Weekly report

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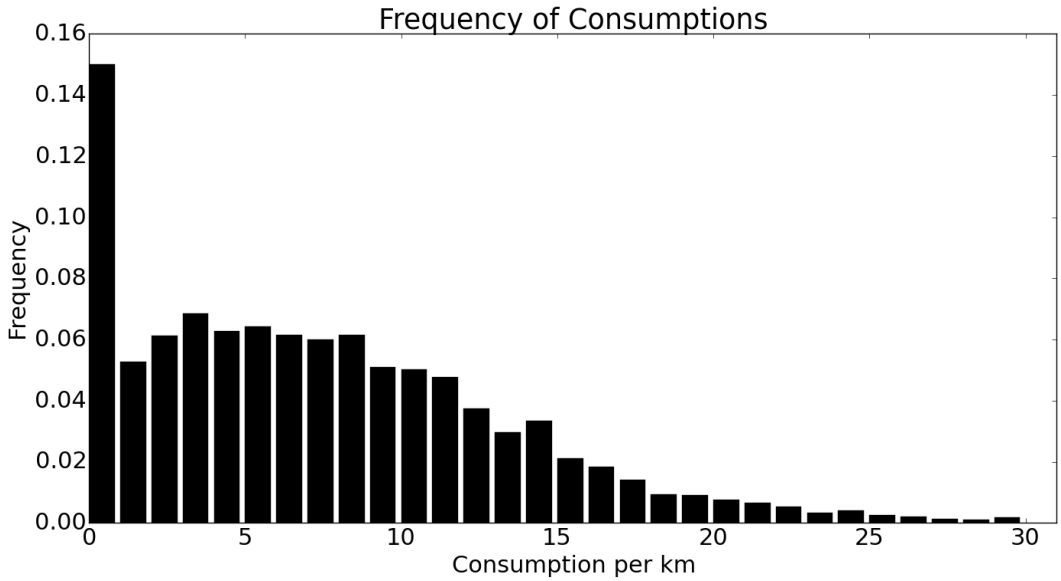
ENERGY CONSUMPTION

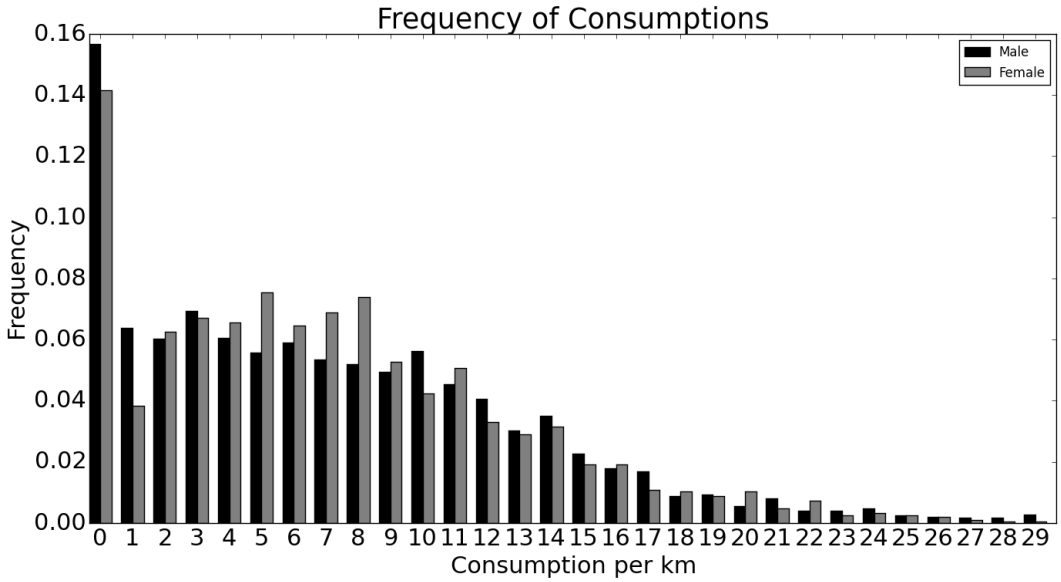
The following graph presents the frequency of energy consumption per km:

Energy Consumption



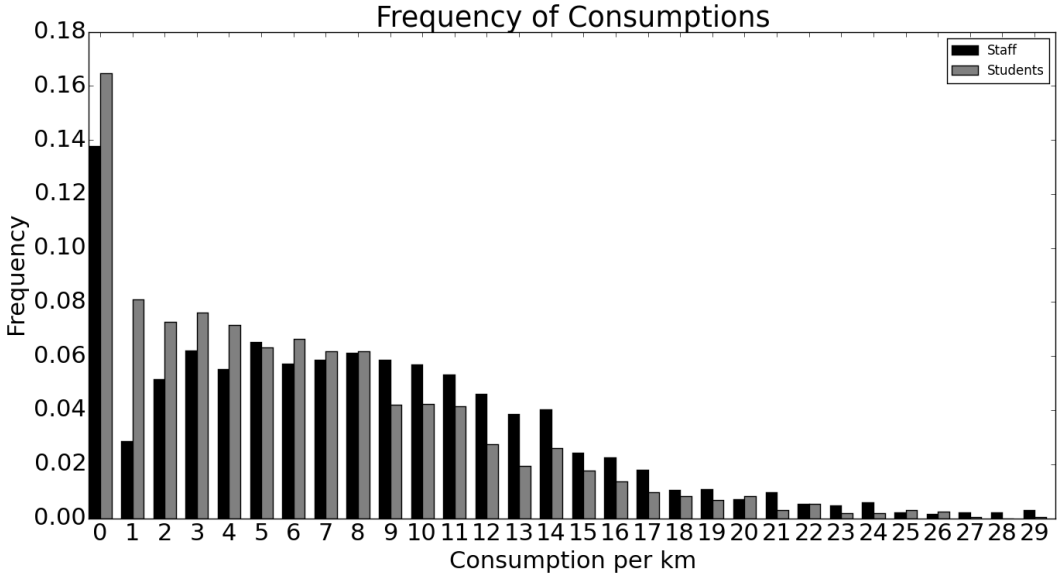
The energy consumption has its highest value at 3 Wh/km and starts decreasing after 9 Wh/km. We seem to have some data problem that generates the initial peak between 0 and 1 Wh/km.

Energy Consumption divided by gender



There is not a clear difference between female and male populations regarding energy consumption.

Energy Consumption divided by occupation



Students have lower energy consumption compared to staff/faculty members. After 8 Wh/km staff members have higher frequency of energy consumption. Conversely, students present higher frequencies in low values of energy consumption especially under 4 Wh/km.

DRIVE 4 DATA:

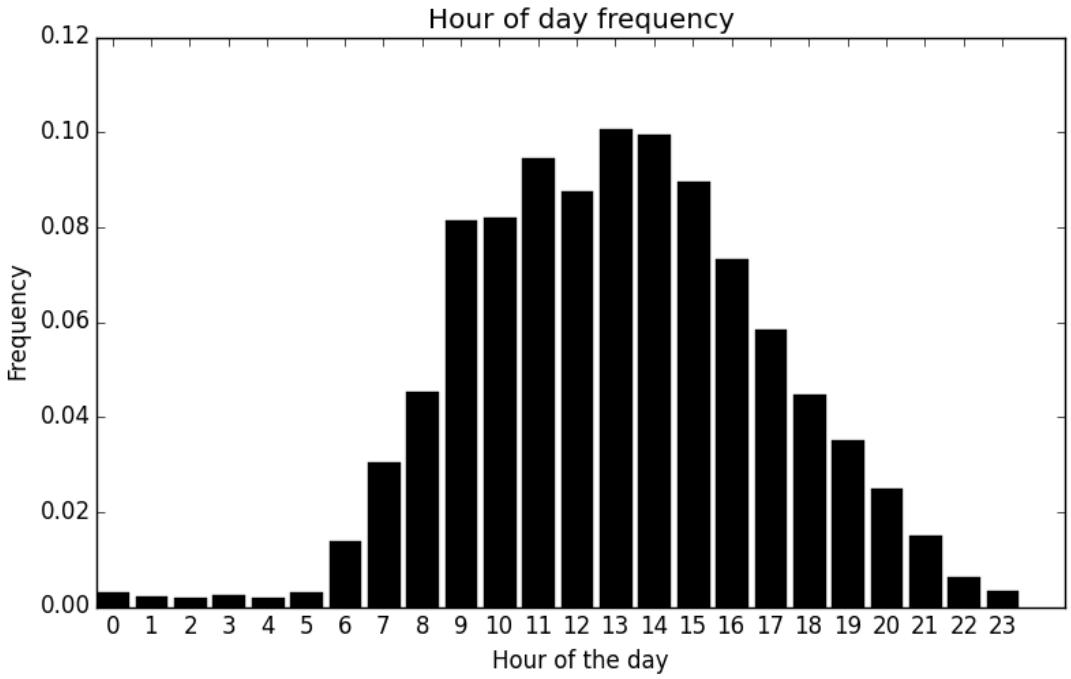
This section presents the results obtained from the analysis of trips in the “drive 4 data” project.

TRIPS ANALYZED: ~6000

CAR DATA:

Participant	Vehicle
Participant 1	Chevrolet Volt 2013
Participant 2	Chevrolet Volt 2012
Participant 3	Nissan Leaf 2012
Participant 4	Toyota Prius Plug-in 2012
Participant 5	Chevrolet Volt 2012
Participant 6	Smart 2013
Participant 7	Ford Focus EV 2014
Participant 8	Mitsubishi iMiEV 2013
Participant 9	Smart 2013
Participant 10	Smart 2014
Participant 11	Smart 2014

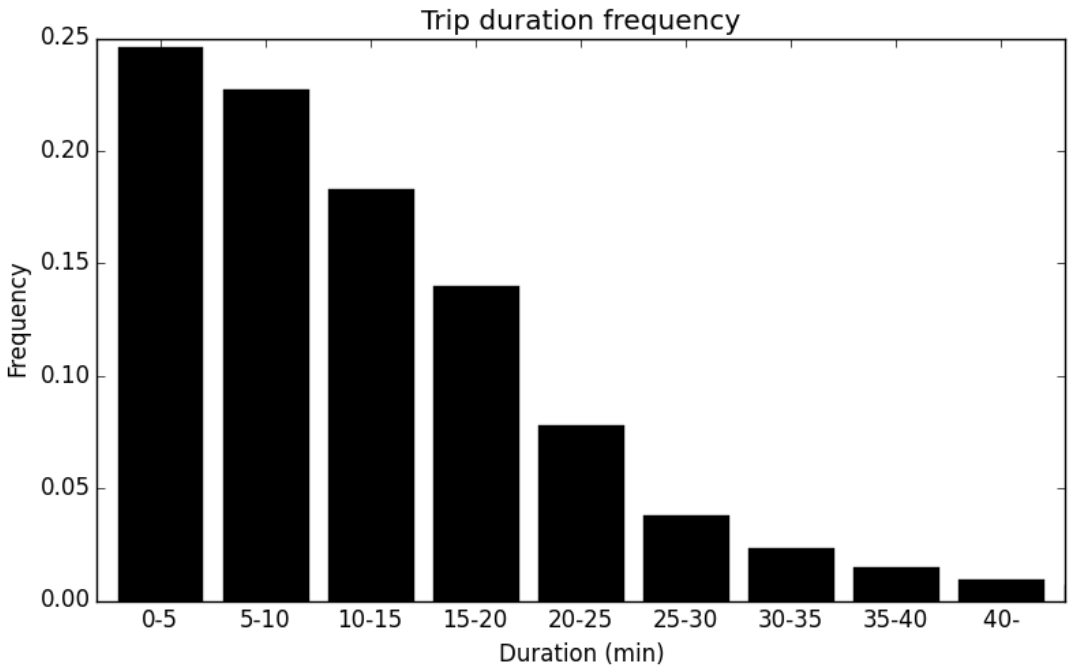
Star time of trips distribution



This plot has a main difference compared to e-bikes, for them we could see a valley in the middle of the day, between 10 am and 3 pm. However, in this case we see that the number of trips has a bell shape. This is probably caused due to the main use that people have for their e-bikes and e-cars. In the case of e-bikes, we saw that they are generally used for commuting, hence the peaks at the beginning and end

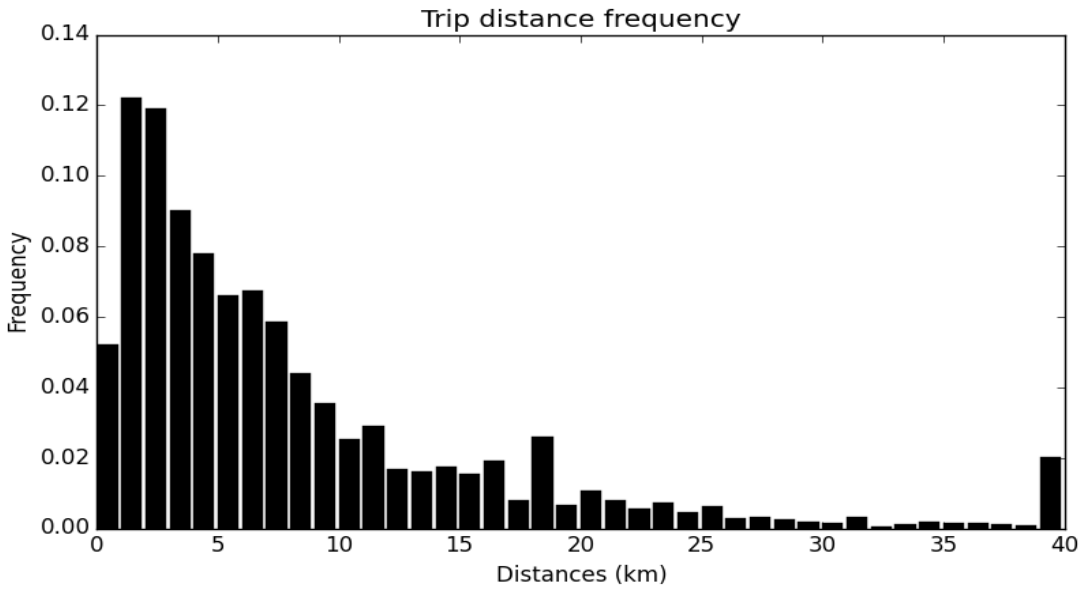
of business hours; in contrast, cars are generally used for multiple purposes which might cause a similar number of trips between 9 am and 4 pm.

Trip duration frequency



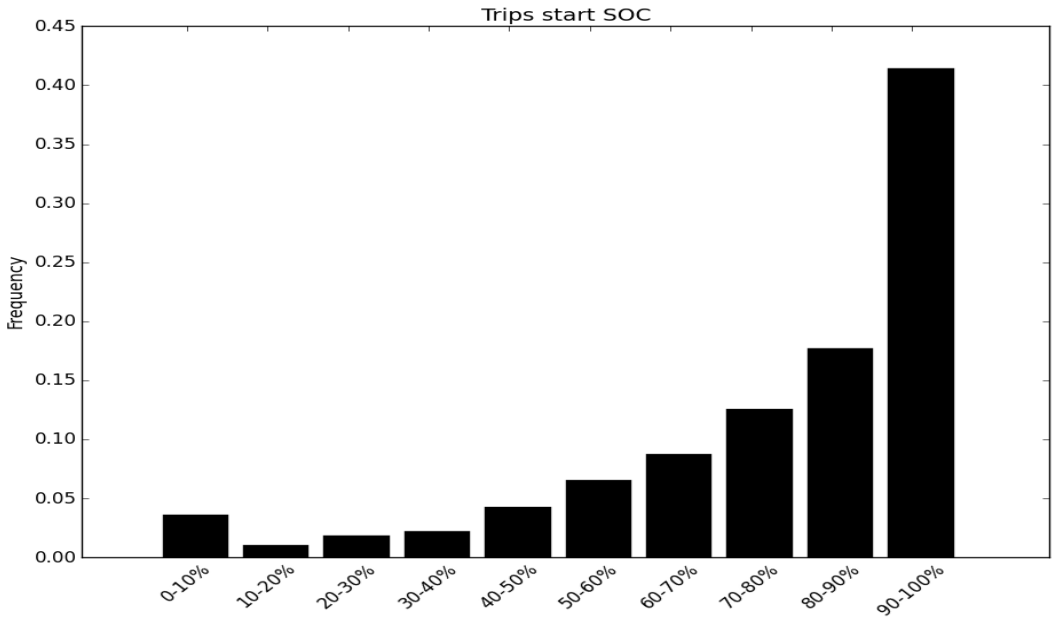
The distribution of duration of trips in e-cars is very similar to the results obtained in e-bikes. In both cases, we can see that most of the trips take less than 20 minutes.

Trip distance distribution



In this plot we can see that people prefer to take short trips. Almost 70% of the trips go for less than 10 km. We do not have data about the population who owns the cars, but since it is a project conducted in Waterloo, shorter distances are common because of the size and the characteristics of the city.

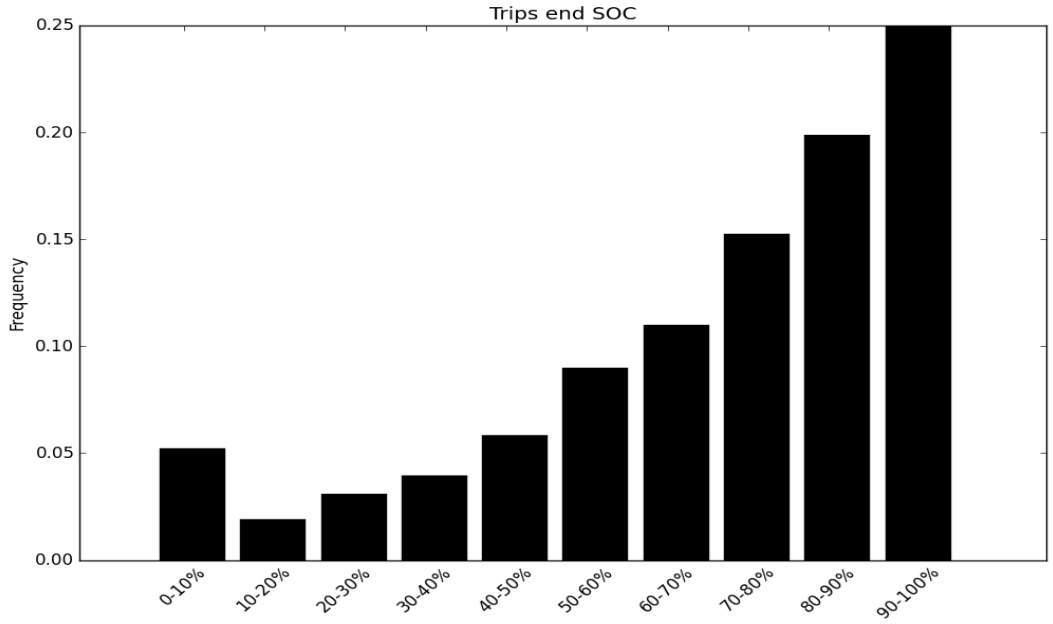
Trip starting SOC



Here we can see that most almost 45% of the trips start with a SOC above 90%. On the other hand, approximately 15% percent of trips start with an SOC level lower than 50%. These results confirm that

range anxiety is common between e-car drivers since they generally prefer to start trips with a battery fully charged.

Trip final SOC



This plot presents the final SOC registered after a trip. Here, we can see that 85% of the trips end with an SOC above 50%. In contrast, only 5% of the trips are close to deplete the battery (0-10% SOC). In this cases, we can see that owners prefer to keep their batteries with a high SOC similar to what was registered with e-bikes.

MISSING GPS DATA:

I analyzed the percentage of missing GPS data during trips for each version of the software of our e-bikes, here are the results:

Version: 0 Missing: 100.0 %
Version: 1 Missing: 76.64 %
Version: 2 Missing: 72.86 %
Version: 3 Missing: 76.64 %
Version: 4 Missing: 48.85 %
Version: 5 Missing: 71.45 %
Version: 6 Missing: 45.92 %
Version: 7 Missing: 8.702 %
Version: 8 Missing: 51.98 %
Version: 9 Missing: 56.41 %
Version: 10 Missing: 7.69 %
Version: 11 Missing: 76.48 %
Version: 12 Missing: 15.72 %
Version: 13 Missing: 63.58 %
Version: 14 Missing: 58.77 %

Version: 15 Missing: 42.78 %
Version: 16 Missing: 55.82 %