Diesdorfer Graseweg
Große Diesdorfer
3D

Probability of taking a direction

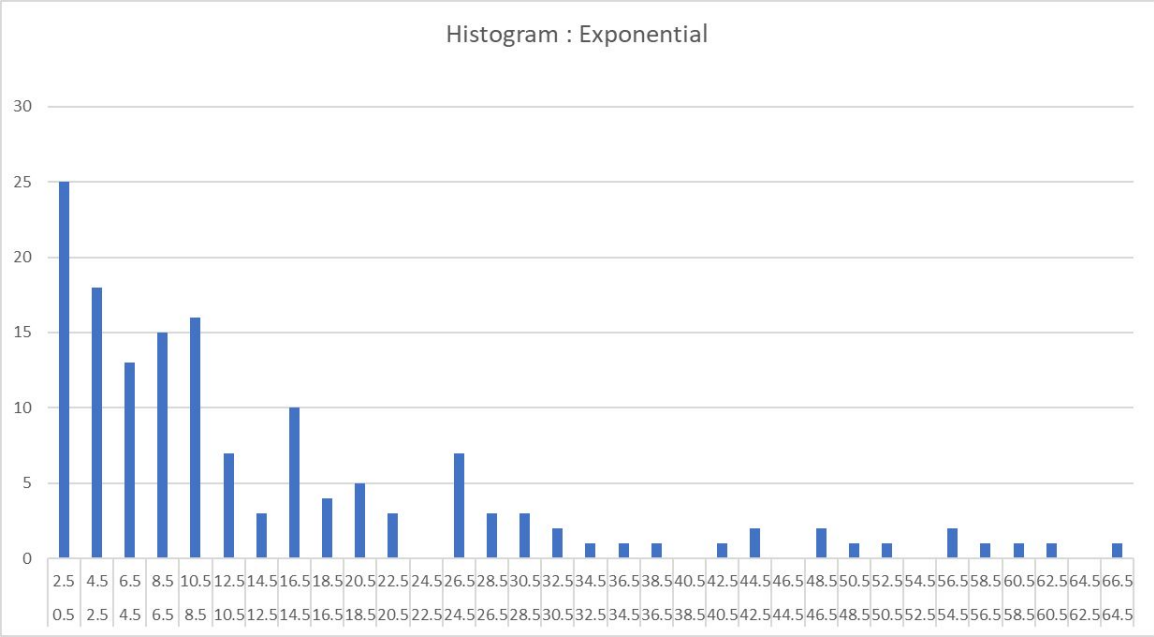
FROM DIESDORFER GRASEWEG			FROM GROßE DIESDORFER		FROM HANNOVERSCHE	
TIME	TOWARDS HANNOVERSCHE	TOWARDS GROßE DIESDORFER	TOWARDS HANNOVERSCHE	TOWARDS DIESDORFER GRASEWEG	TOWARDS DIESDORFER GRASEWEG	TOWARDS GROßE DIESDORFER
6:45-7:45	0.775	0.224	0.59	0.40	0.658	0.341
16:00-17:00	0.717	0.282	0.545	0.454	0.005	0.005

Probability of taking a direction

FROM HANNOVERSCHE S			FROM KUMMELSBERG		FROM HANNOVERSCHE NW	
TIME	TOWARDS HANNOVERSCHE NW	TOWARDS KUMMELSBERG	TOWARDS HANNOVERSCHE NW	TOWARDS HANNOVERSCHE S	TOWARDS HANNOVERSCHE S	TOWARDS KUMMELSBERG
7-8	0.445	0.554	0.348	0.651	0.574	0.425
15:45-16:45	0.318	0.682	0.19	0.8	0.587	0.314

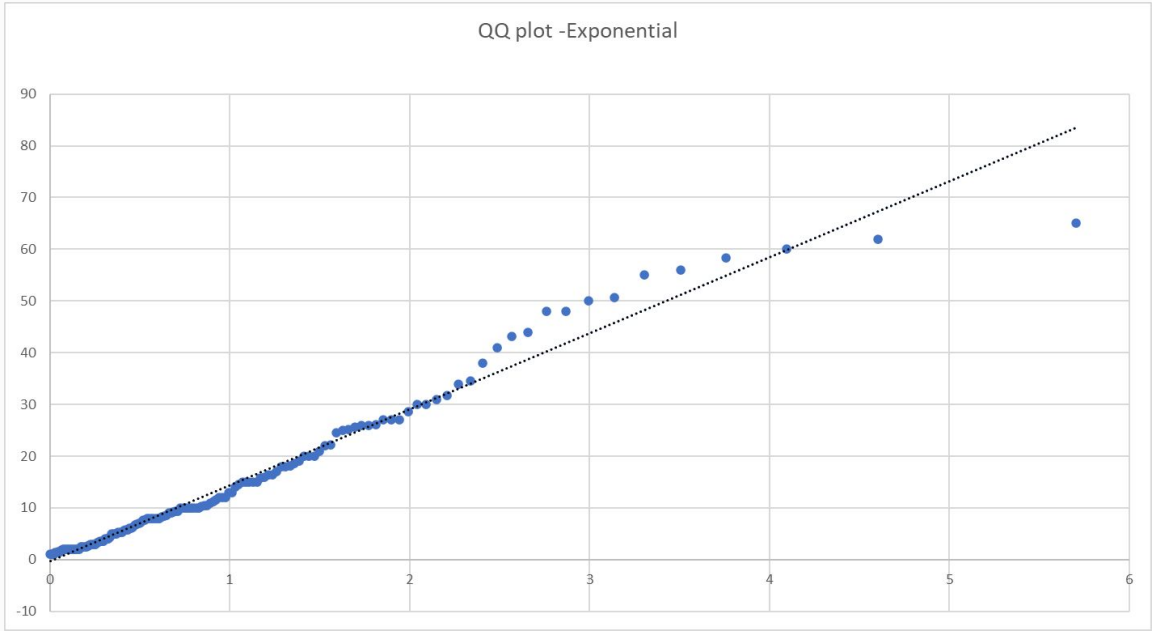
Histogram

From Hannoversche NW (Exponential distribution)



QQ-plot

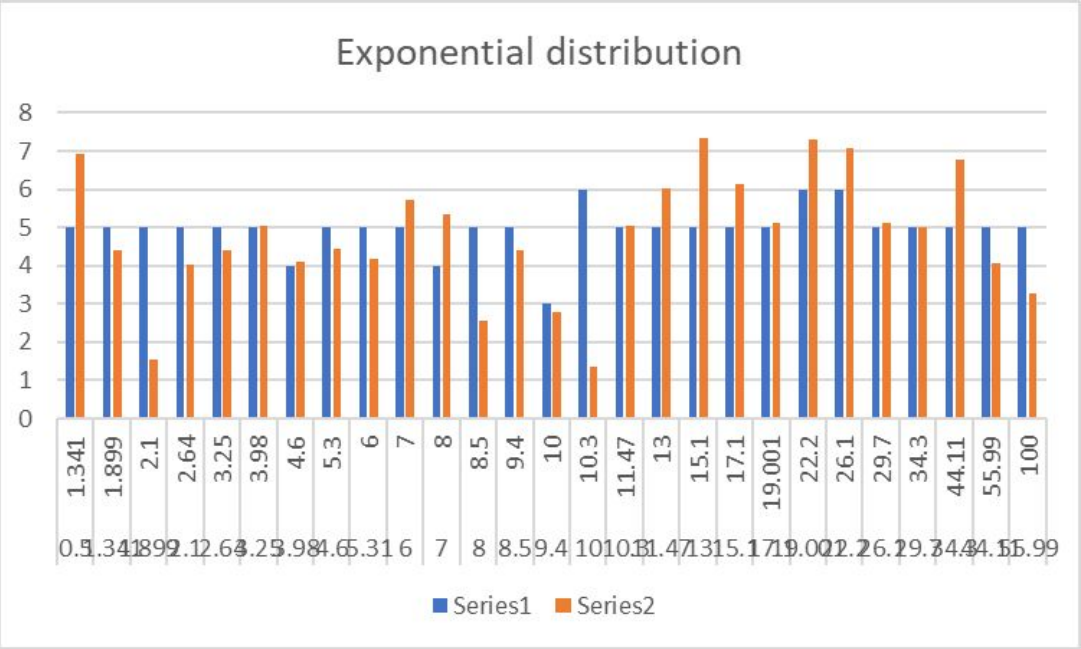
From Hannoversche NW(Exponential distribution)



Goodness of fit-chi squared test

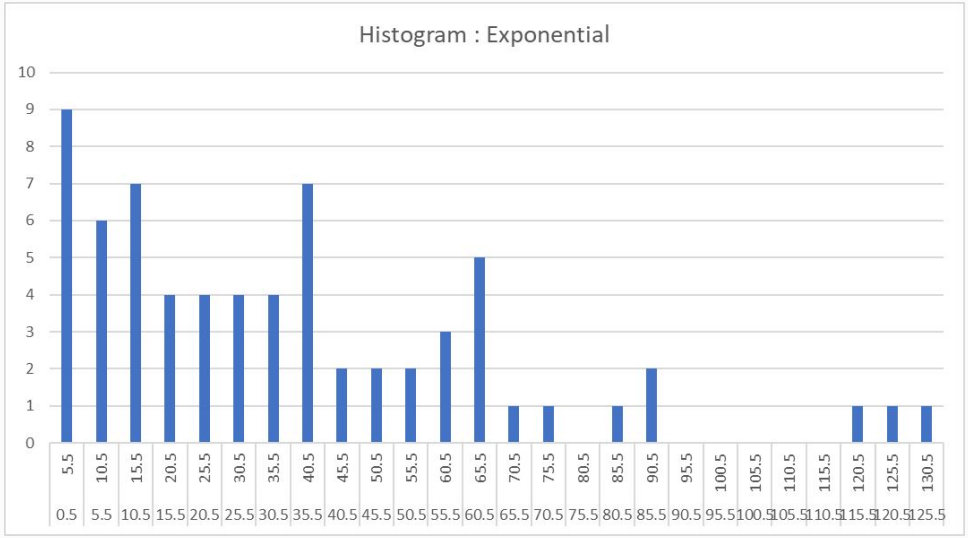
From Hannoversche NW

n	134
f	25
Alpha	0.9
Lambda	0.06518
Chi_0	34.38159
Chi_stat Result	30.89538 Accept

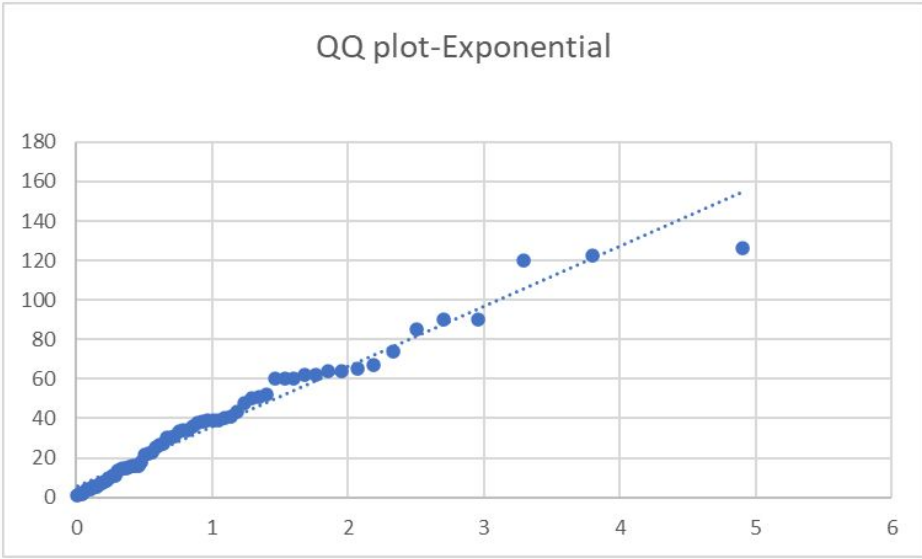


From Ummendorfer (Exponential distribution)

Histogram



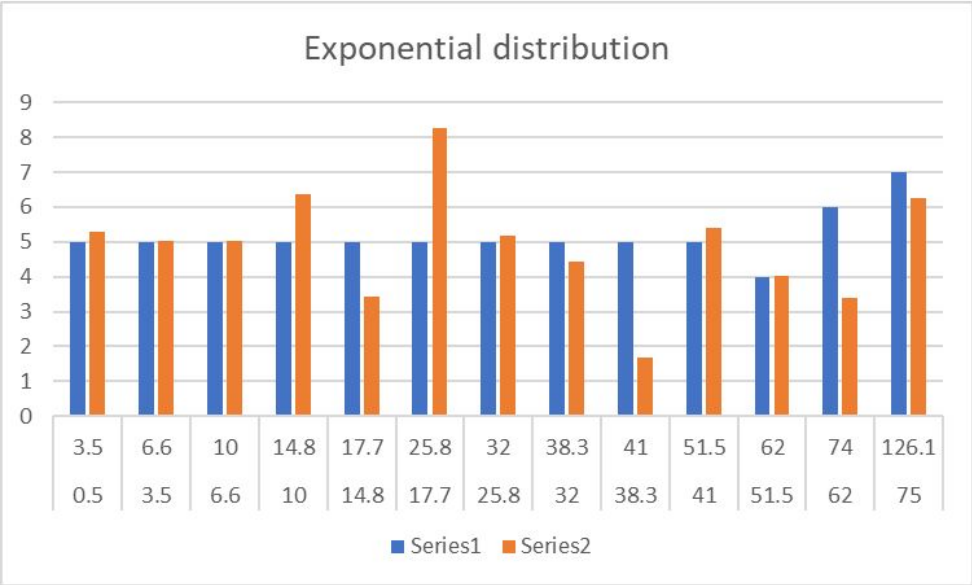
QQ-plot



Goodness of fit-Chi squared test

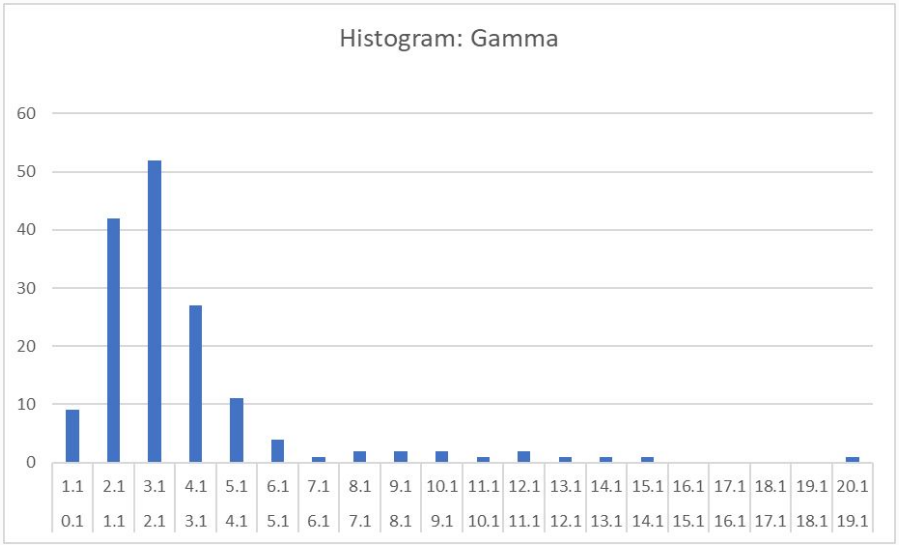
From Ummendorfer

n	67
f	11
Alpha	0.9
Lambda	0.027914
Chi_0	17.27501
Chi_stat	11.1751
Result	Accept

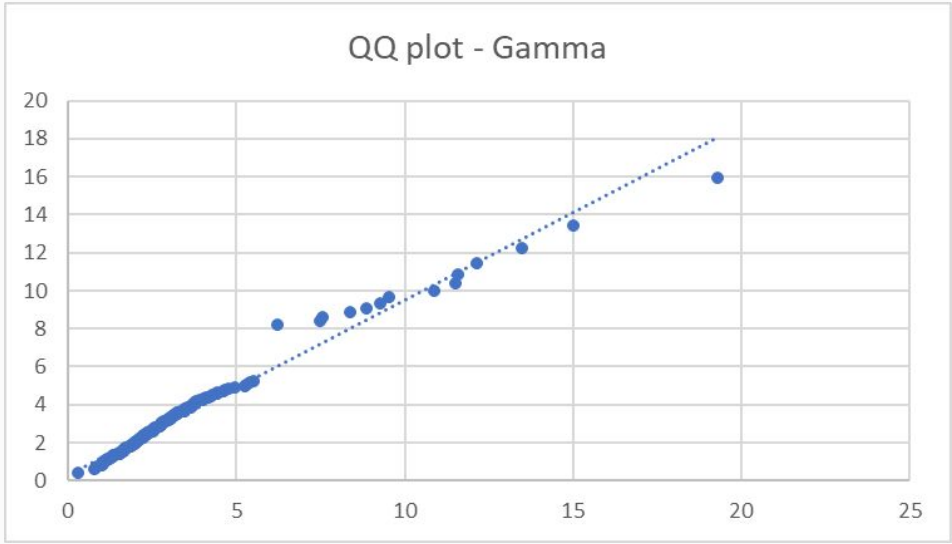


From Diesdorfer Graseweg (Gamma distribution)

Histogram



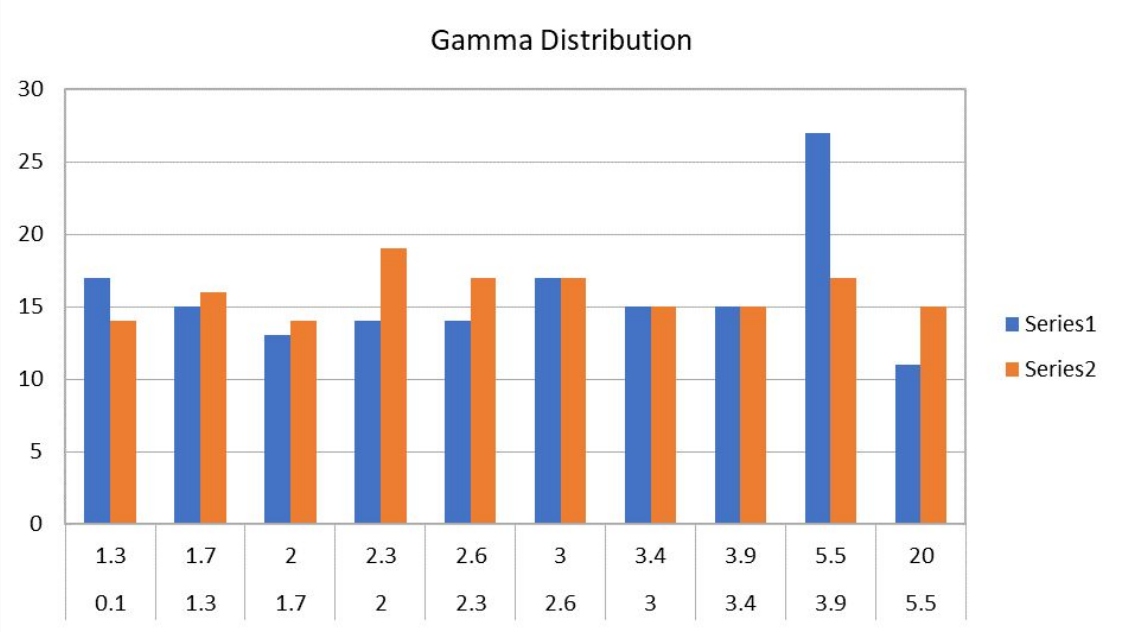
QQ-Plot



Goodness of fit-Chi squared test

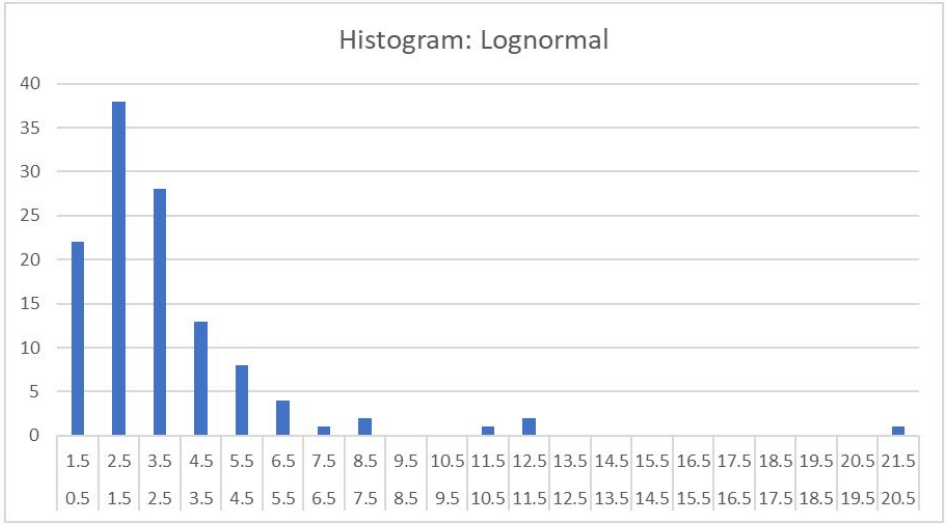
From Diesdorfer Graseweg

n	159
f	7
Lambda	0.299
α β	3.75 0.8
Alpha	0.05
Chi_0	14.07
Chi_stat Result	8.26 Accept

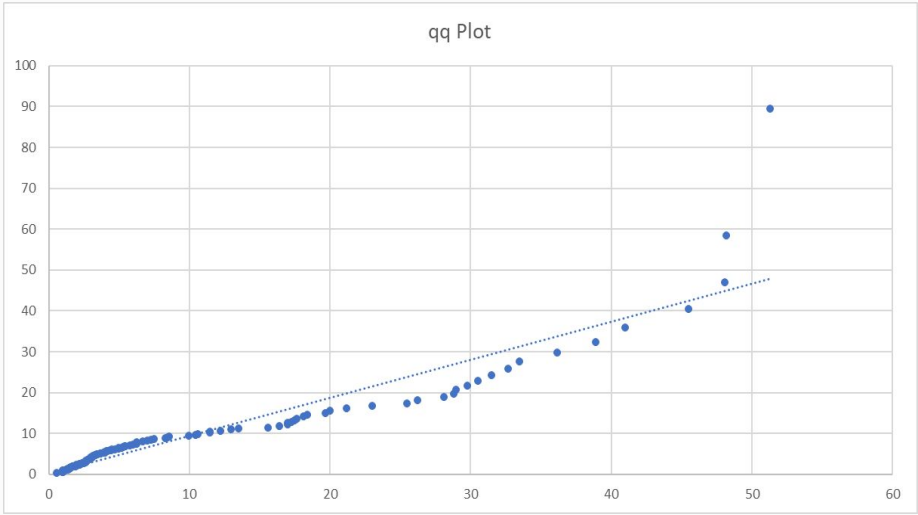


From Kummelsberg (Lognormal distribution)

Histogram



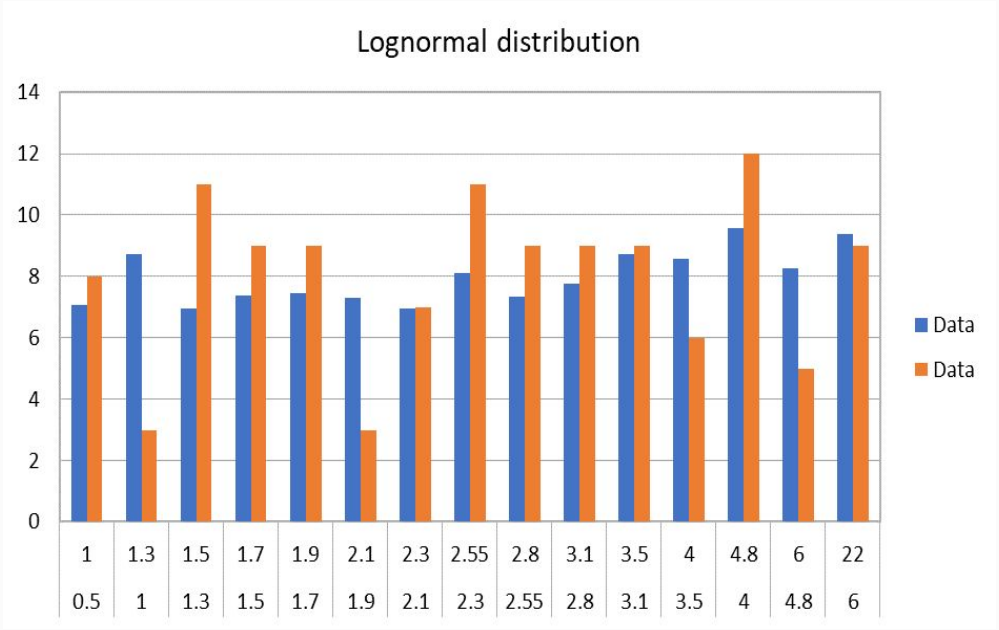
QQ-plot



Goodness of fit-Chi squared test

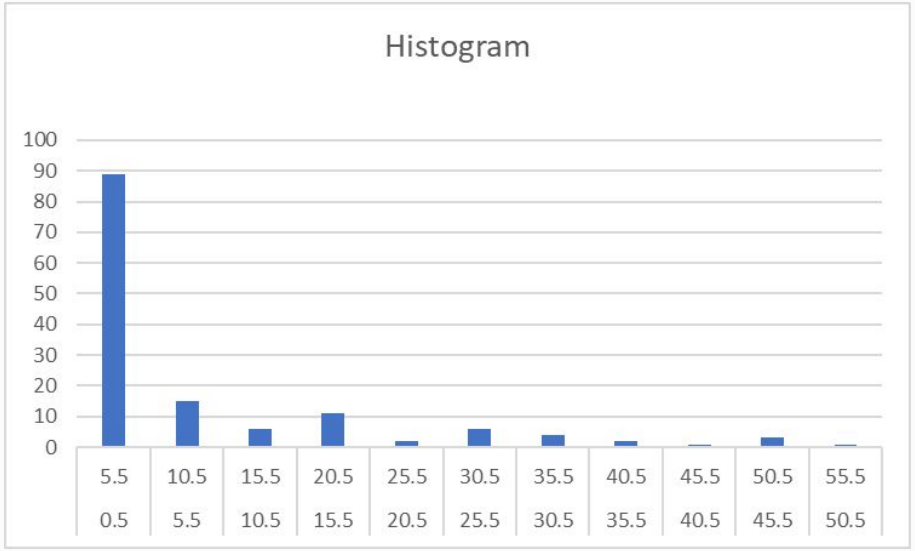
From Kummelsberg

n	120
f	12
Alpha	0.05
Mean	0.931317
Standard deviation	0.607715
Chi_0	21.03
Chi_stat	13.751
Result	Accept

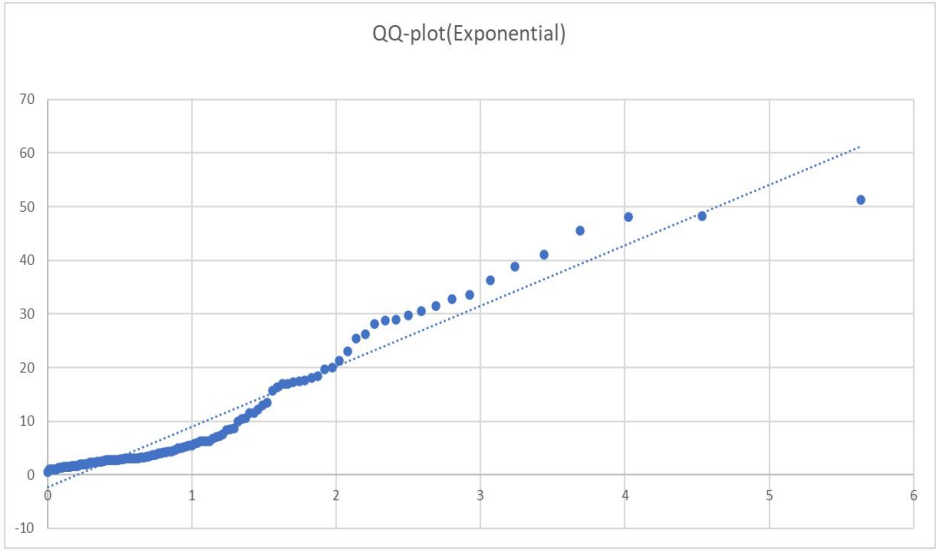


From Große Diesdorfer (Exponential)

Histogram



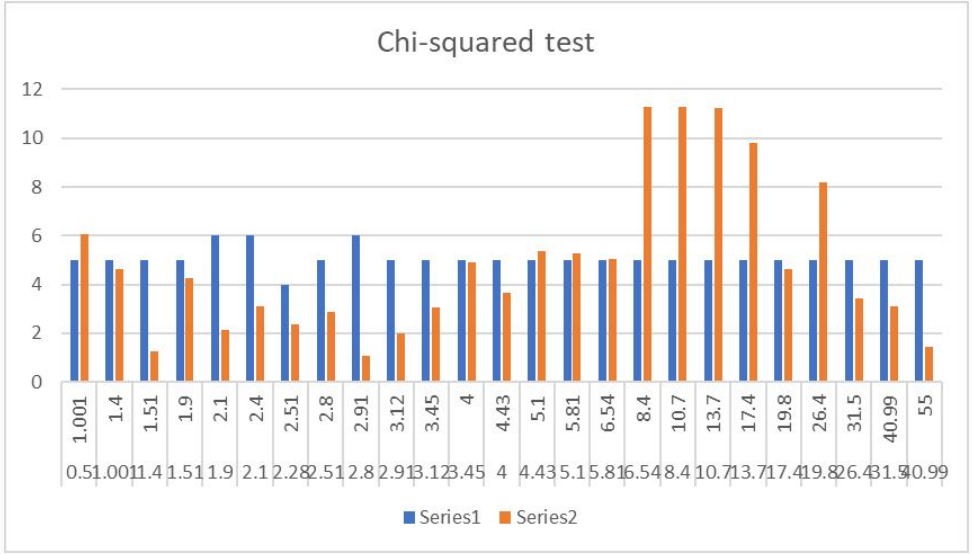
QQ-plot



Goodness of fit-Chi squared test

From Große Diesdorfer

n	127
f	23
Lambda	0.102827
Alpha	0.99
Chi_0	41.6384
Chi_stat	77.96851
Result	Reject



Capacity of places

STREET	VEHICLE UNITS PER LANE
Grosse Diesdorfer	13
Hannoversche-1	8
Diesdorfer Graseweg	9
Hannoversche S	25
Kummelsberg	11
Hannoversche NW	10

Data required for validation

1. Average queue length
2. Average time spent by the vehicles in the system
3. Number of vehicles exiting the node

Average time spent by vehicles in the system

Time - 16:00 to 17:00
(Hannoversche str)

DIRECTION	**AVERAGE TIME** (in seconds)
Towards Hannoversche NW and Kummelsberg	133.033
Towards Ummendorfer, Grosse diesdorfer and Diesdorfer graseweg	147.46

Number of vehicles exiting the node during the evening rush hour

From	Towards	Number of vehicles
Hannoversche S	Diesdorfer Graseweg	455
	Grosse Diesdorfer	455
Diesdorfer Graseweg	Hannoversche S	360
	Grosse Diesdorfer	142
Grosse Diesdorfer	Hannoversche S	210
	Diesdorfer Graseweg	175

Number of vehicles exiting the node during the evening rush hour

From	Towards	Number of vehicles
Hannoversche NW	Hannoversche S	282
	Kummelsberg	198
Hannoversche S	Hannoversche NW	180
	Kummelsberg	386
Kummelsberg	Hannoversche S	510
	Hannoversche NW	120

Difficulties encountered while collecting data

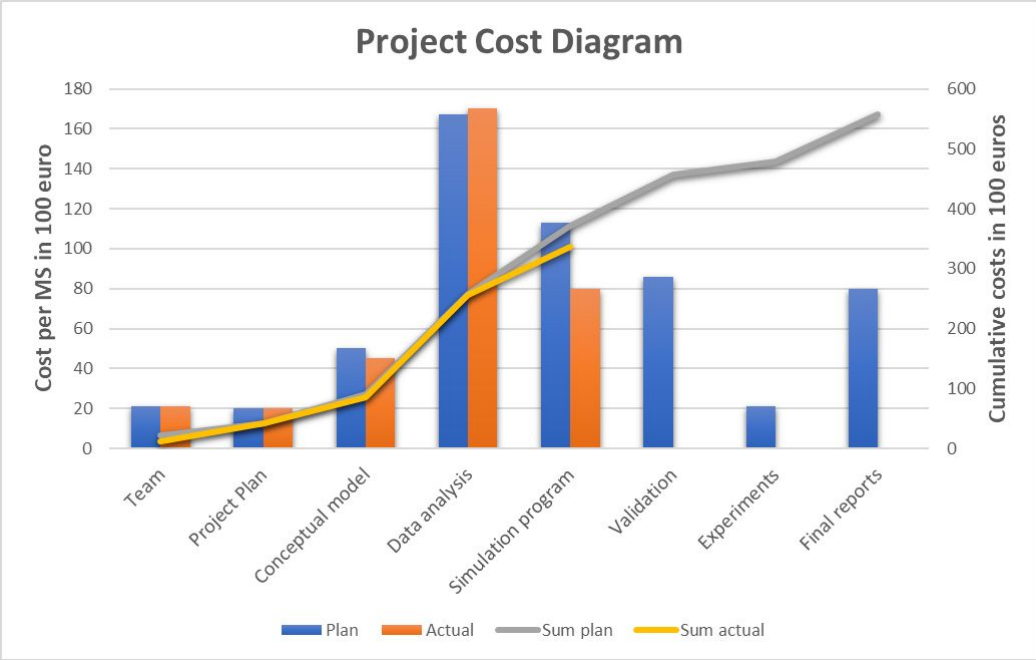
- Deciding on which data to collect
- Dividing the data collection and transformation tasks
- Collecting the data accurately
- Determination of the type of distribution

Limitations on accuracy and validity

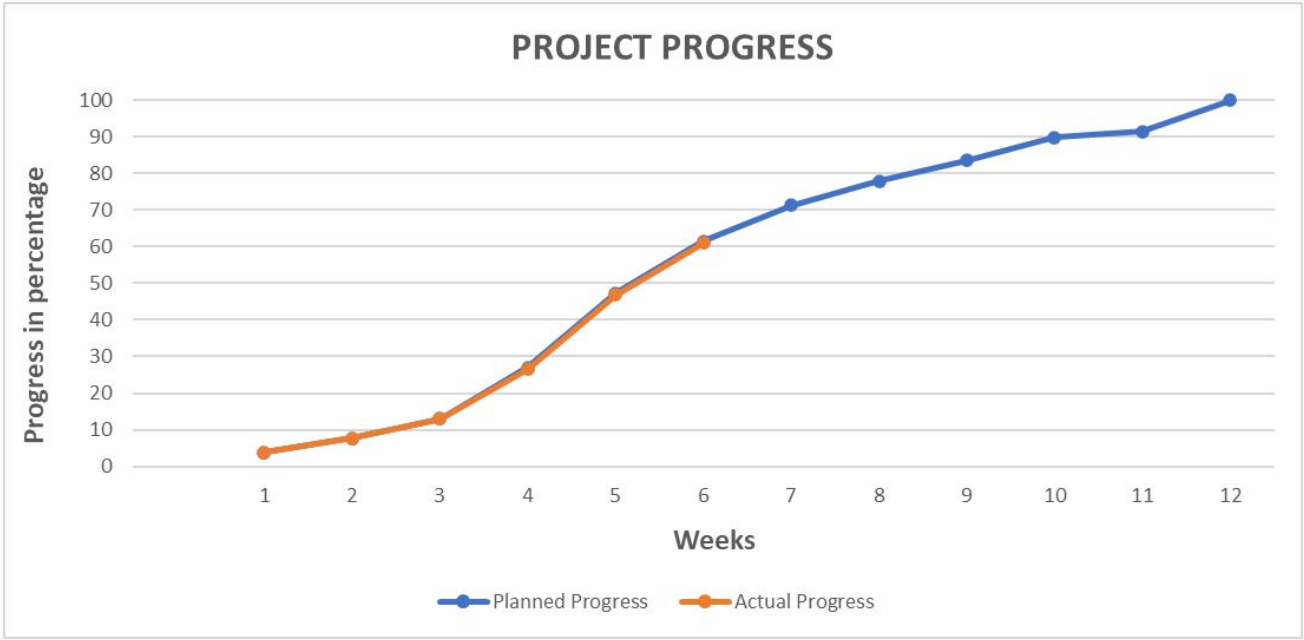
- Small sample size

  (We considered only the evening rush hours)
- Most of the data was collected manually and are likely to human errors

Project Cost



Project Progress



Lessons Learned

- Collecting real world data
- Importance of organizing data
- Larger sample size provides better results
- Teamwork is the most important factor in data analysis

Thank You

Questions?