OPTIMIZING SAN DIEGO MTS

Improving MTS experience for low-income/high population San Diego communities

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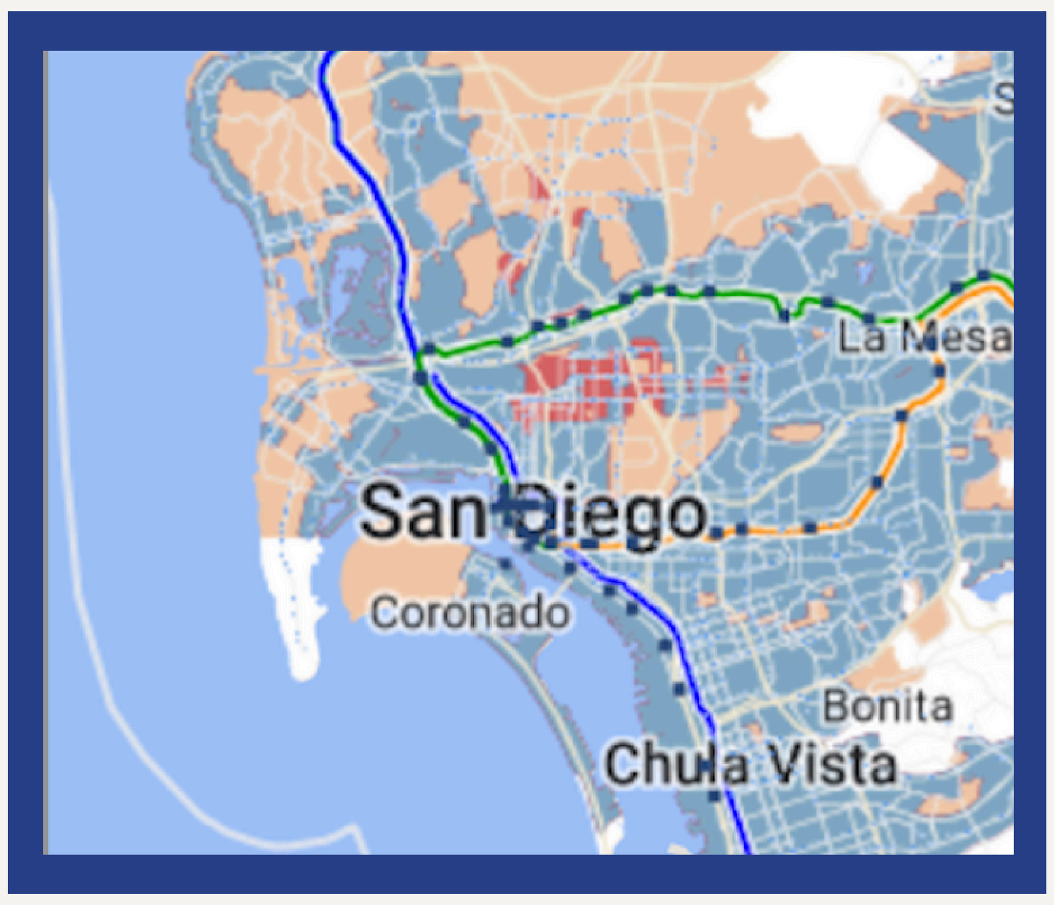
OBJECTIVE

San Diego is a city with a notoriously poor public transportation system. The online tool AllTransit deems the red area on this map, which encompasses University Heights and North Park, to be transit deficient. It happens to be a primarily low income area, which means the people who live here are not getting the service they need. Our goal was to find a way to provide this service.



OUR SOLUTION

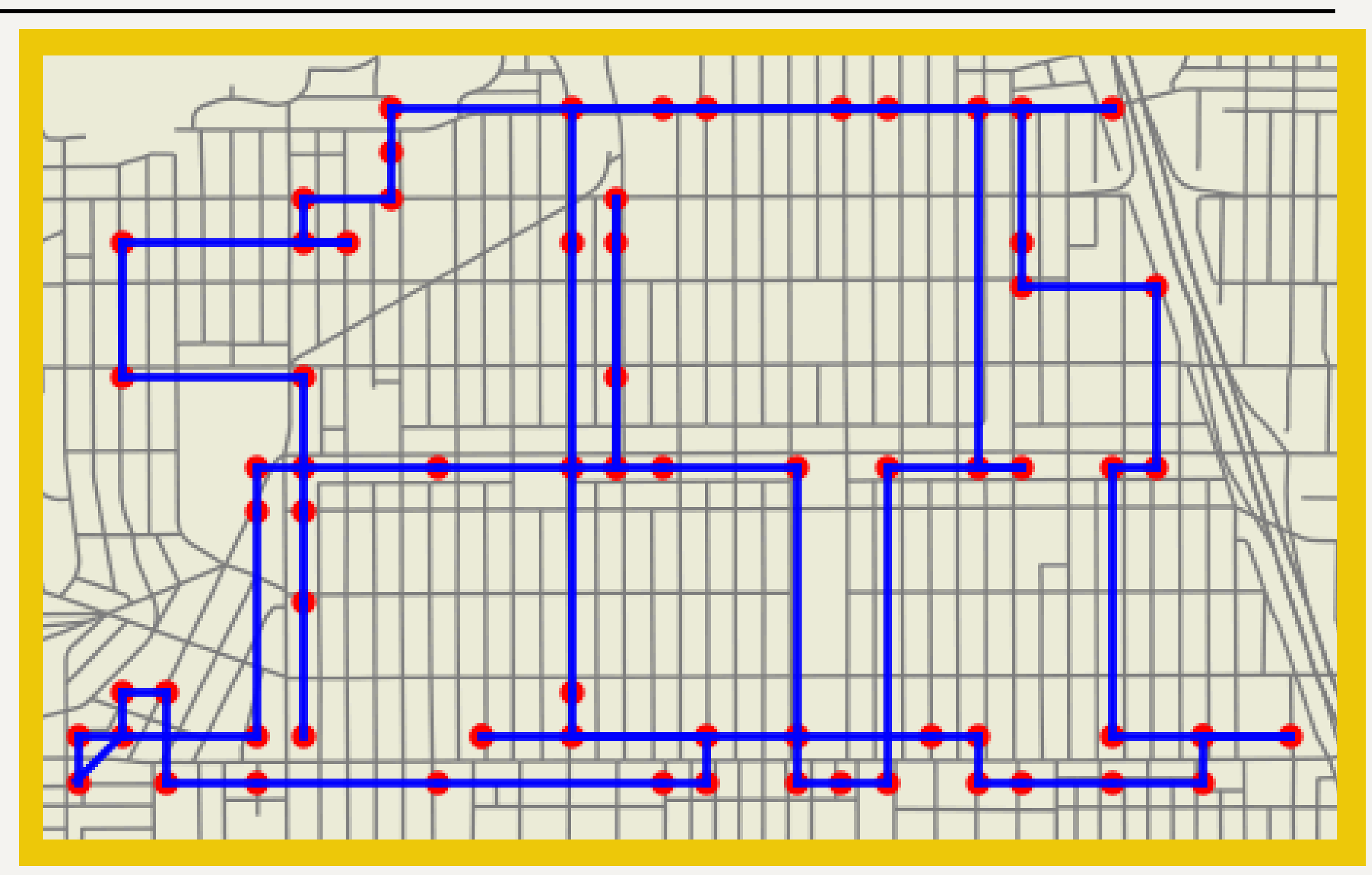
We redistributed some of the departures from all of the bus stops in this area to the bus stops that lie in low income and/or high population block groups. AllTransit recommends an extra 9 departures per hour for every stop in this area, so we also determined the most efficient new route that could be added to supply these extra departures

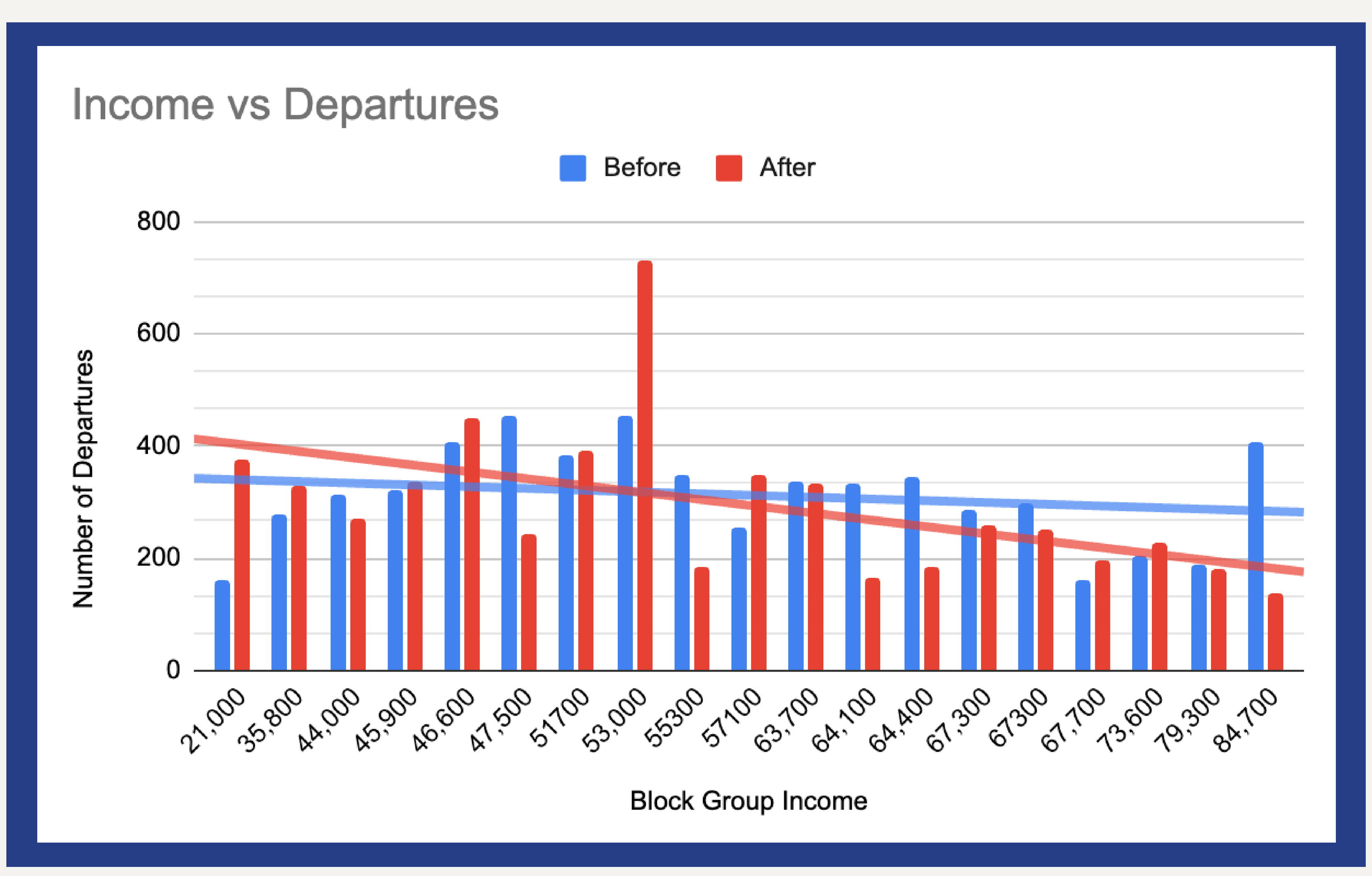
METHODOLOGY

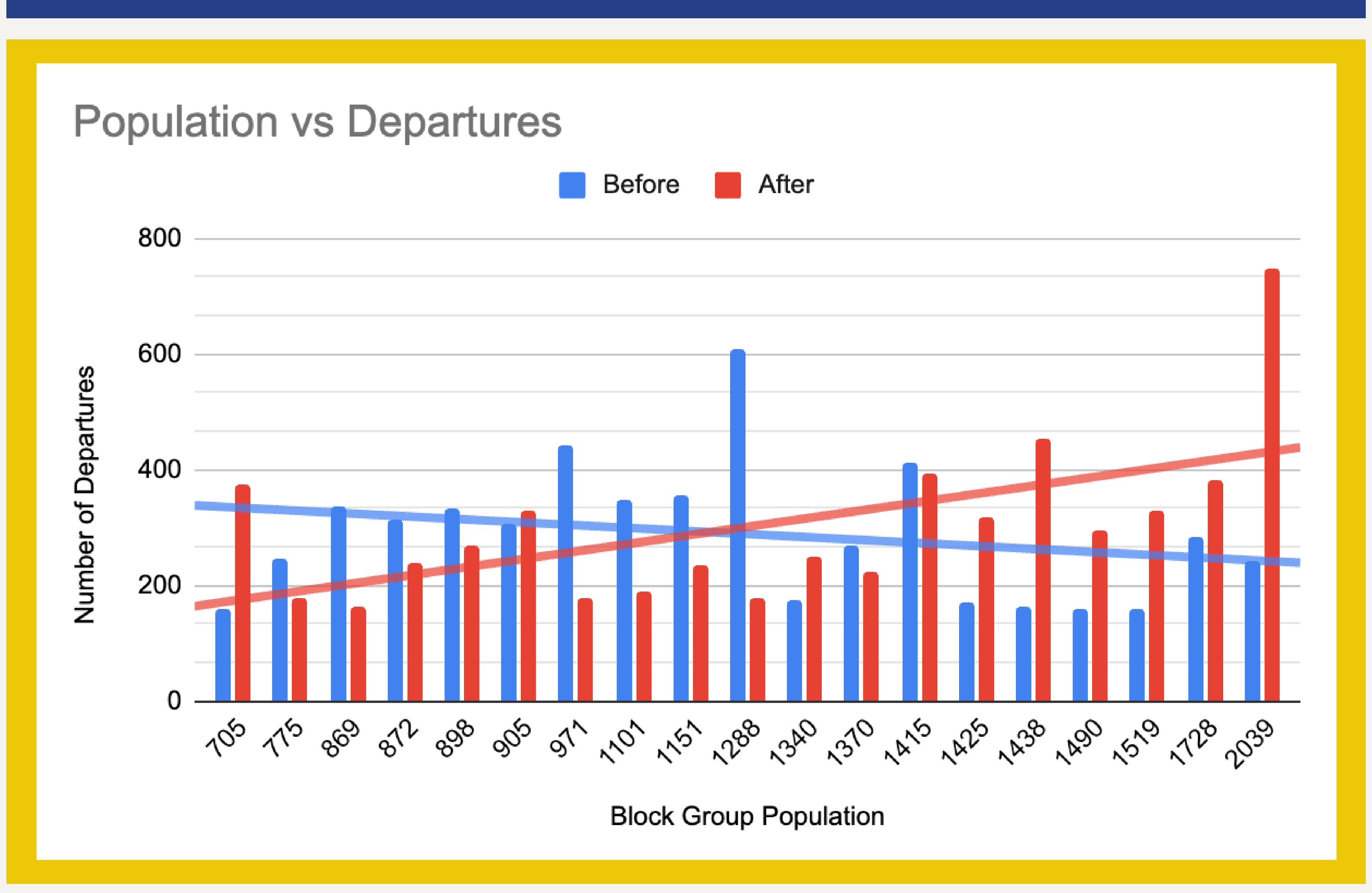
- All of the stops lie within a block group, and we used the median income and population of each block group to assign an importance factor to each block group.
- We divided the block group importance among all of the stops within the group.
- This importance determines the share of total departures each stop gets.
- We then used Simulated Annealing algorithm to determine an optimal rouse using manhattan distances.

RESULTS

Our algorithm was successfully able to redistribute the departures in order to increase the amount of departures in areas that are low income and highly populated. In the Income vs Departures graph, when comparing the before and after trendlines, we are able to see a direct shift in the distribution of the departures from high income to low income areas. Likewise in the Population vs Departures graph, the trendline shows that the distribution of departures has changed to favoring the more highly populated areas.







THE OPTIMAL ROUTE

The blue line represents a simulated annealing solution for an optimal bus route for all of the stops. While this is an approximation and does not exactly match the physical streets, it can still be useful in deducing which streets would be the best to build this new route on. Note that our method of using manhattan distances between stops introduced an artifact that we call "phatom stops", which is where buses would turn.

CONCLUSION

Public transportation in America is often lackluster compared to its other first-world counterparts. Car dependent communities specifically put low income people at a disadvantage, which is why access to public transit is so important. Modern transit systems should therefore prioritize such low income communities until transit infrastructure has grown enough to bring full service to everyone. Our solution aims to give as much access to the lower income communities of University Heights and North Park as possible, while still maintaining service for the higher population areas. In addition, adding extra departures to all stops would improve transit for everyone, and using a route such as ours would be the most efficient way to do so.