

# Routing Vehicles for the MBTA's RIDE

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Massachusetts Bay  
Transportation Authority



## INTRODUCTION

- The RIDE is MBTA's transportation service for mobility-impaired people
- This service is mandated by the federal government as part of ADA guidelines
- It serves 55k people / year
  - 5000 - 6000 rides on a weekday,
  - 2500 rides on a weekend
  - 20% are in a wheelchair

The RIDE's operational costs exceed **\$100 million** annually



## PROJECT GOALS



Assess their historical efficiency and the capabilities of their current software



Provide a systematic way to group similar rides together



Provide an algorithmic way to assign trips to non-dedicated service providers

## METHODOLGY

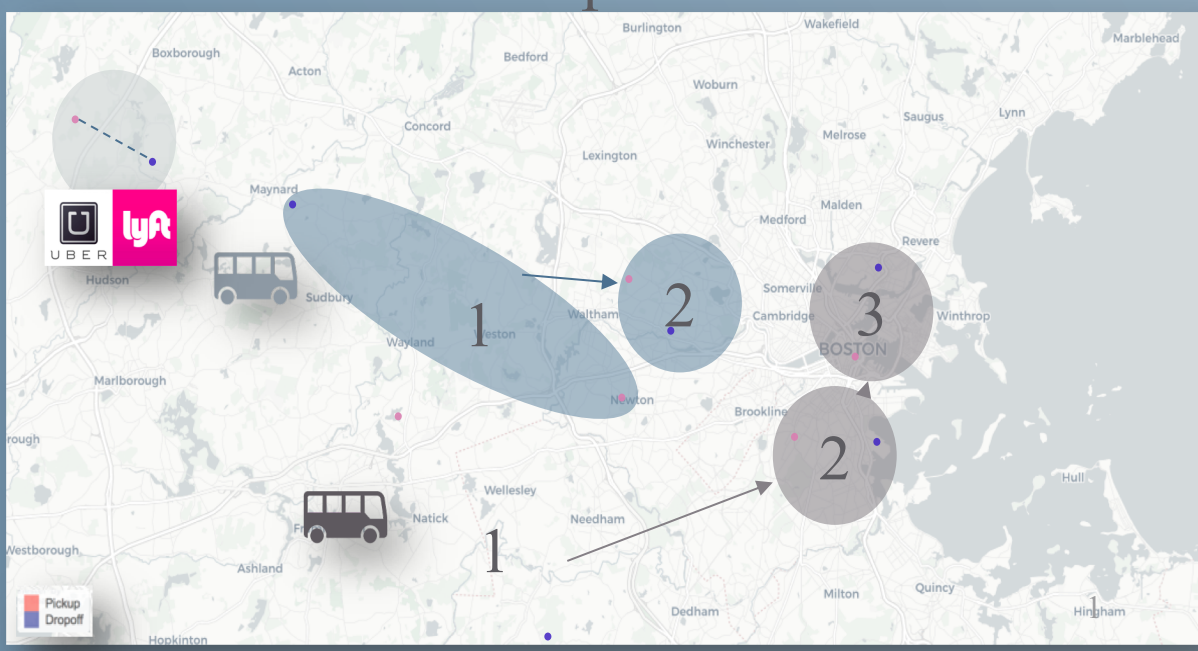
INPUT RIDE REQUESTS

FORM "MINI-CLUSTERS"

REMOVE UBER/LYFT RIDES

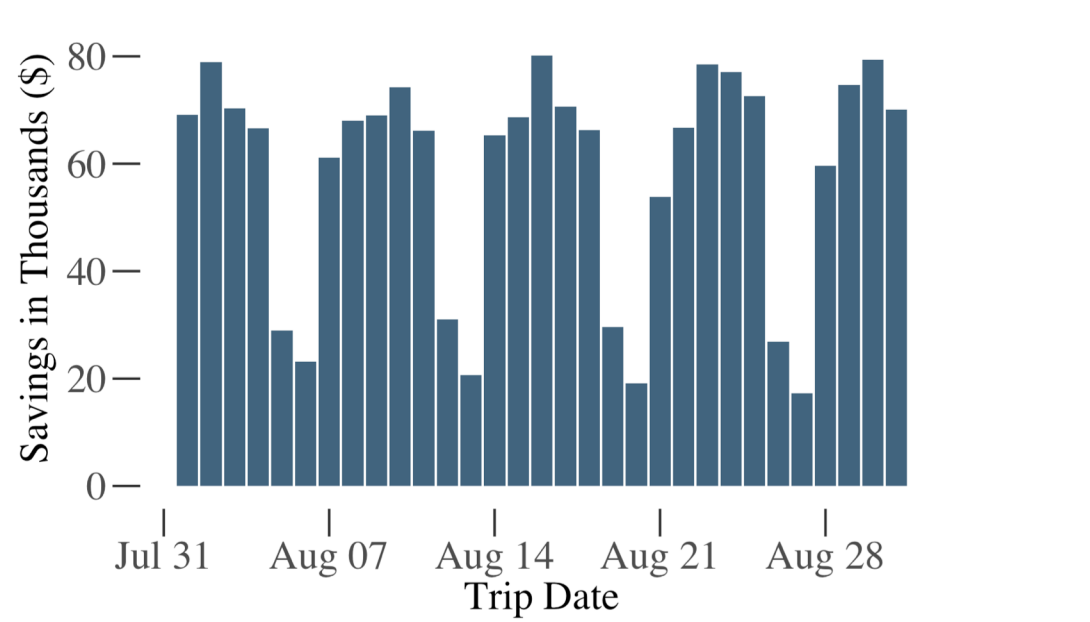
SCHEDULE AMONG CLUSTERS

OUTPUT DRIVER ROUTES

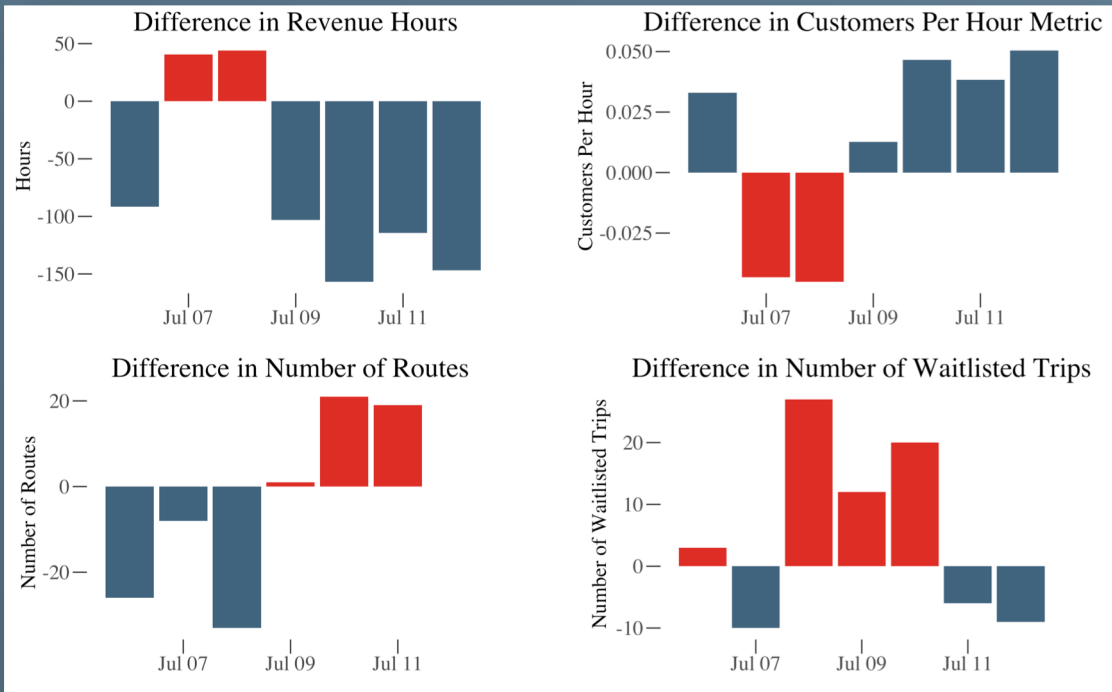


## RESULTS

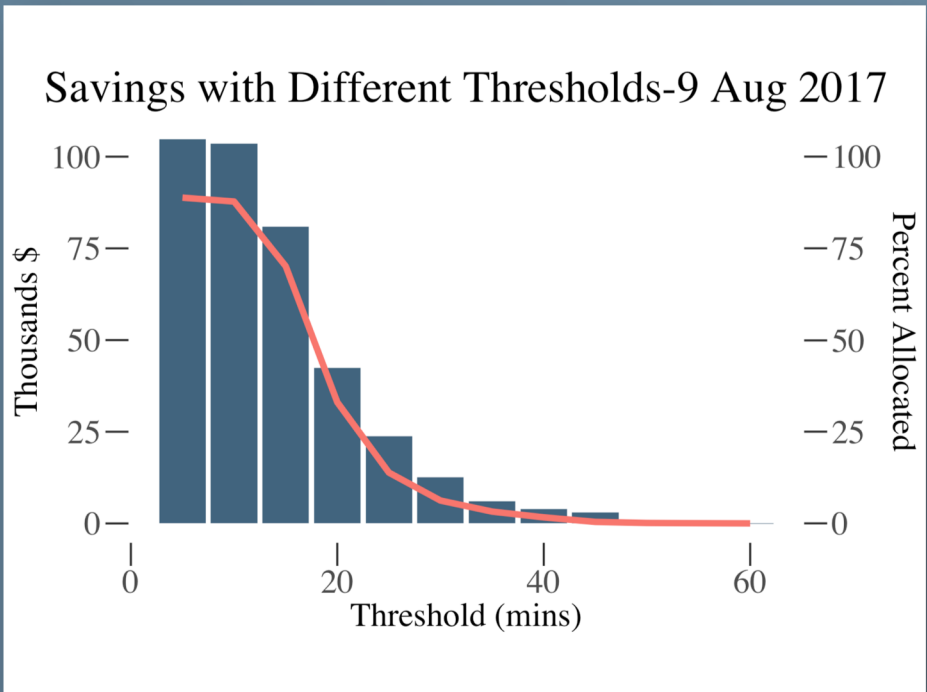
Estimated Savings August 2017 - \$1.5 - 2 million



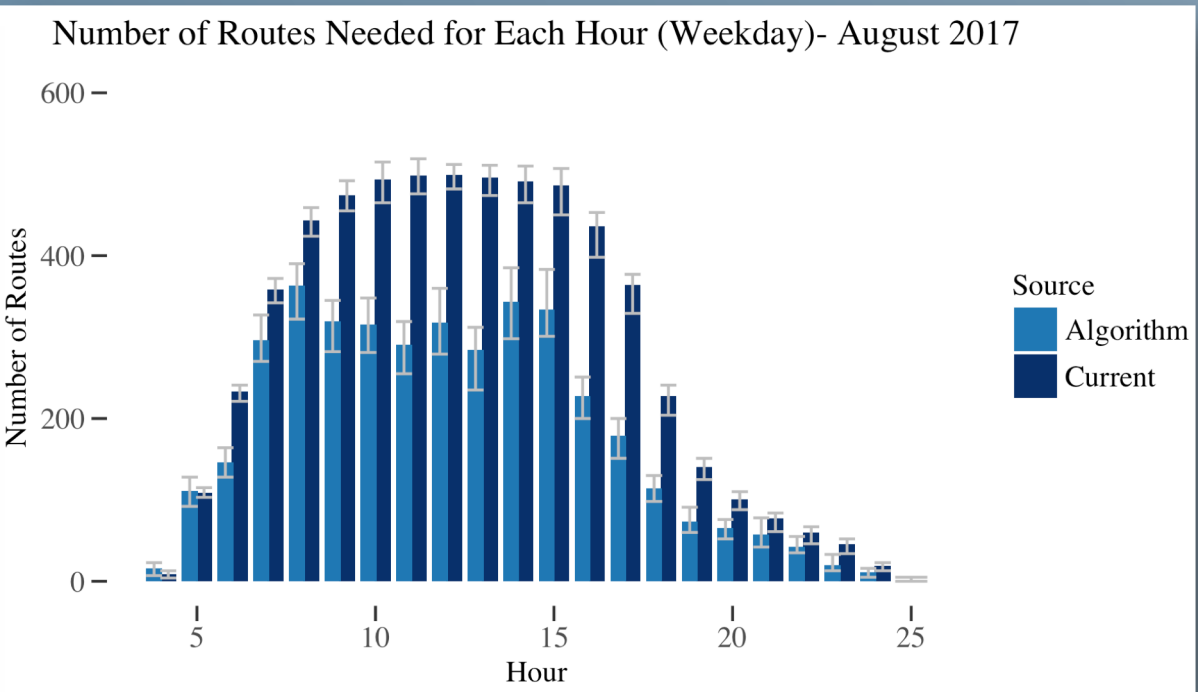
This figure shows the estimated daily total cost savings using our greedy algo rithm. Savings were lower on weekends as since there were fewer trips



Blue bars show results where our algorithm outperformed Adept, red bars the contrary. Generally, the difference between the two algorithms is not significant



The savings by allocating trips to TNCs are shown in bars, and the percentage of allocated trips is shown in red.



There is a large gap between the number of required cars and the number of available cars between 9 AM and 6 PM. Potential issues occur early in the morning at 4 and 5 AM, as well as after 9 PM

## NEXT STEPS

- Continue with legal steps to introduce Non-Dedicated Service Provider allocation. Begin at a small scale to work out technology and user satisfaction and then expand.
- Reduce the number of routes
- Integrate our algorithm in daily operations
- Investigate potential root cause of inefficient routing

## CONCLUSION

The MBTA's RIDE service is a costly operation for the department, and the goal was to identify areas to reduce costs. There is significant savings to be had by allocating trips to non-dedicated service providers, at a higher cost savings than efficiently routing, so we strongly urge the MBTA to work towards this change as its first priority. Additionally, we showed that inefficient routing has led to excessive costs and if the MBTA was to improve this routing, they could save more than 15 million a year.



Left-to-right: Sarah Eade, Céline Guo, Diogo Lousa (MBTA sponsor), Prof Dimitris Bertsimas (advisor), Julia Yan (mentor)

