An analysis of SEPTA Regional Rail On-Time Performance

Presented by Will Entriken
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Executive Overview

Publicly available On-Time Performance data was collected from SEPTA and analyzed over the past three years. A real-time reporting tool was created and recent data illustrates trains on particular lines with consistently poor On-Time Performance. In the interest of achieving SEPTA's goal of 90% OTP, a methodology is given and a specific proposal is presented to modify rail timetables.

Introduction

An online, realtime reporting tool was created which collects publicly available schedule and On-Time Performance data for all SEPTA trains on all lines. This tool has been run continuously since late 2008 and thus contains data for all SEPTA's rail service each minute over the past three years.

Some statistical definitions and methods are shown. Following that is a description of output reports, and results and conclusions.

Definitions

On-Time Performance (OTP) is defined as the percentage of trains on a line which are less than or equal to 5:59 late in reaching their destination. Trains are said to be traveling inbound until they reach Suburban Station, then they are traveling outbound to a different destination. Inbound trains' destination are Suburban Station, for OTP purposes.

Lateness is defined as the delay experienced by passengers for a given stop. This can be expressed as an average lateness, or can be express as a standard deviation.

Percentiles are a metric of Lateness. The 50% percentile is the median. To say that "the 25th percentile lateness is 5 minutes" is to say 25% of trains are over 5 minutes late, 75% of trains are 5 minutes late or less.

Method

Train lateness data is collected from the SEPTA Regional Rail website. Also, schedules are collected from the Regional Rail website. These data and schedules are automatically interpreted by the reporting tool. Several sets of statistics are output by the tool, and some of these are attached to this report. Drill-down is available to identify specific train performance and this shown.

Average Lateness

Average lateness is shown for each stop of each train on a given line. This table is color coded for clarity.

Recommended Schedule

A recommended schedule is presented. This is generated by taking the existing schedule and delaying some stops. Stops are recommended to be delayed when a train is late at that stop on time for a vast majority of the days. Specifically, each recommended time is set to the 10th percentile of the time the train actually arrives at that stop. In other words, any recommended schedule change

may cause a train to delay one or two times a month. But for all other days, the actual train departure time would more closely match the scheduled time. This 10th percentile was chosen to have a minimal risk of negative effectives on OTP.

Each recommended change could be accepted or rejected independently and still have the desired effect.

Results

Outputs from the program for inbound trains are included at the end of this report:

- An overview of available reports
- Average lateness for all stops on all lines
- Recommended schedule changes for all lines
- Drill-down report for Paoli line train #582

These reports show where attention could be spent to improve On-Time Performance. One specific example is Paoli train #582. The Paoli line is fairly good for OTP (for inbound service), except for one train. The 582 train is usually 3 minutes late at its first stop, Malvern, and then remains consistently 3 minutes late the remainder of its trip to Suburban Station. There is an opportunity to modify the timetable and delay the schedule slightly so that the scheduled time more accurately matches the actual train arrival time. This example is highly visible given the data, and may other potential wins are illustrated in the attached exhibits.

Conclusions

The official OTP for fiscal September 2011 was 80%. By analyzing the variance of OTP on a per-train basis, we see the baseline of train lateness and can identify trains which contribute most to OTP degradation. In other words, some service delays are caused by weather, acts of God, etc. and are uncontrollable; other delays are controllable and can be managed through attention to scheduling. The previous report (see *An analysis of SEPTA Regional Rail On-Time Performance, 2009*) estimates that this breakdown is approximately 60%/40%, respectively, for SEPTA's rail.