EC601 Project One, Review of Literature: Optimizations for Public Transport via Light Rail as Developed in the MBTA Green Line

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I. INTRODUCTION

DESPITE public transport by rail offering the clearly greener transportation option, car usage in Boston remains dominant. Assuming the national average of 1.5 passengers per car holds, Boston sees roughly 804,000 people travel by car versus only 276,000 by the MBTA subway system every day [1].

From personal experience as a Boston resident and frequent passenger, the MBTA undoubtedly has room for betterment, and by improving the general public transport infrastructure to be the more desirable option than cars, not only would residents enjoy cheaper and more effective transportation, but so too would the climate benefit from the reduction in the emission of harmful pollutants and greenhouse gasses.

Although the expansion and implementation of longer, denser, more interconnected rail lines is imperative, such projects are expensive and a long time in the making, often requiring years of wading through red tape. Scheduling and route optimizations, however, offer simple, low-cost-to-implement solutions that could help make the MBTA more attractive and effective.

For this project, I will be looking into specific scheduling and routing optimizations that could be made to improve the Green Line, the third most used light rail system in the United States [2]. It's complicated, multibranched network populated by 201 modern streetcars offers a diverse playground to virtually experiment with possible scheduling and routing optimizations [3].

II. CURRENT STATE OF RESEARCH

Currently, most of the research on public transportation optimization are more focused on improvements to the more flexible bus system. However, both busses and rail (including heavy and light rail) all follow the same approach to general planning.

A. Planning Steps: Service Requirements, Timetable Development, Vehicle Scheduling, & Crew Scheduling

Explain the current process for planning layouts, routes, lines, and timetables / schedules [4].

B. Genetic Algorithms

Summarize genetic algorithm for busses paper [5].

C. Eigenmodel for Iterative Planning

Summarize multi-pronged/objective paper [6].

D. Balancing Flexibility & Readibility

Summarize electronic travel guide paper [7].

D. Light Rail Scheduling Standard

Summarize the book chapter on light rail [8].

III. PROPOSED NEXT STEPS

Express lines with parallel schedules idea proposal: need more information on specific customer routes.

A. Express Lines via In-Line Tracks

Idea on how to stack trains for fewer stops and faster service.

B. Algorithmic Feasibility & Human Readability

Algorithms should be numbered and include a short title. They are set off from the text with rules above and below the title and after the last line.

IV. CHAT GPT ANALYSIS

Describe the prompt given and overall form of the result.

A. Section

Stuff.

B. Section

Stuff.

C. Section

Stuff.

D. Section

Stuff.

E. Section

Stuff.

V. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the article, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

REFERENCES

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[2] https://www.apta.com/wp-content/uploads/2022-Q4-Ridership-APTA.pdf
[3] http://roster.transithistory.org/
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