

# Hackathon Logistics

## Task 1

**Develop a facet of a sentencing algorithm for people convicted of violating a bike-share law (listed in Appendix A).** The sentencing algorithm should deter people from harming the bike-share program in the future.

If you want to code, create an algorithm which the following characteristics:

- Inputs: a test file with characteristics about the defendant and the crime, formatted like Appendix A is formatted
- Output:
  - a string or number representing a sentence, a fine, or any other punishment you think appropriate

If you do not want to code, create a presentation about how this sentencing algorithm can be implemented ethically. Below are some ideas:

- Whether to make the algorithm transparent or open-source
- How to make sure judges use the algorithm properly ([see this blog post for an interesting perspective](#) on how lawyers approach these algorithms)
- How to ensure the algorithm does not become biased
- How to sell the algorithm to the public

If you do not want to code, you can also develop an algorithm with pencil and paper.

## Task 2

Once you are done with Task 1, tell a hackathon organizer. We will pair you with another team, so that you can stress test each other's solutions and offer each other constructive criticism.

## General Instructions<sup>1</sup>

The City of Ames has long been known as a leader in innovative policies. Other cities all around the country often look to Ames for inspiration and enact legislation modeled on Ames' legislation. Recently, the ambitious and charismatic Mayor of Ames, Ms. Gropius, wanted to continue this legacy of Ames being a leader by addressing the environmental and social costs of current commuting patterns. Specifically, Ms. Gropius wanted to encourage people to use less cars and more bikes when commuting. As such, Ames instituted a one-of-its-kind

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<sup>1</sup> This case is entirely fictional. Any resemblance to real people, programs, or incidents is coincidental.

bike-share program. Unfortunately, the bike-share program has led to a lot of unintended consequences that the city now needs to address.

## The Bike-Share Program

In year 0, Ames bought 10,000 bikes and equipped them with GPS trackers and electronic locks. Ames is a city of 1,000,000 people, so the bikes can serve at most 1% of Ames' population, which Ms. Gropius felt was enough for a pilot program. Ames residents can use an app on their phones to locate a bike close to them, walk to that bike, unlock it using an app on their phone, and then ride it to or from work. Most residents bike from the outskirts of the city to downtown in the morning, and from downtown to the outskirts of the city in the evening, although some users also use the bikes for other purposes.

## The Problems

**Leaving bikes outside the pick-up and drop-off zones.** The bikes are meant to be picked up and dropped off in certain areas, to avoid cluttering sidewalks and roads. However, some people drop off the bike as soon as they are done using it, instead of leaving the bike in the nearest designated area.

**Leaving bikes outside the riding zone.** The bikes are meant to be used for commuting to and from work, and their terms of use clearly state that they should not be used outside city limits. However, several people ride the bikes outside city limits and leave them there. This adds to the program administration costs, because someone has to drive out to all the bikes and bring them back to city limits.

**Vandalism - bike locks broken.** Some people have been breaking the bike locks off the bikes, so that the bikes can be ridden by people who do not have the ability to unlock the bike through the app.

**Vandalism - other types.** Some people have been breaking other parts of the bikes. For example, the paint is sometimes scratched, the tires are punctured, the seats are removed from the bikes, or the tires are removed from the bikes.

**Bikes stolen.** Some bikes have gone missing and cannot be located through their GPS trackers anymore. Some of these bikes have been repainted and are used for personal uses. Some have been resold for money.

**Drivers hitting bikers while opening doors.** Many drivers are unaware of how to safely open car doors around bikers. Instead of doing a "Dutch reach," which would allow them to look out for any approaching bikers, they blindly open their car doors and hit an approaching biker. Bikers can be thrown into traffic when this happens, which can injure them very gravely.

**Drivers hitting bikers while driving.** A small minority of drivers accidentally crash into bikes while driving. This most often happens when cars are changing lanes or turning, although it occasionally happens at other times as well. These accidents are serious and have the potential to be fatal.

## The Stakes

Ms. Gropius wants to incentivize people to drive less and bike more. She believes that this change would lead to a lot of positive effects:

- People who bike will become healthier because they would get more exercise
- Residents of the city will become healthier because they will breathe less exhaust fumes
- The roads will become less crowded, reducing stress, road rage, noise, and car crashes
- Space currently devoted to parking garages downtown can be repurposed for innovative and community-friendly uses

If the bike-share program is successful, Ms. Gropius will be able to convince the City Council to buy more bikes. A successful program will also help Ms. Gropius run for higher office. If you do a good job creating this sentencing program, Ms. Gropius will be extremely pleased, and will likely reward you with a promotion and raise.

## Facts and Figures

<b>Cost of bikes</b>	$\$500 \times 10,000 = \$5,000,000$
<b>Cost of adding lock to bikes</b>	$\$100 \times 10,000 = \$1,000,000$
<b>Cost of building and maintaining app</b>	\$300,000 per year
<b>Cost of maintaining bikes</b>	\$200,000 per year

*Table 1: Cost of bike-share program*

	<b>Maximum punishment (sentence and/or fine)</b>
<b>Vandalism of item worth under \$500</b>	5 months and/or \$5,000
<b>Vandalism of item worth equal to or over \$500</b>	10 months and/or \$10,000
<b>Stealing item worth under \$500</b>	15 months and/or \$15,000
<b>Stealing item worth equal to or over \$500</b>	30 months and/or \$30,000

<b>Traffic accident due to minor negligence</b>	120 months and/or \$120,000
<b>Traffic accident due to gross negligence</b>	240 months and/or \$240,000

*Table 2: Statutes that could be relevant*

## Appendix A

This is the data for the hackathon: [https://github.com/niharikasingh/sentencing\\_hackathon](https://github.com/niharikasingh/sentencing_hackathon)

You may use the python script to generate a larger file if you want

Extra sources:

Recidivism data from COMPAS: <https://github.com/propublica/compas-analysis>