



CRIME & TEMPERATURE: SCHEDULING AWARENESS PROGRAMS

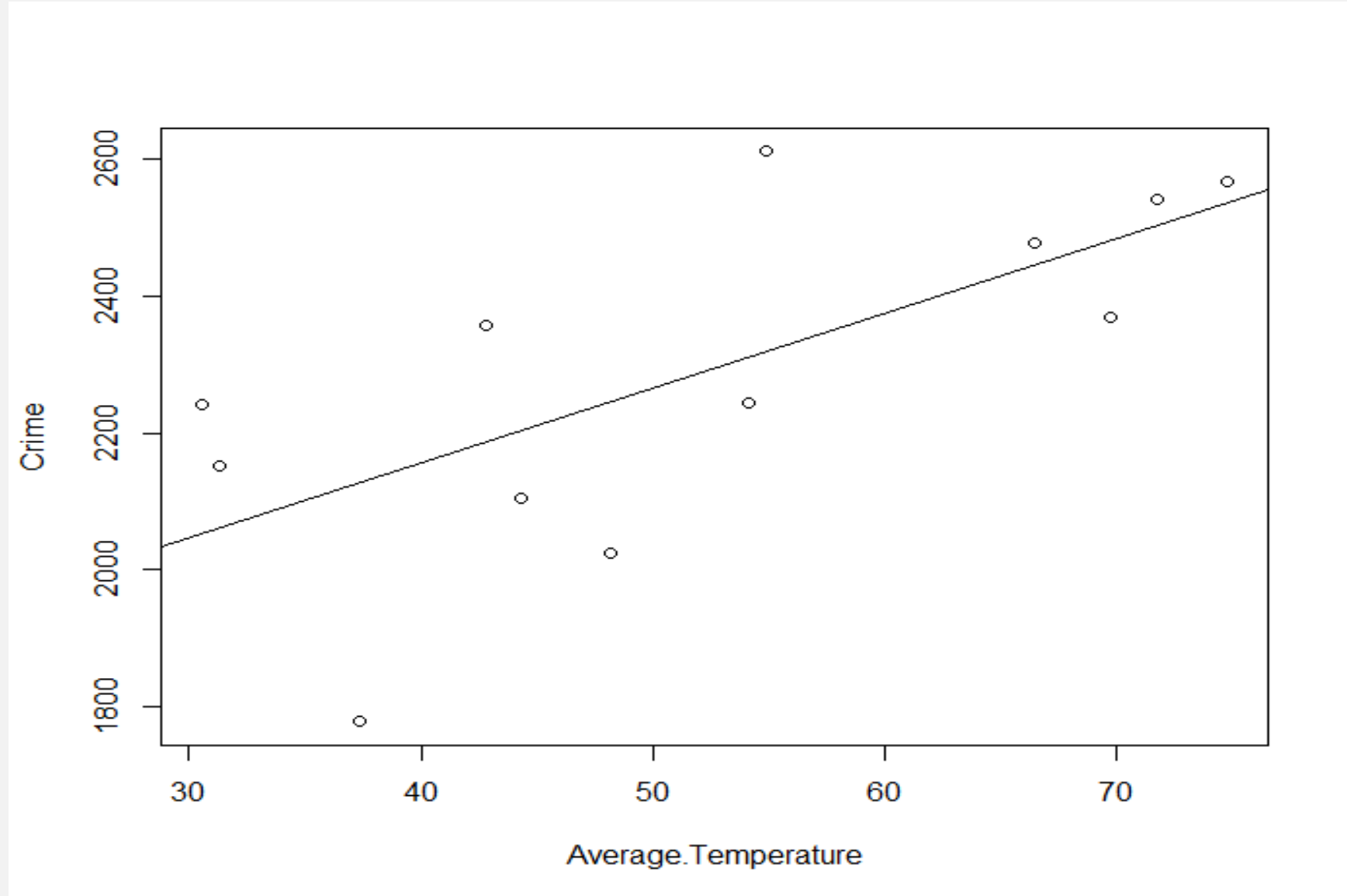
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INTRODUCTION

Certain patterns of crimes distribute unevenly throughout the year, and people’s emotions and behaviors are influenced by ambient temperatures. But is there a positive correlation between crime and temperature? If yes, how strong the correlation is?

Many schools and communities have initiated “crime prevention/awareness” programs. But how to determine the best time and budget allocation for hosting the awareness program?

CORRELATIONS



Correlation Coefficient: 0.69

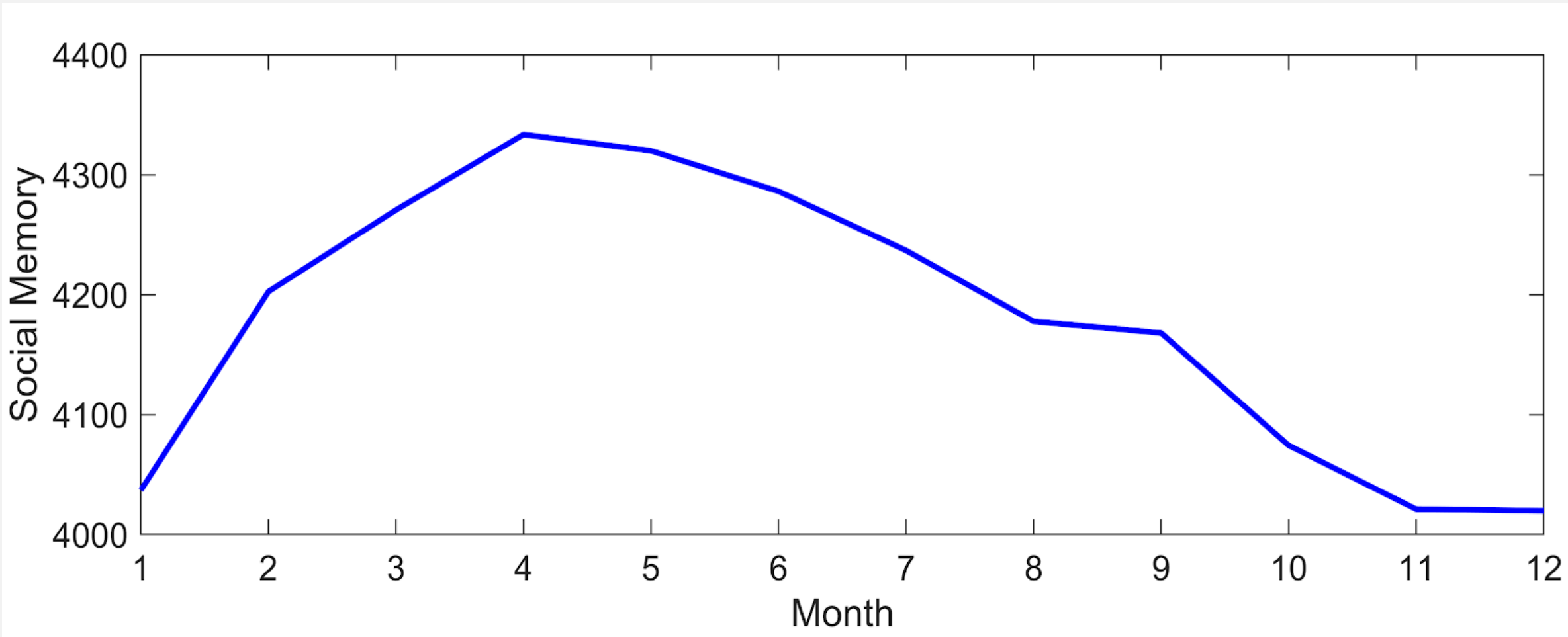
- This data tells us that there is a nearly strong correlation between crime rates and average temperature.
- One does not cause the other, however higher ambient temperature does increase impulsivity and general human activity level, resulting into increase in social interaction and risk of violent incidents.
- The warmer the weather, the more certain types of crimes are committed. (Lauritsen, PhD, 2014).

AWARENESS PROGRAMS

SOCIAL MEMORY

$$SM[k] = \sum_{i=k+1}^{k+12} c[i] \cdot e^{\frac{i-k}{8}}$$

k is the k^{th} month of the year.
 $c[i]$ is the average crime incidents happening in the i^{th} month of recent years



OPTIMIZING THE DATE

<1> If one and only one of month would be chosen, obviously we choose the k corresponding to the max value of $SM[k]$. That is April.

<2> School scenarios: For a school with regular spring/fall semester, we can only pick k among $\{2,3,4,9,10,11\}$. That are April and September.

<3> If we want to conduct awareness programs twice a year but with frequency no higher than once in every three months, maximizing the social memory is to maximizing the following objective function:

$$\max\{SM[k1] + SM[k2]\}, s. t. |k1 - k2| \geq 3$$

That are April and July.

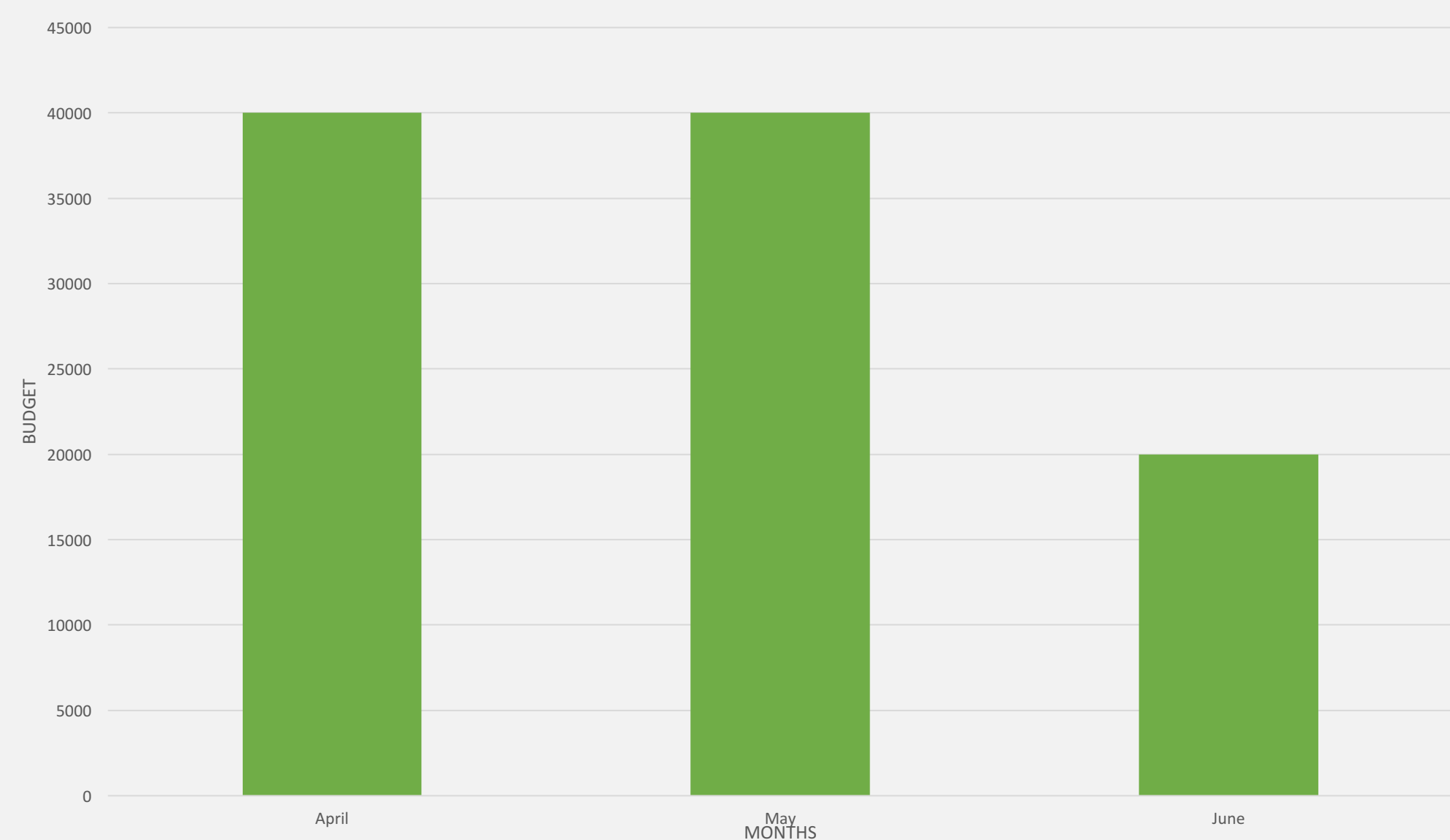
ALLOCATING BUDGET

$$\max \sum_{k=1}^{12} x_k * SM[k]$$

subject to

$$\sum_{k=1}^{12} x_k = 100000, \\ 0 \leq x_k \leq 40000, \quad k = 1 \dots 12$$

RESULTS



POLICY PROPOSAL

- In school education, we recommend educators to incorporate the topic of “impulsivity control”.
- Traditionally, October were chosen as the “crime awareness month”, but according to the results from our model, we recommend choosing April as the crime prevention month.

BIBLIOGRAPHY

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- Lauritsen PhD, J.L. Seasonal Patterns in Criminal Victimization Trends. 2014. Bureau of Justice Statistics.
- Jari Tiihonen, Pirjo Halonen. The Association of Ambient Temperature and Violent Crime. 2017.