Developing a Dashboard for Last-Mile Freight Traffic

FTC 2050
FREIGHT TRAFFIC CONTROL

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Aim

The dashboard is a freight data visualisation and analytics tool designed for non-specialist audiences. It enables users to perform core analytical functions relevant to urban last-mile traffic, including geospatial visualisation and filtering, without the need for specialized software and tools. It is built using open-source HTML and JavaScript libraries and is designed to be used within a web browser.
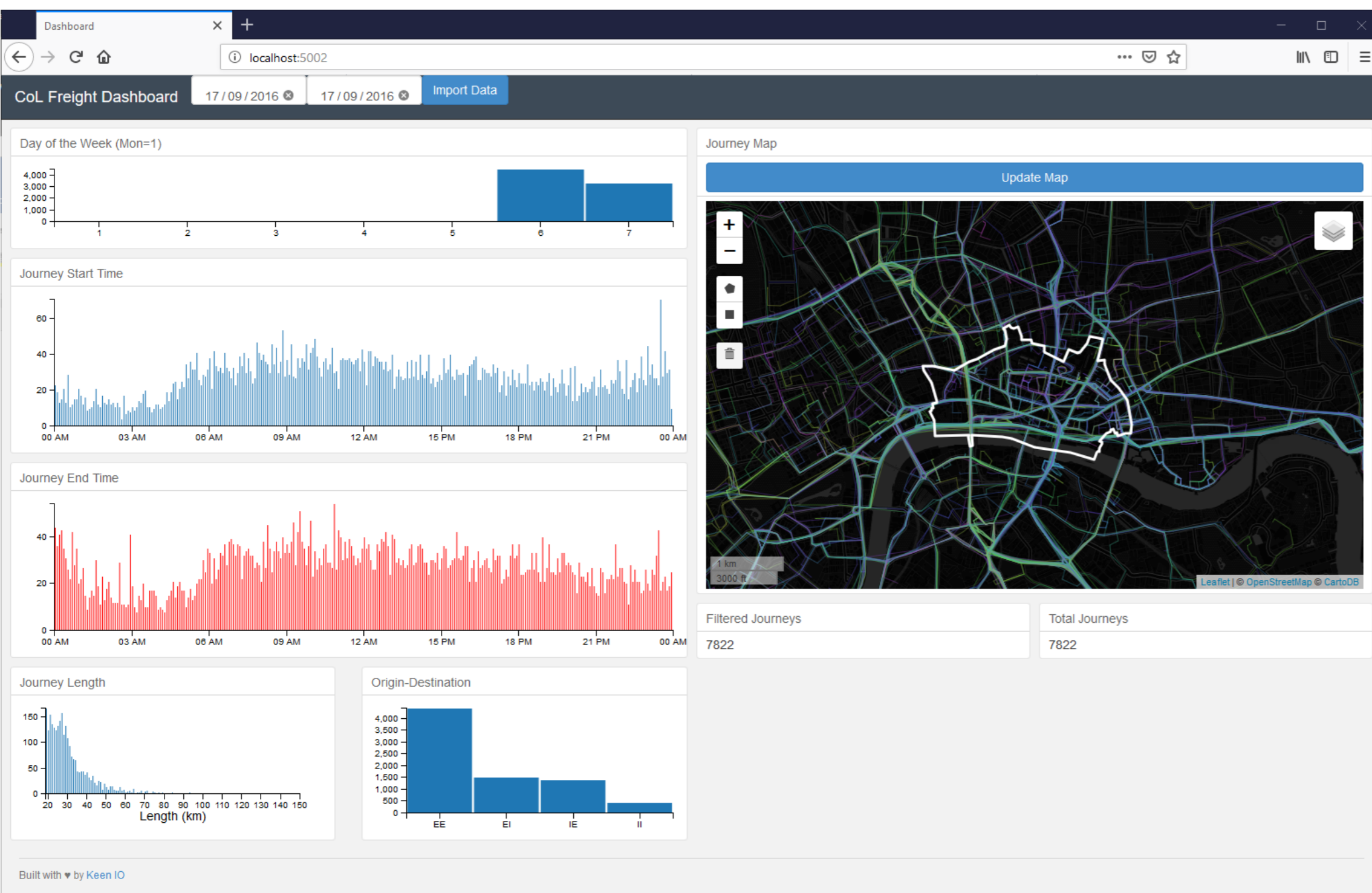

The dashboard window.

Data Formatting

The data used in the dashboard is in three formats:
- A dataset containing general information and metadata for each trip, including trip start and end time, trip length, information about origin and destination, etc.
- A dataset containing the raw waypoints for each trip, sorted chronologically.
- A reconstruction of the trip path geometry in GeoJSON format, created by map-matching the raw waypoint data against the street network as provided by OpenStreetMap.
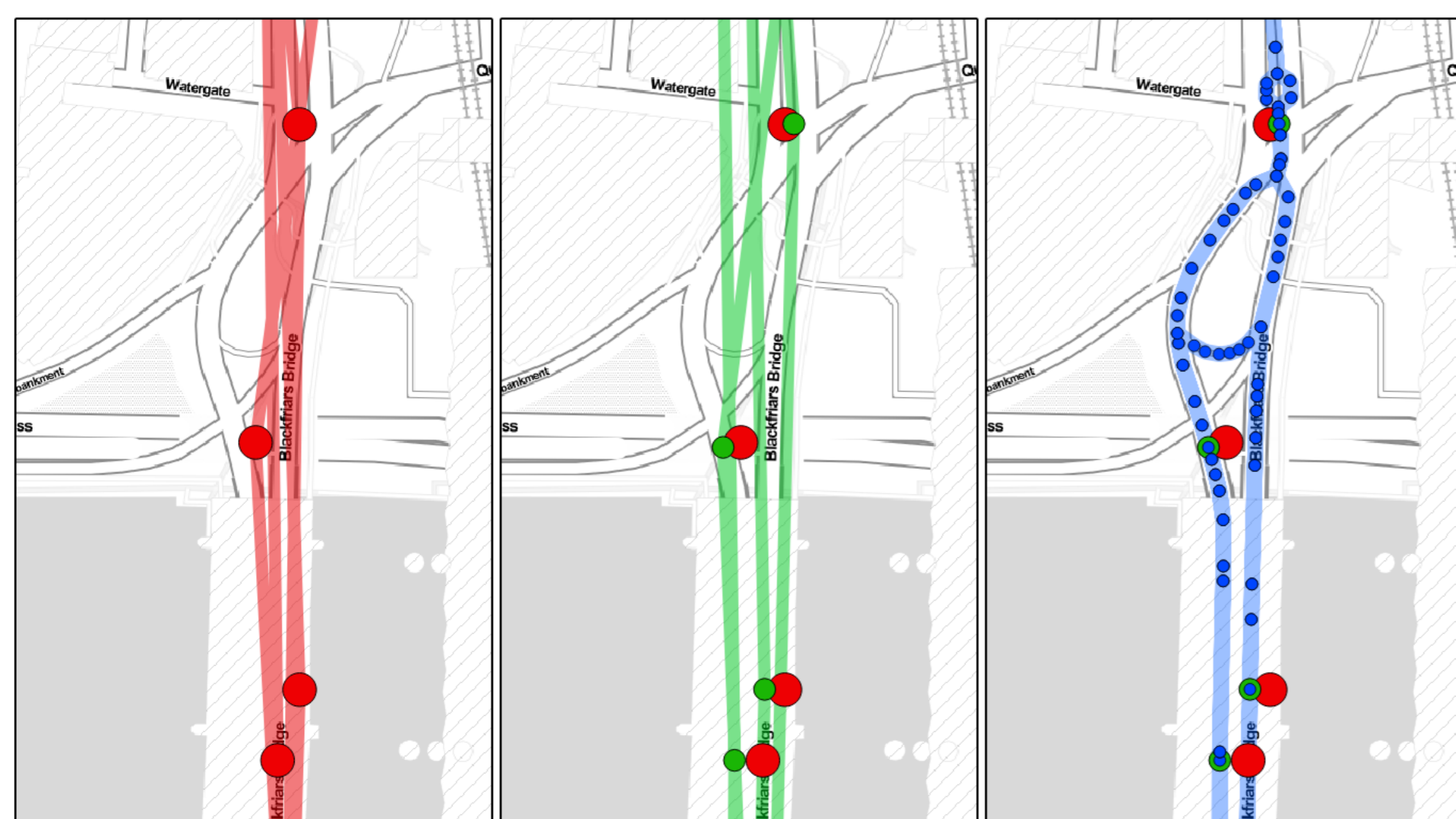
Map matching. Left: Raw waypoint data. Middle: Waypoints snapped to the street network. Right: Interpolation between known visited points, to reconstruct the full path.
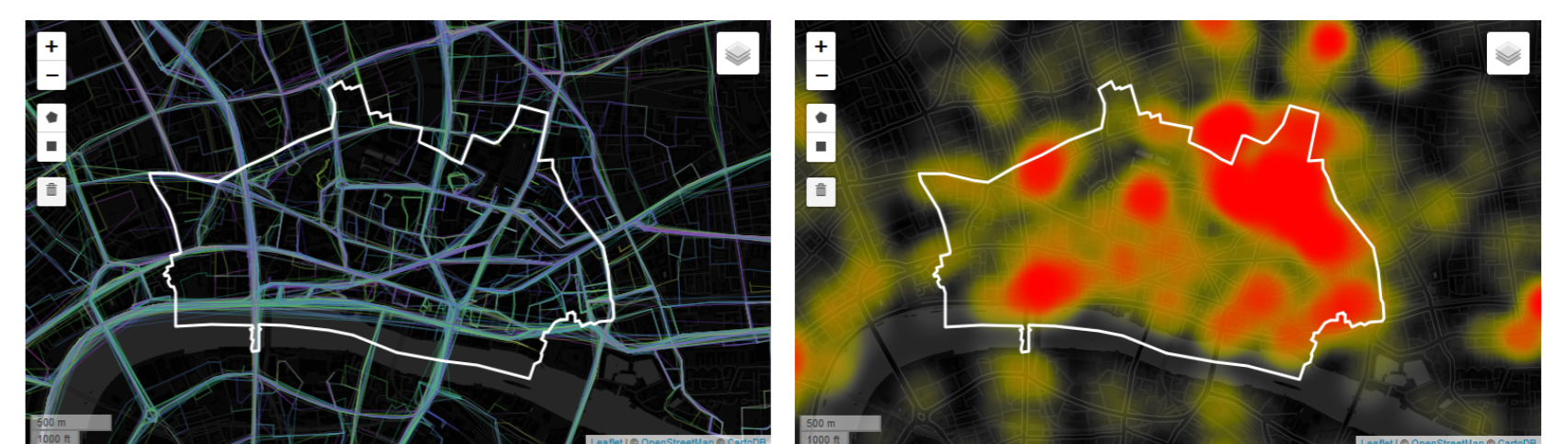
Visualisation

Charting

The dashboard tool has the capacity to visualise multiple attributes at the same time in a single view. In its current form, the dashboard visualises 7 attributes, as shown in the dashboard overview window: number of trips by day of the week, by time of day (by trip start and trip end time shown in separate charts), by trip length, and by origin-destination pair. In addition to these elements, the dashboard includes two numeric outputs, one showing the total number of trips contained in the dataset, the other showing the number of trips currently selected via the application of data filters.

Mapping

The dashboard further includes a map canvas used to visualise geospatial properties of the dataset. Specifically, the map includes two layers (shown below), one visualising the trip paths (below left), and the other visualising relative densities of trip destinations via a heatmap (below right).

Map layers. Left: Individual trip paths. Right: Trip destinations heatmap.

User Interaction

Data filtering in the dashboard is applied on the same objects used for visualization, i.e. charts and maps are interactive elements. Filters for each dimension are applied differently depending on data type and visualisation method. Filters can be can be combined over multiple dimensions allowing for fine scale analysis, for example identifying all lengthy journeys during business hours that traversed a specific junction.
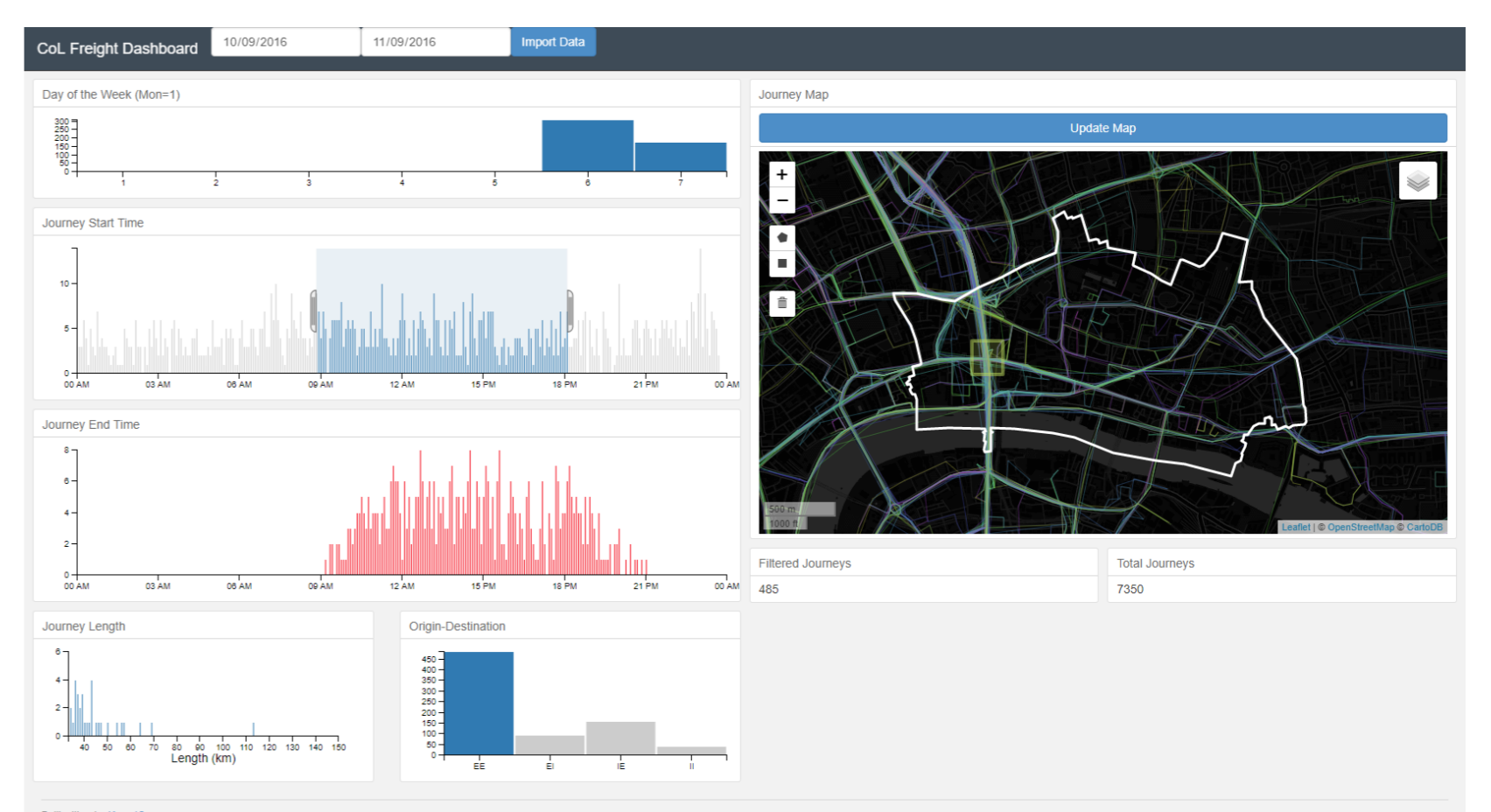
Filtering data on multiple attributes simultaneously. Active filters include: by journey start time, by origin-destination locations, and by visited locations.

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