

The Rural School Vehicle Routing Problem



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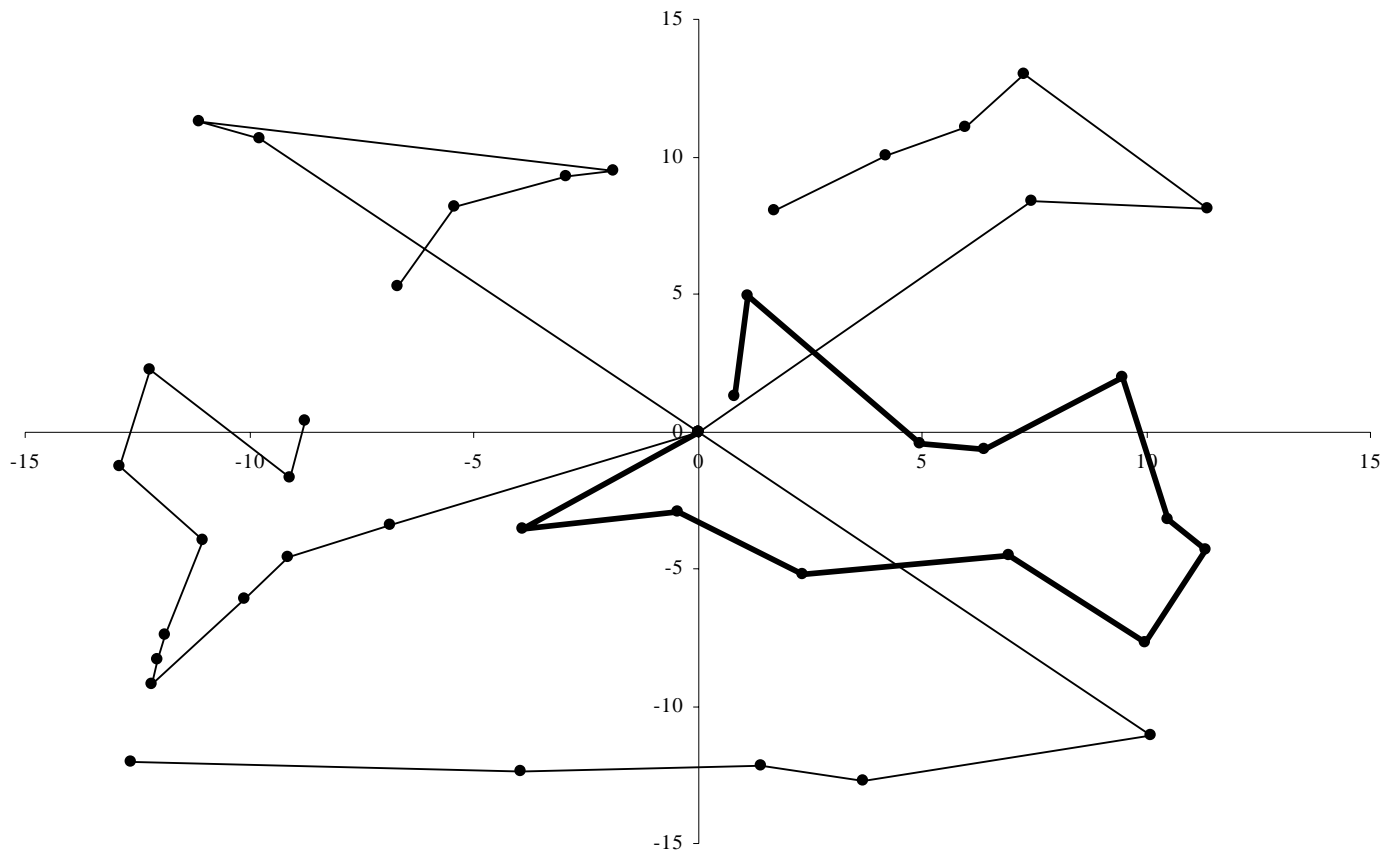


Motivation

- Rural and Small School Districts
 - Large geographic area
 - Don't reach vehicle capacity before reaching time constraint
 - Small student population
 - May not be best to have homogeneous fleet of large vehicles
- Traditional Methods
 - Minimize cost
 - May produce nonsensical results in rural school districts

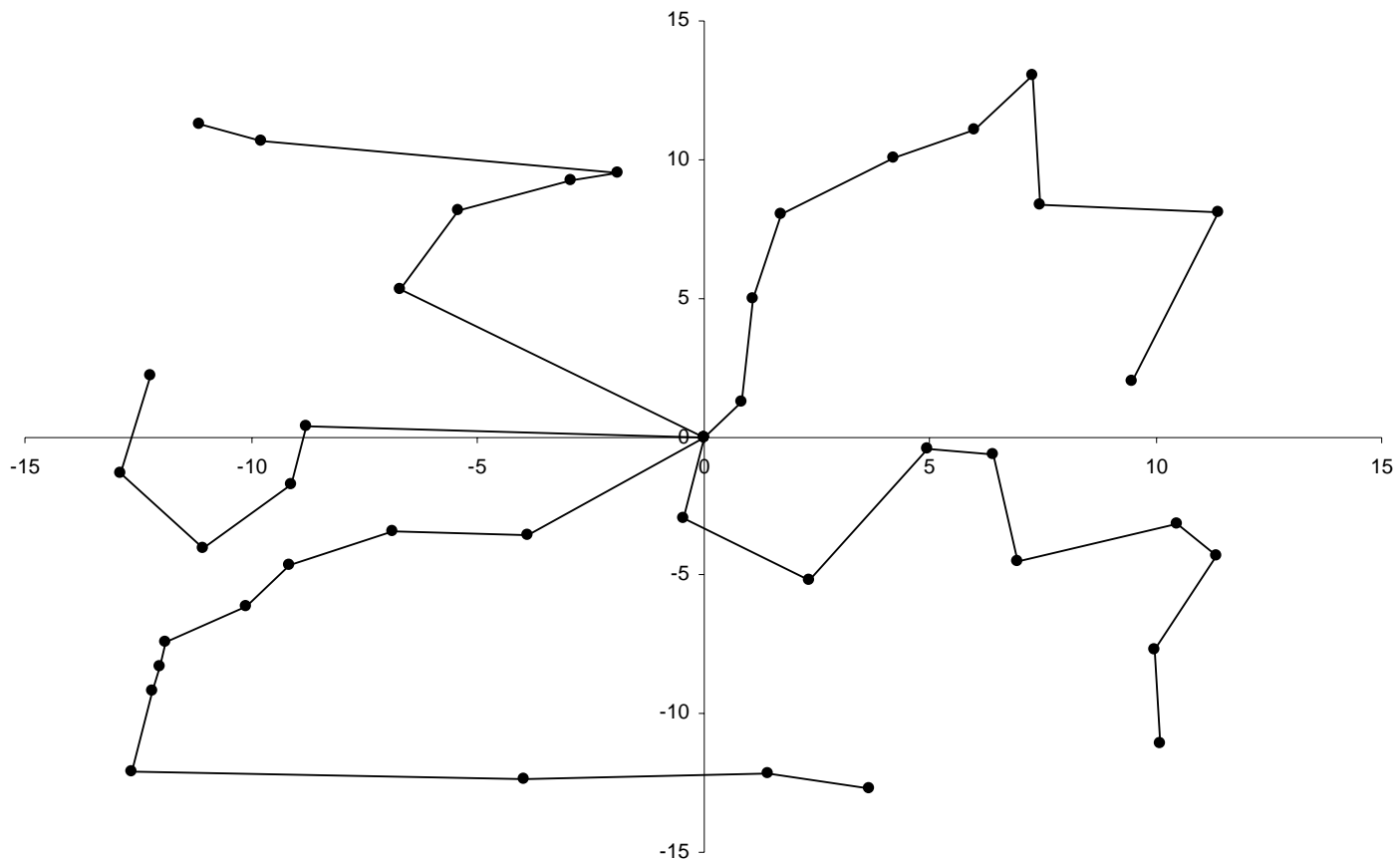


Traditional Routing Simulation





Rural Routing Simulation



Tradeoff between Cost and Service

	Fleet	Cost	Travel Time	Time on Bus	Time Constraint
Traditional	4 large, 1 small	93,796	610	1,131	60
Method	4 large, 1 small	87,290	578	1,325	75
New Method	3 large, 2 small	94,387	624	983	(60)

Relationship with Safety

- Students will be on board for shorter period of time and for shorter distances
- Safer **IF** assumptions are met
 - Positive relationship between probability of event and duration of trip
 - Relative uniformity of risk across district
- Alternative model using linear programming could focus solely on maximizing ‘safety’



Transporting Individuals with Special Needs

- Segregate students
- Simultaneously route heterogeneous vehicles by allowing commingling
 - Must account for equipment presence and use



Summary

- The new method provides an alternative to traditional ones which may produce illogical results
- Focus is on time or distance students are in transit
- Readily allows for accounting for specially outfitted vehicles



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