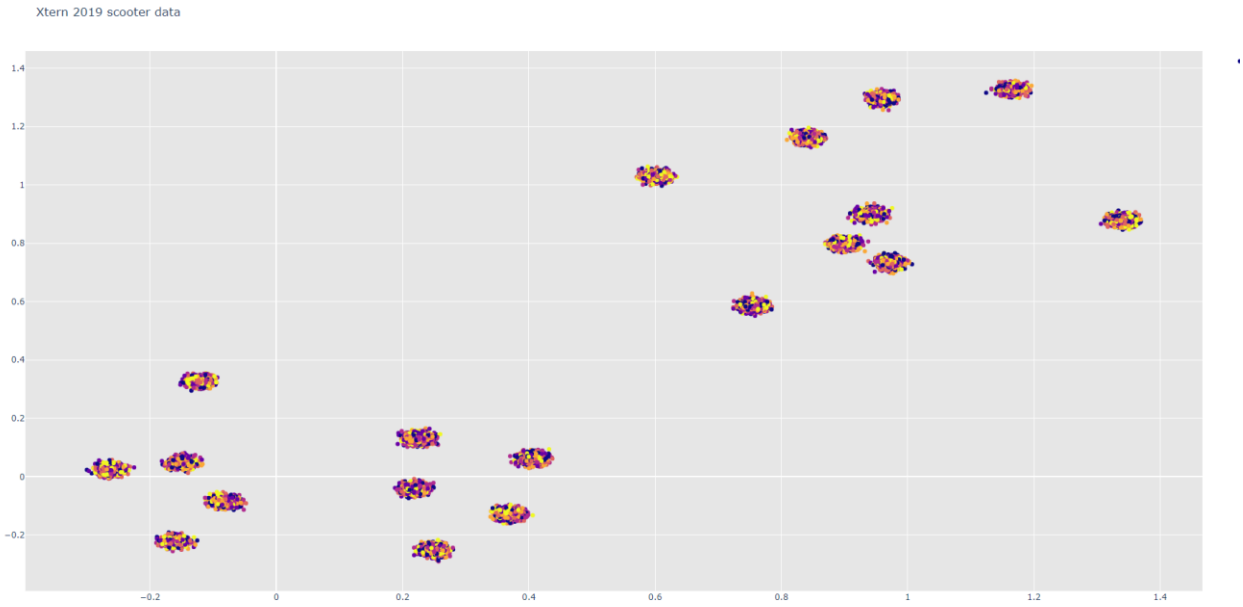
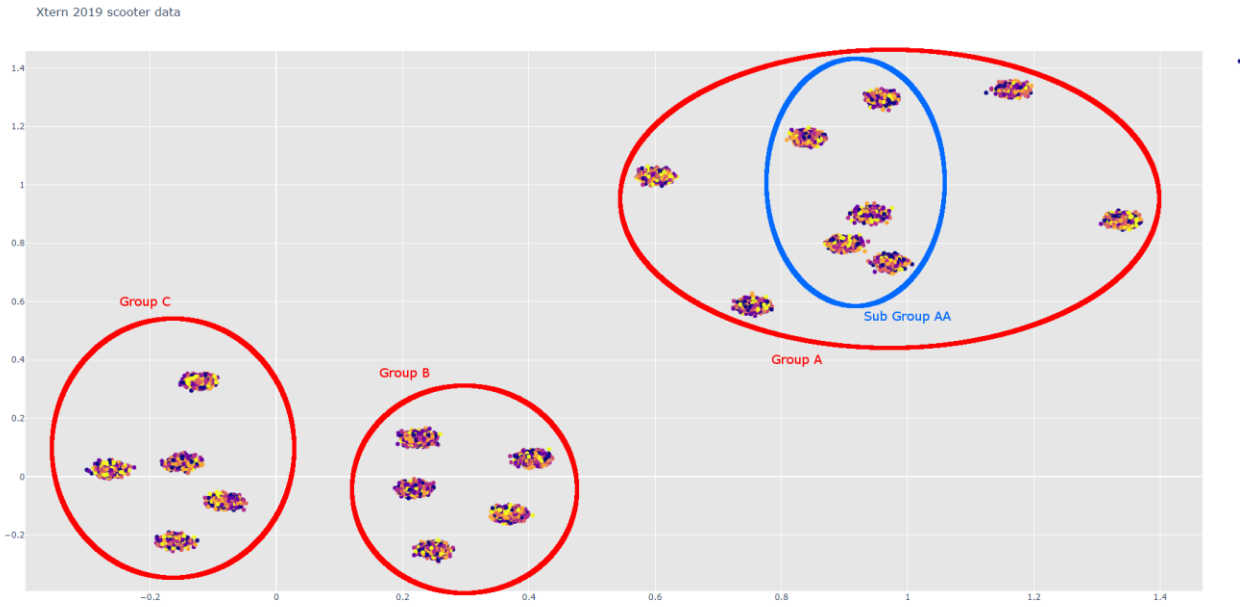
Plotly Graph of the CSV scooter data



From this data, we can see 19 clusters of scooters all with varying charge level (dark color = low batter, bright color = charged battery). From this, I identified three key groups and one sub group.



Group A:

Is the largest and least condensed of the groups and as such contains a **sub group AA**. The shape and size of group A proposes a problem for pick-up and charging of the scooters; although the subgroup AA falls right in the middle the other 4 clusters in group A form a four corners box around the data. This makes the clusters of scooters hard to chain together so I purpose splitting group A up to make the pickup of the scooters smoother. This group is also important because it is on the side that the bus will start on

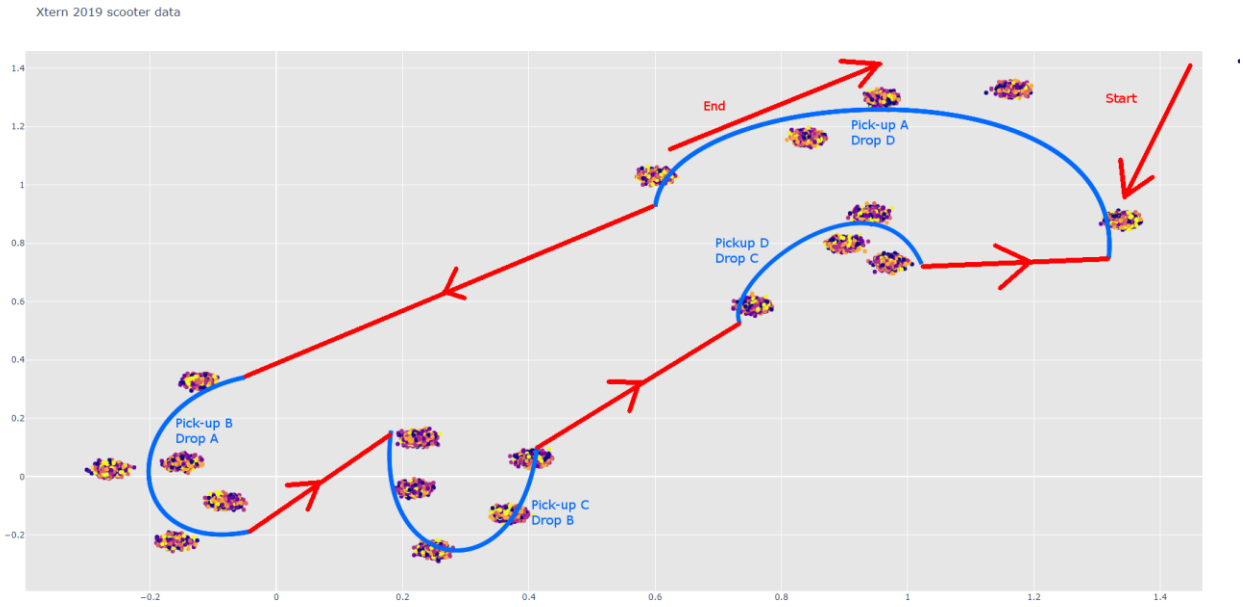
Group B:

Is the second closest to thebe the second group to and forms a U-shape making an easy route for the bus.

Group C:

Is the furthest away from the busses and as such, will be vital to keep pace and efficiency when here as to not run into problems far away from home

My Purposed Charging System



Assuming that the cluster of scooters are within a couple miles (0-1 would be something like 100 miles), with that in mid the two farthest apart clusters are at (-0.3, 0) and (1.4, 0.9) which would be about 260 miles apart depending on the roads and at 50mph that would take just over 5 (5.2) hours to do. With this in mind the most practical way I see to charge all groups of scooters would be to have four designated pick up groups (indicated by the blue lines). Each groups would have a team in them that would gather all scooters that have a charge of less than or equal to two. By grabbing only these scooters, we save room on our bus and still leave some scooters out for customers to use. Each team would be responsible for gather and then driving the scooters to the next location (driving is indicated by the red lines). Once at the next location they would unload most or all of the scooters that had charged during the drive. Then the next team would gather their scooters and do the same steps. This would lead to a total of 4 teams (teams A-D) each in charge of their own area with rotating scooter stock.

The pros to this system would be that you could specialize/work in one area, have a semi consistent schedule of work, and prevent neglect of scooters left in one place and ease of preforming regular maintenance with the rotating scooters. Some cons I could see are, increased in number of people needed, and transportation questions (how will they get back to their area after their shift if the give the bus to the next group; company car?)

Calculate operation time cost: If each cluster take 20min to collect

Collection time	19 * 20	= 6.33 hours
Drive time	1.5 + 0.6 + 0.8 + 0.6 = 350miles / 50mph	= 7 hours
Open & close procedures		= 0.66 hour
traffic and additional charge time		= 2-6 hours
	Total	= 16 – 20 hours