Better Management of Bicycle Fleet - BikeShare

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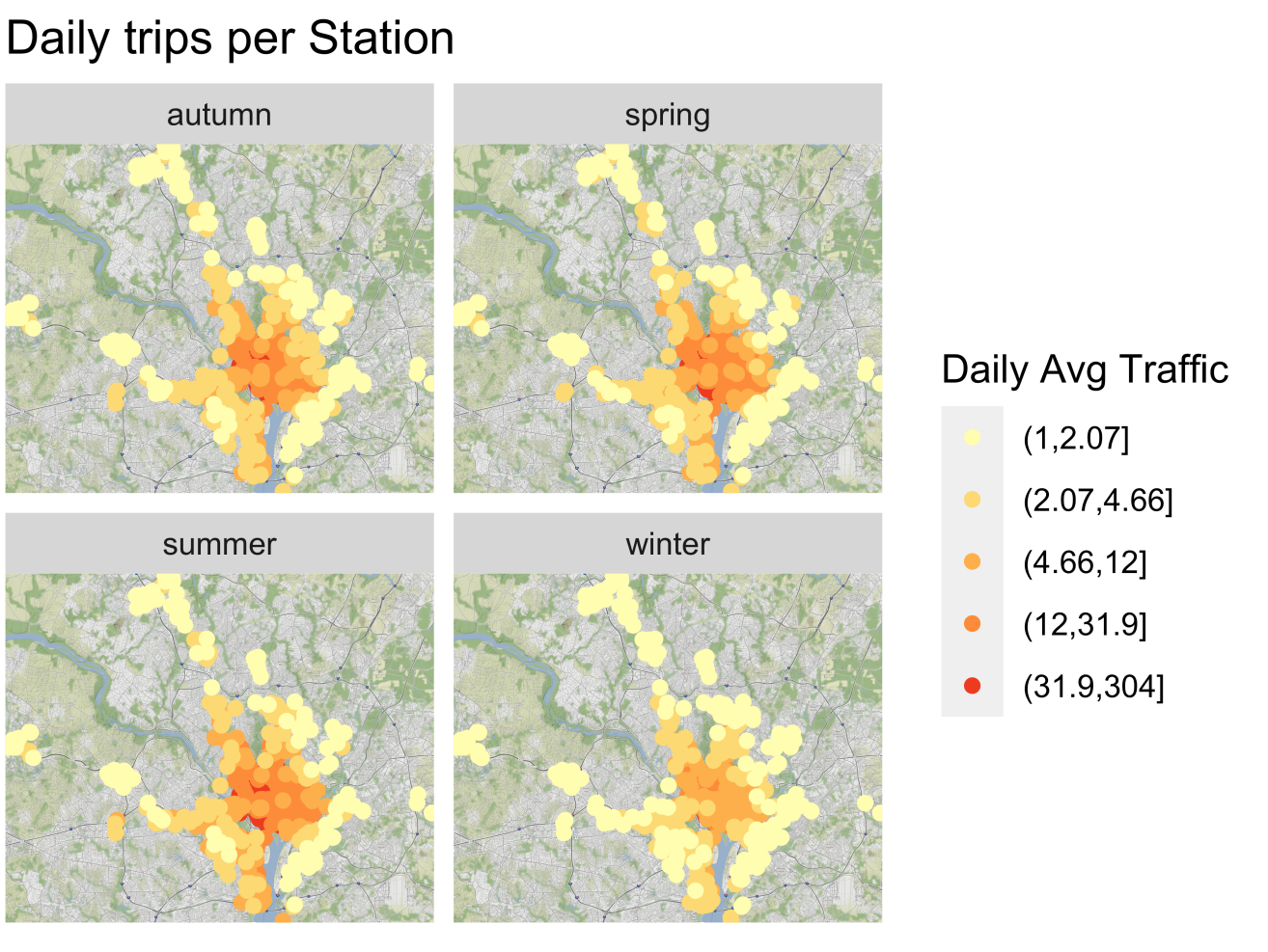
Introduction and Purpose

As the Council-owned bike sharing scheme for the City, *BikeShare* has the mission to provide a reliable, cost-effective bicycle sharing service across the Metropolitan area. In 2017 alone, *BikeShare* served over 3.8 % million trips with a fleet of 4,652 bicycles.

As of today, bike repairs only occur when a bike is detected broken. Apart from the obvious impact on customer satisfaction when a bike breaks, this model is also inefficient from a workshop's workload perspective, affecting workload and time to repair.

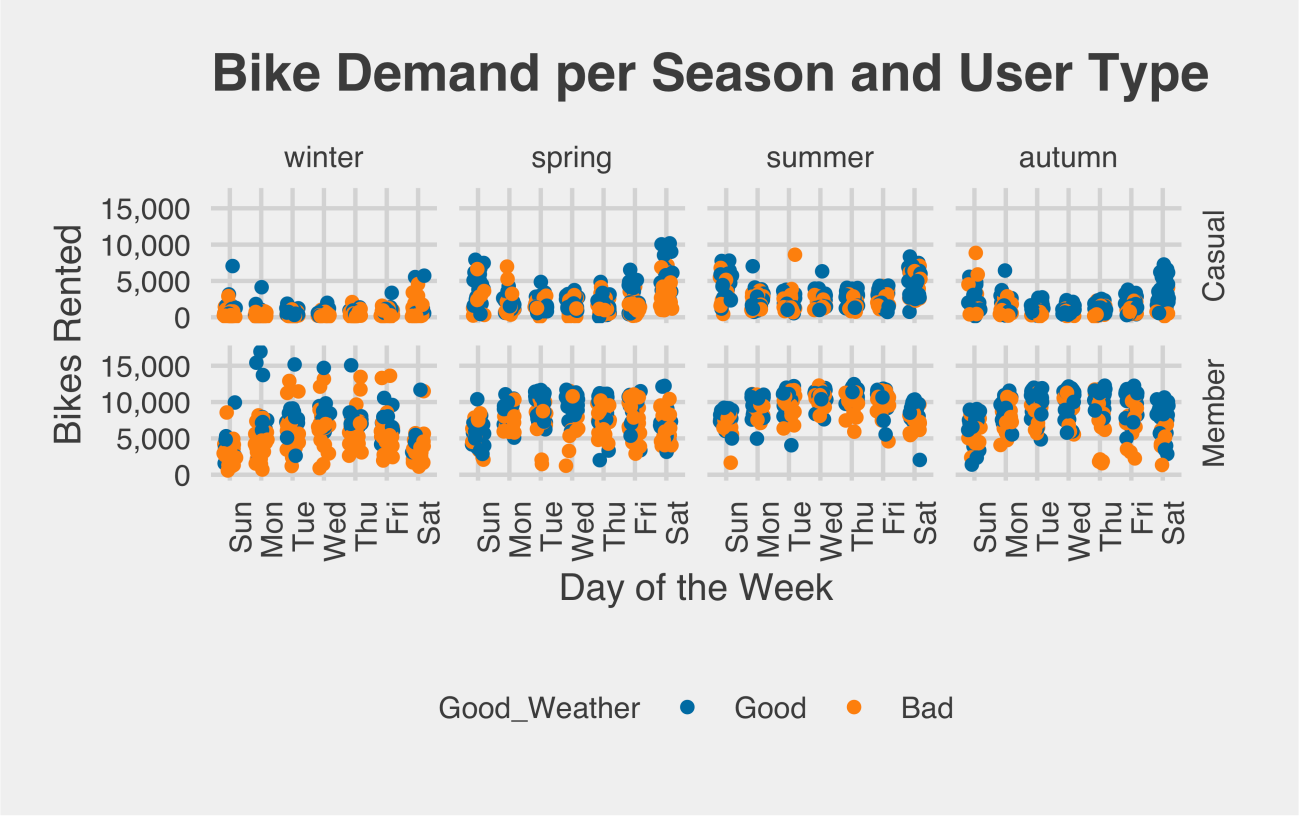
In order to address, this BikeShare can tap into the existing operational data and use analytics to optimise this problem.



Fleet maintenance volumes and windows need to be carefully chosen

In order to **provide a good service** for the users of the bike sharing scheme, **unavailability needs to be avoided**. Unavailability is caused by lack of maintenance or lack of supply. Thus, maintenance windows need to be selected **smartly**.

- Shared bikes are **used every day of the week**. Registered users provide a constant demand baseline.
- There is **some seasonality** in the demand: registered users brave through the winter keeping the numbers high.
- At first look, it seems that **weather conditions are the biggest deterrent** for bike usage. If it is too cold, or too hot or too windy casual users won't ride; registered users' numbers will also drop.
- Bikes will **keep breaking** - even if they are well built! Thus, **every opportunity** to undertake maintenance **needs to be taken**.



Challenge: Using data analytics, we can leverage the **weather forecast** to optimise the fleet **maintenace without compromising availibilty SLAs**.

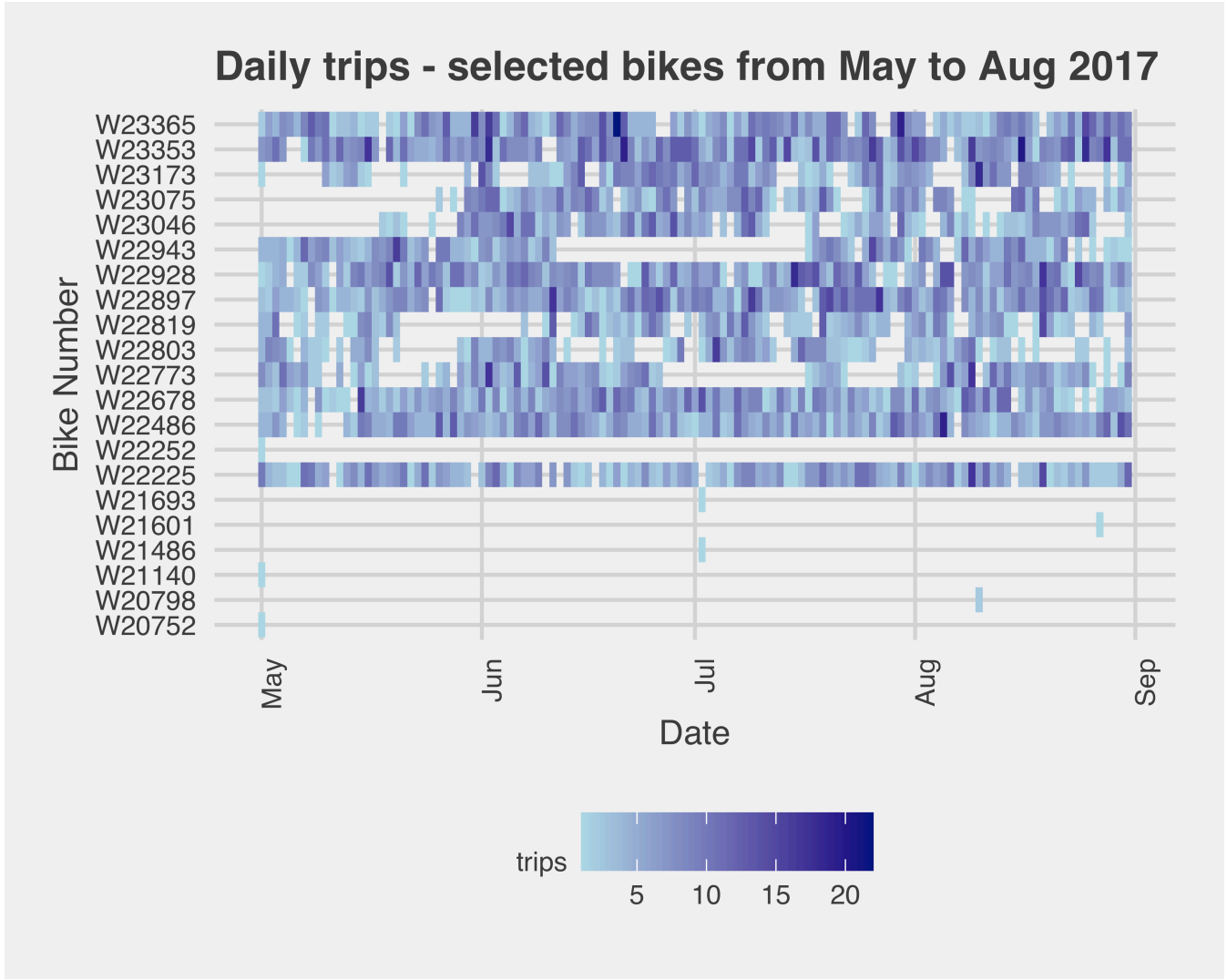
By addressing uneven bike utilisation, it is possible to extend the life of the fleet

Some bicycles in the fleet are heavily used almost every single days, while others are seldomly ridden. As a result:

- **Heavily used bikes will be at higher risk of failure** and accelerated asset ageing.
- **Unused bikes will be at risk of neglect** - e.g. left with flat tyres in an low traffic station.

By obtaining a detailed log of all bike travel, it will be possible to identify which bikes are being used the most and calculate their risk of failing. This will allow to proactively book them for service.

When those bike are taken out for service, they can be replaced with lower used bikes , evening asset utilisation.



Data Collection to Optimise Maintenance workload and bike availability

To achieve the objectives, the below data needs to be collected:

- Detailed trip data, itemised per each trip taken by each bicycle
- Weather Observations/Forecast for each day of the year
- Bike failure rates.
- Workshop's repair turnaround stats.

Based on the data, the below metrics will be generated:

Metric	Description	Source
Daily Service Capacity	Number of bikes that can be maintain any day, based on workshop capacity and predicted demand	Workshop Turnaround stats, Summary of daily trip data, weather
Need to Service Factor	Indicator whether a bike needs service ahead of probable failure	Detailed trip data

These metrics (combined with spontaneous failure rates) should serve as input for a proactive service plan.

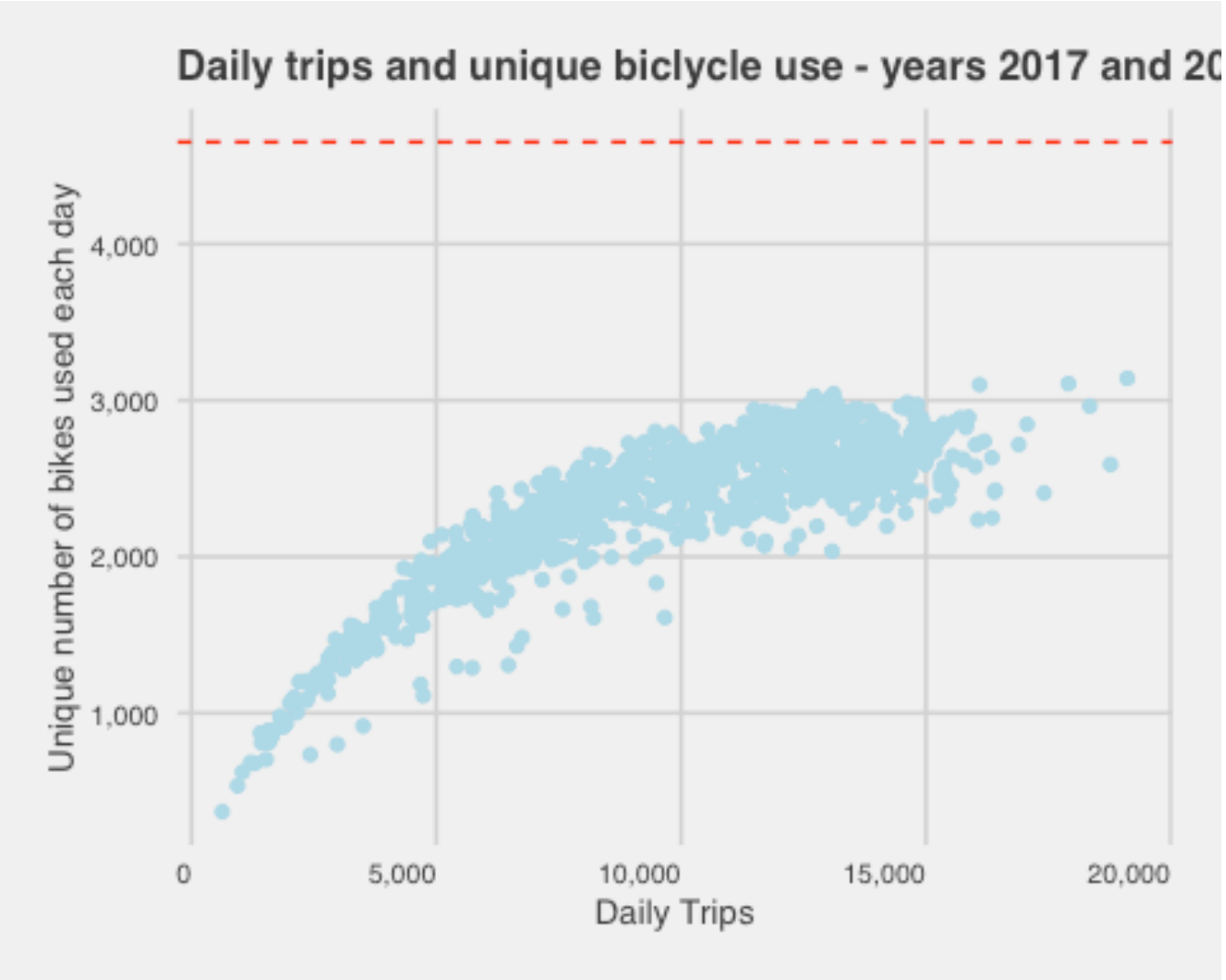
(Initial) Results and Deliverable

The generated metrics will be used to generated a day-by-day maintenance plan, by matching the optimal number of bicycle to service every day with a suggestion of which assets need to be service each day. This plan will include an allowance for unexpected service needs. This model will require weekly updates.

Intermediate Results - perhaps we are not exploring the most relevant problem

However, when further analysis has been conducted, it has become apparent that the previous problem statement is **not** relevant : the fleet (4,652 bicycles) exceeds by far its daily demand.

Taking the above into consideration, perhaps a better problem to understand is how the weather conditions affect demand in each individual station, to make better placement decisions each day.



Intermediate Results - Other Opportunities

In addition, such big difference between fleet size and demand opens a window to explore other options to improve the service such as:

- Reduce the fleet size and optimise costs.
- Use excess capacity to deploy “pop up” stations on high usage events and locations (e.g. offer them as a public transport alternative during massive events, bring bikes to parks in spring).
- Explore other use models - e.g. day-long and weekend rentals, allowing registered users to take bicycles home overnight.

Next Steps

The next steps on this journey are:

- Re-do analysis, per station.
- Present results.