



Milton Road Traffic Study

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Introduction

This study provides a detailed analysis of morning *inbound* journey times into Cambridge along Milton Road during 2019, with a comparison of bus journey times (using recorded bus position data) and general traffic movements (using signals generated by two Bluetooth device sensors positioned at each end of the route analysed).

Specifically this study looks at the in-bound traffic during the morning peak (07:30 to 09:30 Monday to Friday) between the junction with the A14 and the junction with Arbury Road and Union Lane. It is based on measurements between November 2018 and October 2019. Annotated map images showing the effectived segments of data collection are provided later in this report.

Accuracy and interpretation of the data

Journey times vary widely and are difficult to summarise, so conclusions from this analysis needed to be carefully considered and ideally should be supported by additional insights from alternative sources. However the persistent data collection within the SmartCambridge programme has allows this analysis to use data from over 3000 separate journeys along the selected route which provides

The majority of the attached graphs use a 'box and whisker' representation in which the green line is the median (or 50th percentile), the box represents the range from the 25th to the 75th percentile (50% of all readings), and the whiskers the range from the 5th to the 95th percentile (90% of all readings). The black circles show the remaining 10% of readings.

The software used to compile this report has been made Open Sourced and is publicly available on GitHub (https://github.com/SmartCambridge/milton_road_study).

This report was prepared by J. Warbrick and Dr. I. J. Lewis at the University of Cambridge, Department of Computer Science and Technology, 19th December 2019.

Data & Terminology

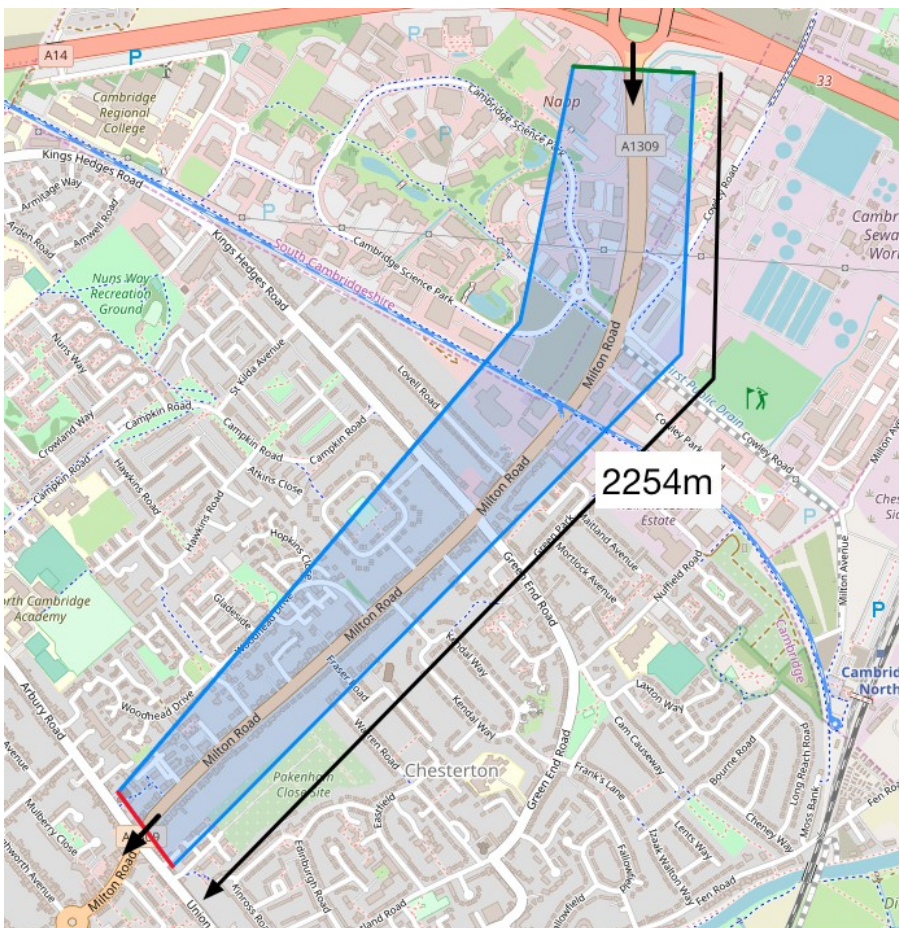
Data for this study comes from two sources:

1. Bus journey times, derived from bus position data
2. General traffic journey times, derived from Bluetooth sensors

Data source 1: bus journey times

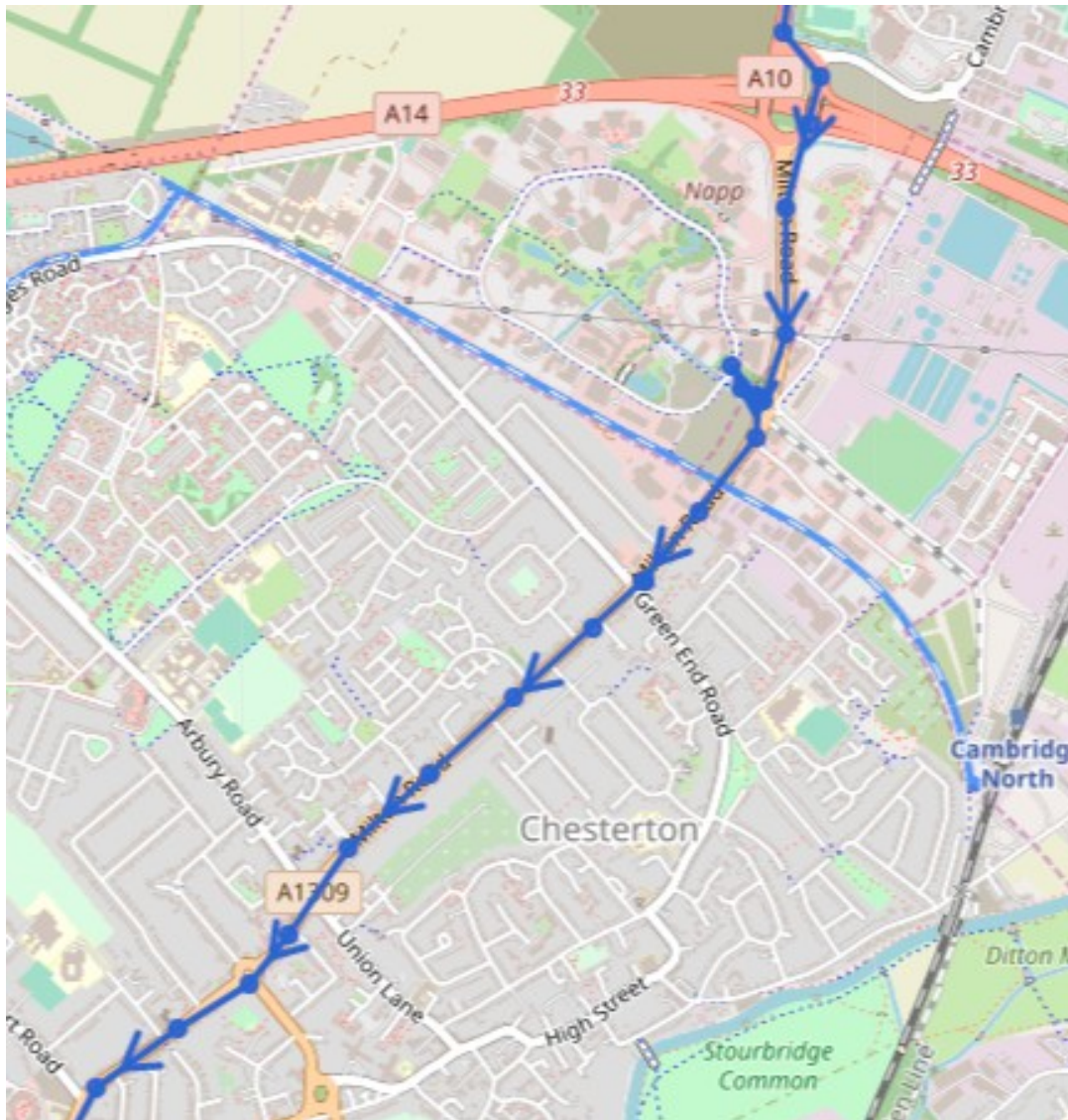
Bus journey times are from the SmartCambridge Intelligent City Platform (<https://smartcambridge.org/>) which extracts bus journey times from real-time bus position information to measure traffic speeds in Cambridge. Journey times are extracted for buses travelling through virtual 'Zones' enclosing sections of road. For this study a custom zone 'milton_road_alternate_in' was defined for the section of Milton Road between its junction with the A14 and its junction with Arbury Road and Union Lane and individual journey times were extracted for it from approximately a billion bus position datapoints from the twelve months to Nov 2019.

The mean distance travelled by buses in this zone was 2254 meters.



Bus journey times were aggregated to give median journey times for 15 minute periods from 07:30 to 09:30. This yielded 1833 samples with at least one journey out of a theoretical maximum of about 2080 (52 weeks, 5 days per week, 8 samples per day), containing a median of 2 journeys each with a range of 1 to 5. The Milton Road Park & Ride service is the only one travelling through this zone from start to end. While other buses use this section of Milton Road they don't travel along its entire length.

The inbound Park and Ride service turns off Milton Road briefly to service a stop at the Science Park until 09:15 which adds between one and two minutes to the journey time in normal conditions. The time taken for this diversion is included in the data analysed here:



Data source 2: General traffic journey Times

Journey times for general traffic are from a real time data platform provided to the County Council by [Drakewell Ltd](#). This uses detection of BlueTooth devices (mainly mobile phones) to measure journey times between monitoring stations. There are about 40 such stations at major junctions in Cambridge. This study used data on traffic flow between stations at the A14 ('A'), at the junction with Kings Hedges Road ('B') and at the junction with Milton Road and Union Lane ('C'):



This study used archive data provided by Drakewell that gives median journey times and a count of observed journeys for 15 minute intervals on links between pairs of stations. For the purposes of this study the journey times on the two links (A to B, B to C) were added to give journey times covering a total distance of 2186 meters. Samples with less than 10 journeys on either link were omitted, leaving a total of 1776 samples out of the theoretical maximum of about 2080, containing a median of 42 observed journeys with a range of 20 to 94. By comparison, data from an intelligent traffic sensor located on Milton Road just past the Arbury Road/Union Lane junction records a median of 137 motor vehicles passing it during the same time intervals (inter-quartile range 126 to 146).

The Drakewell data is sensitive to various configuration parameters which are changed from time to time. Overall the samples contain a median of 42 samples each (inter-quartile range 33 to 50), but there was a noticeable drop in sample size in July 2019, from a median of about 45 to about 30, probably as a result of the 'outlier sensitivity removal' parameter being increased to its maximum value. This does not appear to have had any effect on the overall journey times reported.

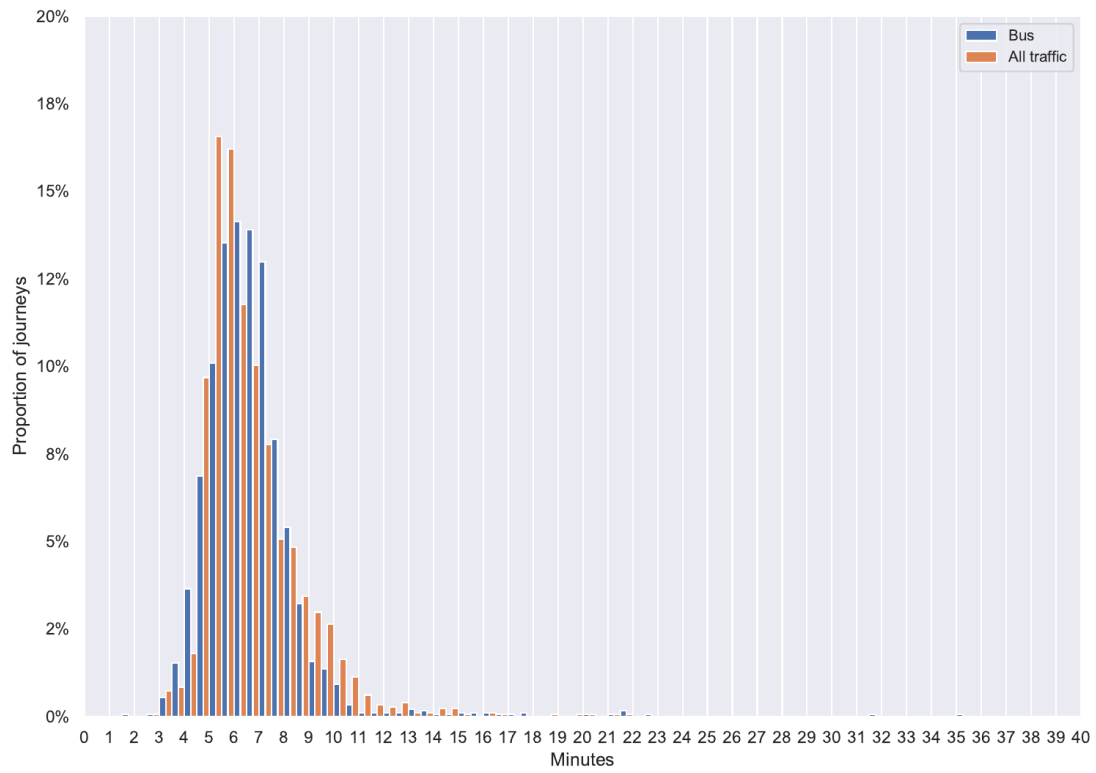
Observations and conclusions

1. Within this sample, buses are typically about 20 seconds (5%) slower than the general traffic (median bus journey time 388 seconds compared to 368 seconds for general traffic). Buses have access to a bus lane for about a third of the route (between the junction with Fraser Road and the junction with Arbury Road and Union Lane) which should give them an advantage over general traffic, but this may be balanced by calling at the Science Park.
2. Times for bus journeys are slightly more consistent than for general traffic journeys (with an inter-quartile range of 88 seconds, compared to 128 seconds for general traffic). General traffic journey times also have a larger 'tail' of longer journeys.
3. Bus times are noticeably slower between 07:30 and 08:15 and noticeably faster between 09:15 and 09:30 (probably because they are no longer diverting to the Science Park stop). General traffic journey times are fairly consistent over the entire period.
4. All journey times vary slightly Monday to Friday with quicker journeys on Mondays and Fridays and slower ones on Wednesdays. This matches trends observed elsewhere in traffic volumes and car park usage.
5. All journey times vary a little month to month. Lower times in April and August probably correspond to school holidays.

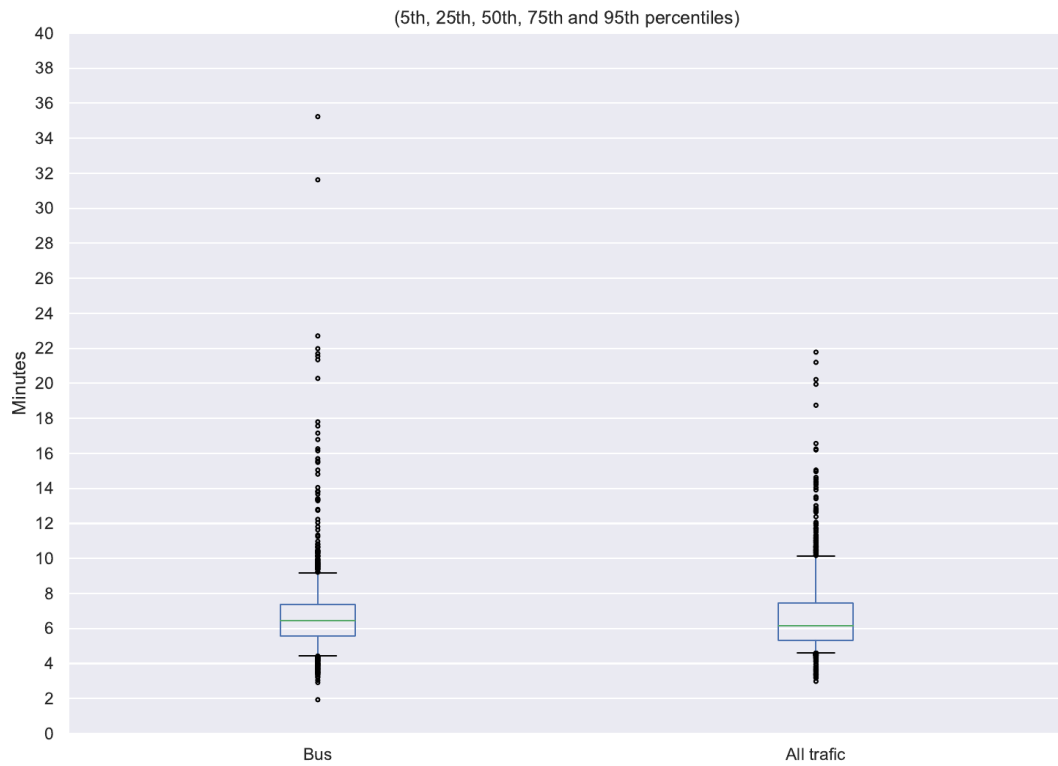
Graphs

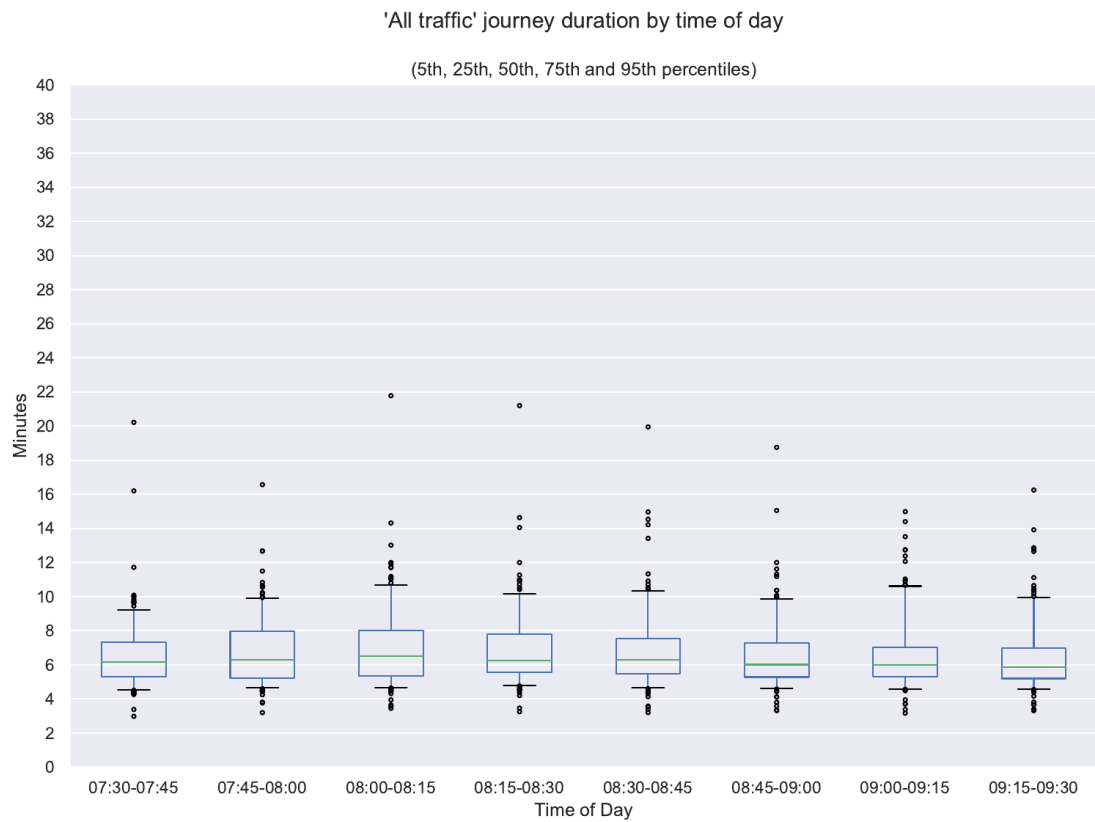
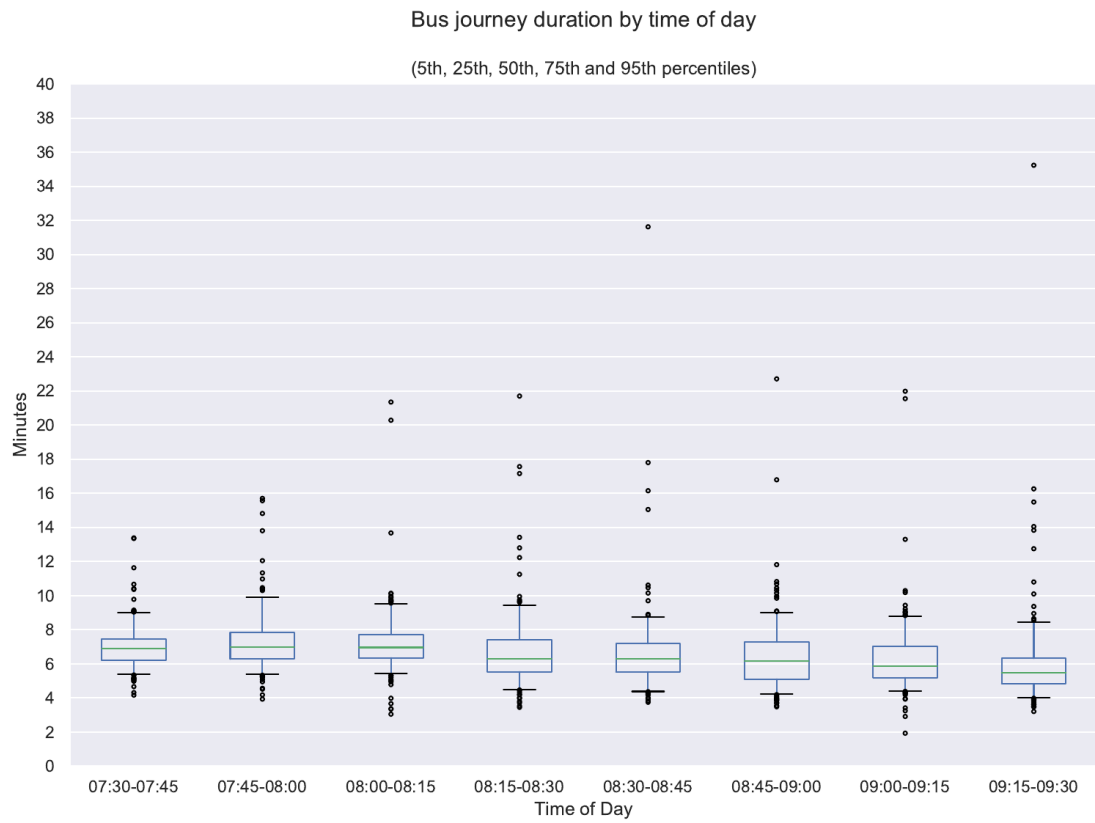
All of these graphs come in pairs, with each pair showing bus data first and general traffic data second.

All journey duration distribution



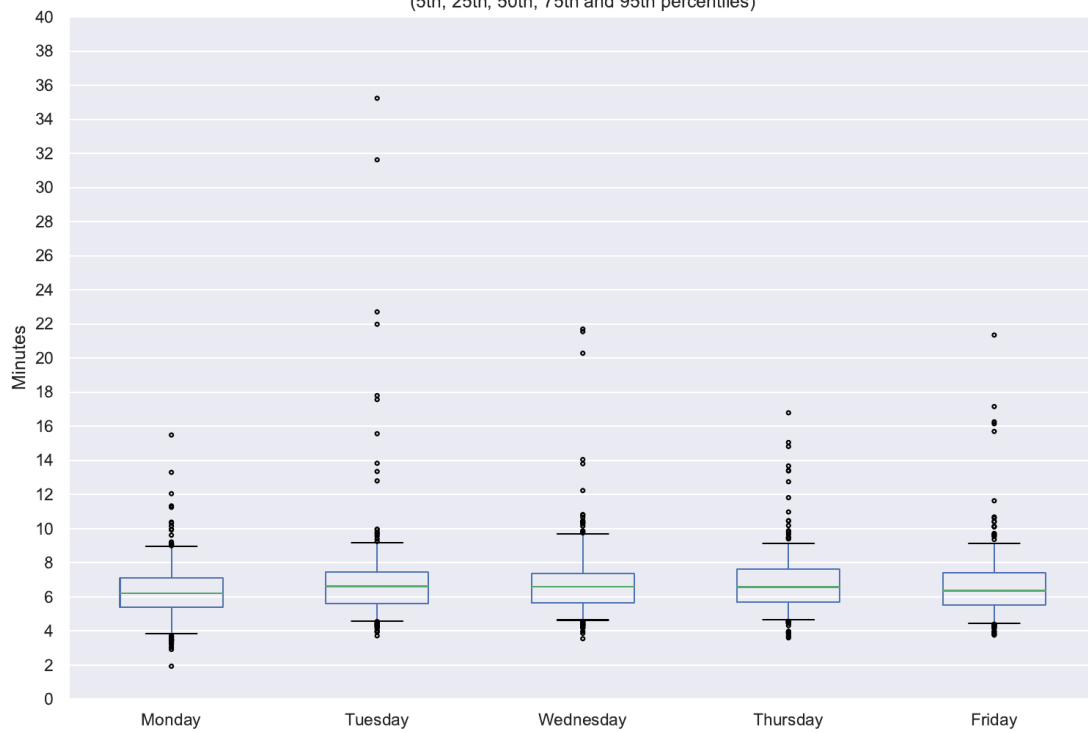
All journey durations





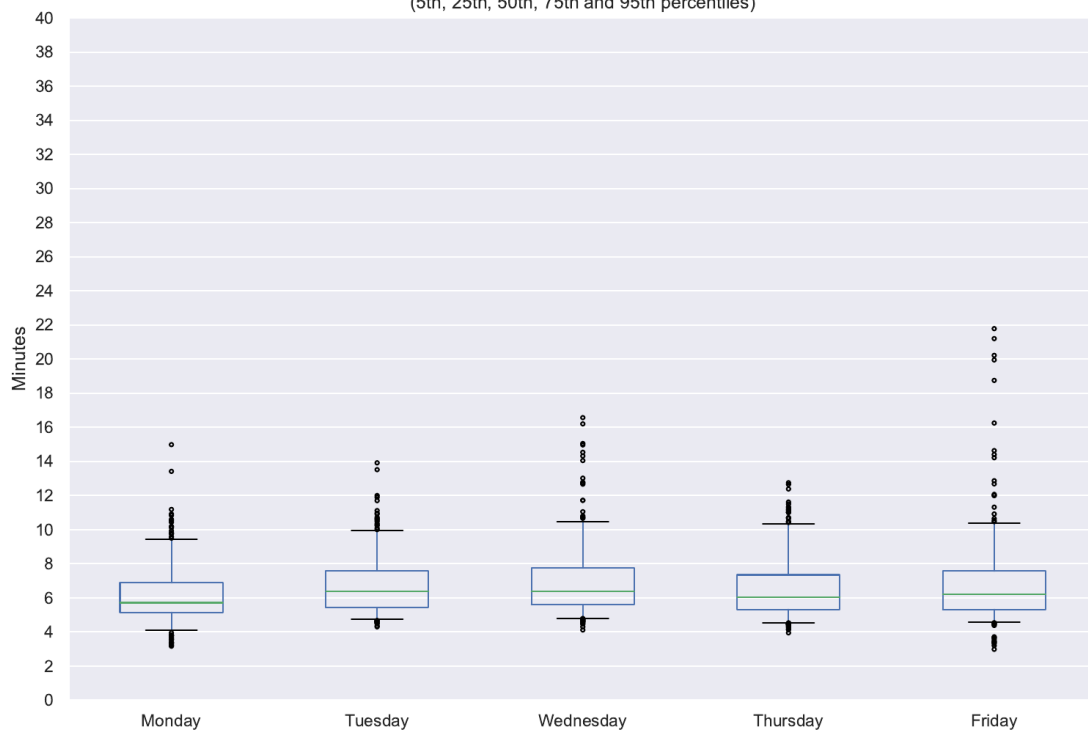
Bus journey duration by day of week

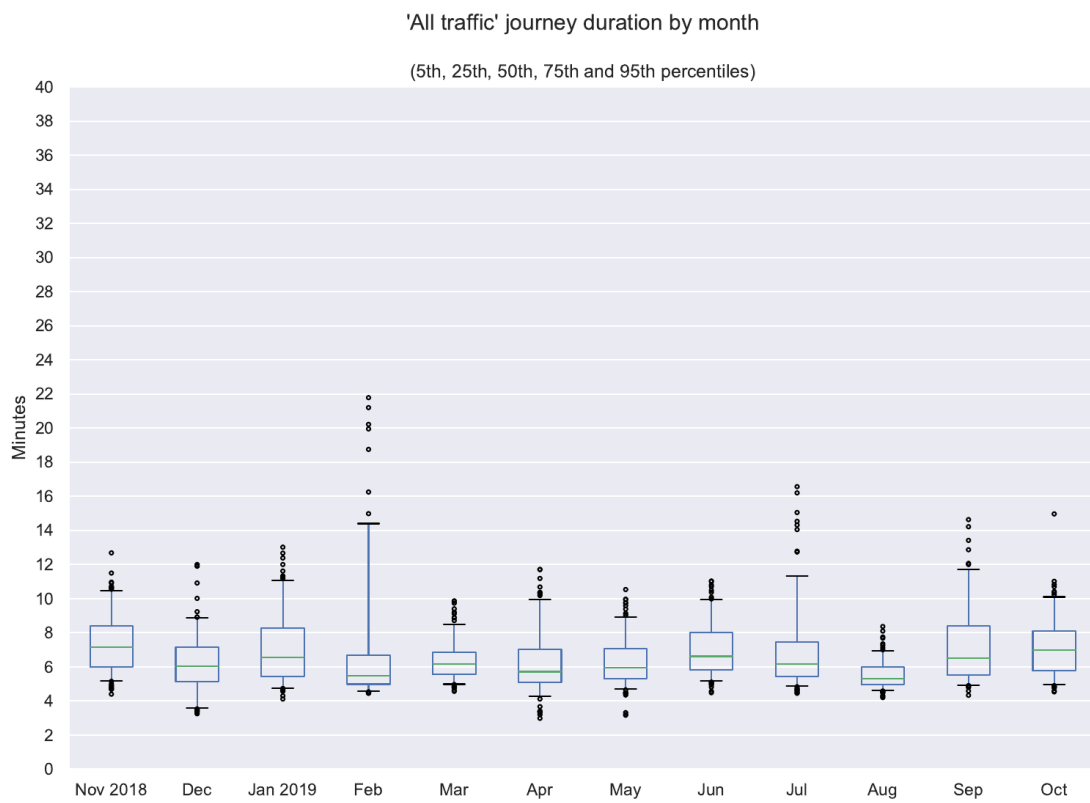
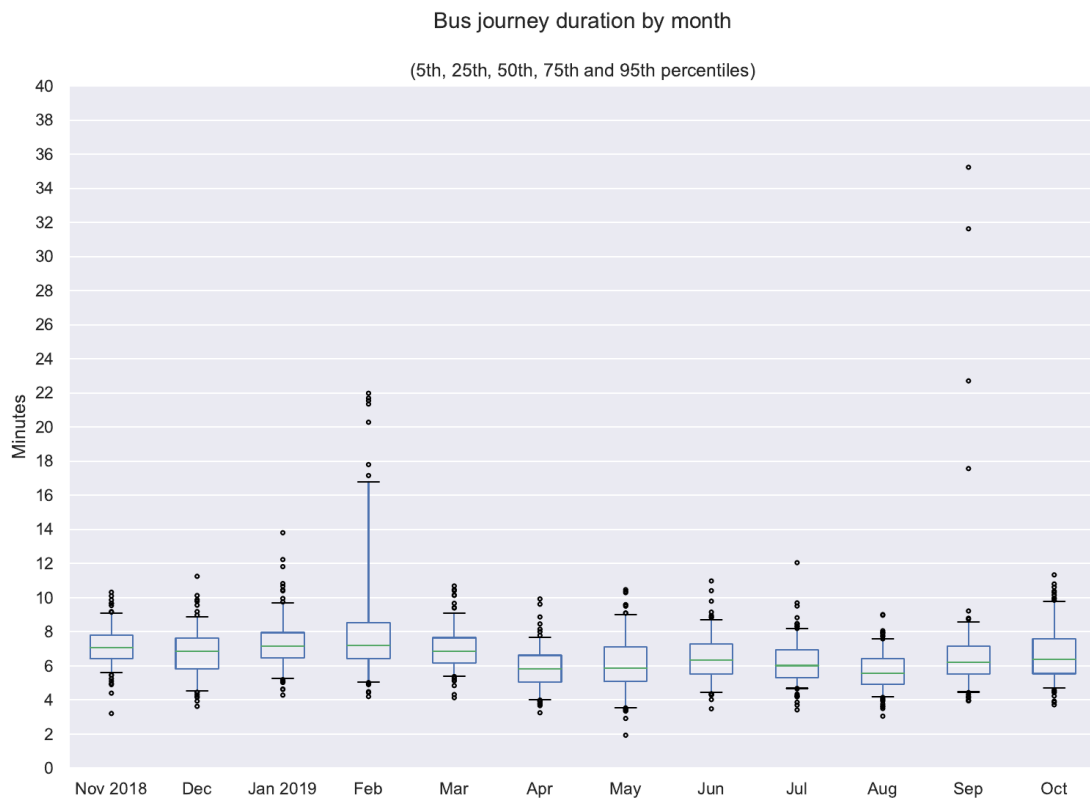
(5th, 25th, 50th, 75th and 95th percentiles)



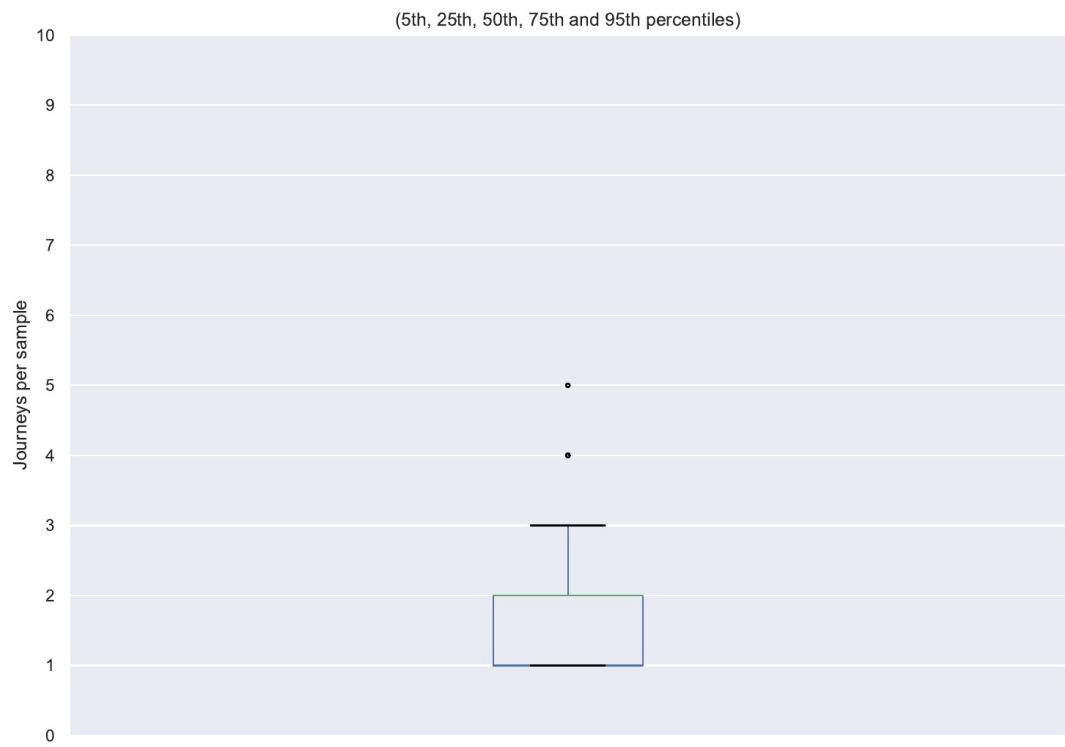
'All traffic' journey duration by day of week

(5th, 25th, 50th, 75th and 95th percentiles)

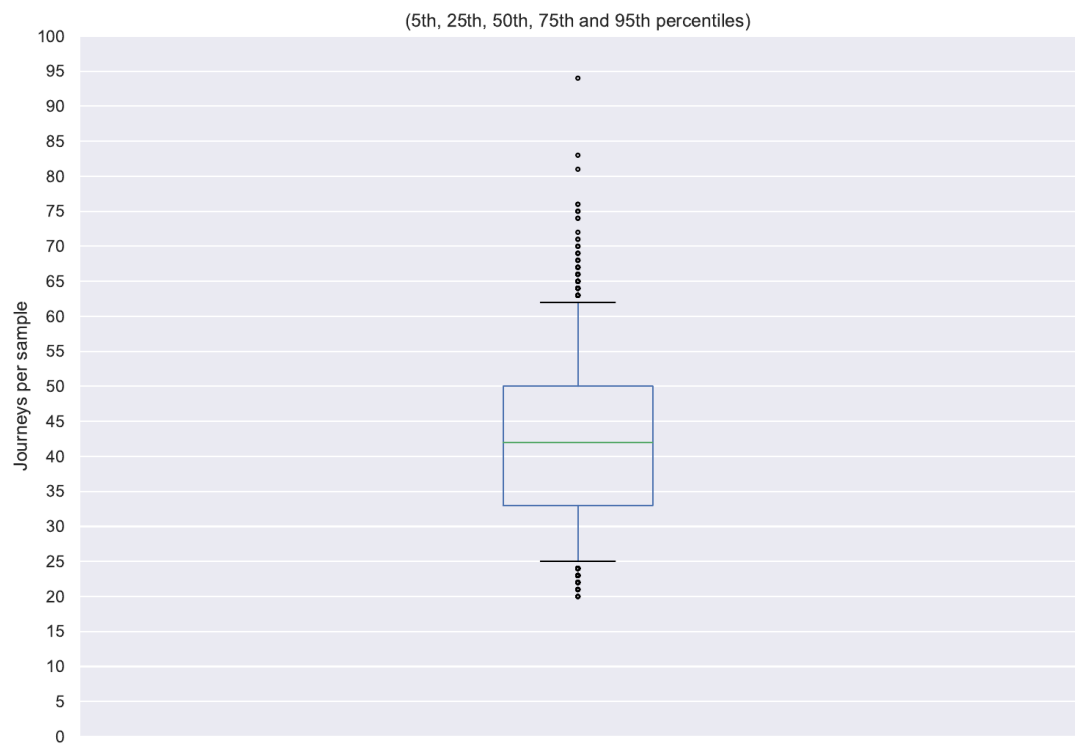




Bus sample sizes



'All traffic' sample sizes



'All traffic' sample sizes by month

(5th, 25th, 50th, 75th and 95th percentiles)

