ASSESSMENT METHODOLOGIES
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RELIABILITY METRICS FOR THE EVALUATION OF THE SCHEDULE PLAN IN PUBLIC TRANSPORTATION

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Abstract

Nowadays, the major Public Transportation Companies around the world use intelligent transportation systems based on automated data collection frameworks. The existence of these data has driven to the development of new approaches to the operational planning of public transportation. These approaches, commonly known as ADC-based operational planning strategies (ADC from Automated Data Collection), to improve public transportation reliability consist of adjusting the definitions made on the initial steps of the operational planning process by using real-world data. This type of changes concentrates mainly on restructuring routes and adjusting the existing schedule plan (SP). However, the usefulness of such tunings from a company point-of-view is often of difficult evaluation.

This paper starts by presenting a brief review on improving the network definition based on historical location-based data. Then, it presents a broad review on ADC-based evaluation techniques of the schedule plan reliability, discussing the existing metrics.

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The purpose of this paper is to critically describe the performance indicators used in the evaluation of the SP reliability, following the aforementioned bibliographic reviews. They will be certainly useful to shape the approaches developed by the research community for improving the quality of public road transportation operations based on data collected by ADC systems.

This paper focuses on two different, yet highly related, approaches: 1) changing the network definition; 2) evaluating and adjusting the SP in place. The automatic control strategies and the different actions to improve the SP remain out of the scope of this paper.

**Keywords:** Automated Data Collection (ADC); Operational Planning (OP); Public Transportation (PT); Network Design; Schedule Plan (SP); Reliability Metrics.

1. Introduction

In the last three decades, following a growing demand for fast transportation services in urban areas and clear advances both in real-time communications and in vehicle location technologies, public road transport companies have made important investments in information systems mostly dedicated to their operations (Furth et al., 2003; Barabino et al., 2013; Mazloumi et al., 2010; Hounsell et al., 2012). Automatic Vehicle Location (AVL), Automatic Passenger Counting (APC), Automatic Fare Collection (AFC), and multimodal traveler information systems are just some examples of this kind of answer from the operators to a major concern of reliability and service quality level from passengers. As a consequence of this effort in Advanced Public Transportation Systems, these companies have been able to collect massive data, indeed real continuous flows of data (Furth et al., 2003).

The existence of these new data has driven to the development of new approaches for planning the operations of public transport companies, and many researchers have highlighted their potential to offer insights on new ways to evaluate and improve service reliability by means of both operational planning (OP) and control (Strathman et al., 1999; Strathman, 2002; Strathman et al., 2003). Some of these approaches imply changes in