# Statistical Analysis of Bike Sharing Data

```
knitr::opts_chunk$set(cache=FALSE)
knitr::opts_chunk$set(echo=TRUE)
knitr::opts_chunk$set(fig.width=14)
knitr::opts_chunk$set(fig.height=14)
prjpath <- "~/work/citiviz/bikeSharing/bikestats/"
datapath <- paste(prjpath, "data/", sep="")
analpath <- paste(prjpath, "analyses/", sep="")
rcodepath <- paste(analpath, "Rcode/", sep="")
setwd(analpath)
```

## Abstract

In this report we develop statistical analysis that can be applied to bike sharing data. The goal of this analysis is to 1: understand the nature of bike usage in a bike sharing system, from angles of users, the providers of the bike sharing system, and the city where the bike sharing system is situated, 2: define and quantify the performance of a bike sharing system, 3: suggest improvements to the system's performance, and 4. to develop our analysis into visualizations for the end user who can be the bike sharing system providers, the city, or the users of the bike sharing system. To stengthen our analysis we have used example data form online resources, in addition to the data provided by the bike sharing company.

## Introduction

Several bike sharing systems have started recently in different parts of the world. Because it is geographically distributed, and used both as well as use by the bikers, it is hard to define a performance metric for a bike sharing system. We study the usage patterns across the users (bikers), and across the stations to define several consistent, quantitative metrics that measures the performance of the system. Such metrics will allow us to study the performance when some changes are made to the system, such as the addition or removal of a bike station.

We consider several viewpoints of the bike sharing system (BSS), which will be addressed as independent analysis of the data,

1. **systemic perspective**: an analysis of the overall usage of the system
2. **user perspective**: an analysis of the user behavior
3. **station perspective**: an analysis of the usage of bike stations
4. **business perspective**: an analysis of how the usage translates into revenue
5. **geospatial perspective**: an analysis of the geospatial features of the BSS network
6. **operational perspective**: an analysis of the operations involved in running a BSS network
7. **multimodal transport perspective**: an analysis of how the BSS is situated in the larger multi-modal transportation network of the city