

# Effects of Volunteering Activities on Crime Rate: Identify Correlation

## 2. Domain

The domain for this research will be about community, specifically crime and volunteering activities. This paper will focus on finding the relationship between crime rate and volunteering participation.

## 3. Question

Crime rate has been increasing for the past few years and it has become a major issue in Victoria (Percy, 2016). This report will tackle this issue and try to answer the following question: **“Could increase in volunteering participation reduce offence/ crime rates?”**. The answer might interest government and organisations, such as Department of Justice and Regulation Victoria, Department of Human Services Victoria, and other volunteering organisations (i.e. Go Volunteer and Volunteering Victoria) as it will help resolve connectedness issues that will reduce crime rate. To answer the question, this report will investigate the relationship between variables, specifically volunteering participation and offence rates. If we find a negative correlation between offence and volunteering participation, this information can be used as potential solution for the problem, which benefits volunteer organisations as they get more support from Victorian government as well as the government itself as they find a way to solve crime issues.

## 4. Innovative Information the Answer Provides

The answer can provide innovative information as relationship between volunteering and crime hasn't been widely explored. Although it hasn't been widely explored, it can provide valuable analysis such as correlation (see Section 3) and clustering. This data can help government to decide potential causation and determining location that need help at most. In addition, innovative way of volunteering as a solution also provide a new perspective through solving connectedness issues at a smaller scale. For example, when socially disconnected people volunteers, they are given opportunity to make new friends/ connections, do activity that helps them realize that they are useful, as well as feelings of belonging to the society. As their experience increase through numerous volunteer opportunities, they can gain organisation and other skills that help them solve unemployment/ income problem which also a major cause of increasing crime rates.

## 5. Datasets

The first of the chosen dataset was taken from AURIN (named “community\_data.csv”) has been filtered and contain data about percentage of people participate in volunteering (volunteer\_participation\_percentage) based on LGA from Department of Health and Human Services that was released on November 2016.

Link: <https://data.aurin.org.au/dataset/vic-govt-dhhs-vic-govt-dhhs-lga-profiles-2015-lga2011>

The second dataset was also taken from AURIN (named “offence\_data.csv”) which contain data about offences in 2012 – 2016 that was divided into section A-F based on LGA from Crime Statistics Agency that was released on 2017.

Link: <https://data.aurin.org.au/dataset/vic-govt-csa-lga-vic-crime-statistics-2012-2016-lga2011>

## 6. Adding Values Through Processing, Integration, Analysis, and Visualisation

Processing, integration, analysis and visualising data add value compared to having raw data. Processing can add value by making sure data is consistent and accurate. In the project, processing

begins by stripping irrelevant columns and changing column name, thus making the data more consistent and useful for the research. Next, more processing benefits can be seen when offence\_data was normalised to extract true information about the offence rate in a location unbiased from number of population (see Section 7).

Integrating both datasets add values as we can easily use it in visualisation and further analysis to spot correlation between them (getting hint of causation), predict pattern, or classifying the data. For example, combining both datasets allow correlation analysis through scatter plots and Pearson correlations between volunteer participation and offence rate (see Section 7). Analysis and visualisation add values by making it easier for human eyes to spot pattern and interpreting large information. As an example, bar chart can be used to display the increasing rate of crime, find segmentation behaviour for each type of crime, while scatter plot and best fit can be used to visualise correlation (see Section 7) which helps to find possible factor of certain events.

## 7. Summary of Initial Wrangling

### 7.1 Pre-processing

Pre-processing starts by removing unnecessary columns using AURIN filter tools on both datasets. CSV files was read to DataFrame, column names were changed (i.e. lga\_code11 -> lga\_code) for consistency and smooth integration using inner join. Afterward, offence\_data was transformed so that it displays valuable information about offence rate. Note that before this transformation, offence count (a- f\_total, offence\_total) is not normalised and therefore biased by number of population in an LGA. To solve the issue, every row was iterated and changed so that the number of offence is changed to a normalised version using formula from Crime Statistics Agency to calculate offence rate / 100,000 people (number of populations in each LGA is given as LGA\_ERP).

$$\text{offence rate} = \frac{\text{number of crimes}}{\text{number of populations}} * 100,000$$

Before integration process, an average of offence rate from 2012 – 2016 was calculated because community\_data is taken from 2011 census, which have different time periods. Despite different time periods, government of Victoria – Department of Health and Human Services confirmed the validity of community\_data for 2012 – 2016 periods when it was released in 2016.

### 7.2 Integration

Integration was done to merge offence\_data and community\_data using its index (lga\_code). This was done using df.merge() function using inner join mode. Columns after merging is lga\_code, a\_total, b\_total, c\_total, d\_total, e\_total, f\_total, offence\_total, lga\_name, and volunteer\_rating\_percentage. The process went smoothly due to column editing in pre-processing steps. Duplicated column such as lga\_name was deleted and merge data was saved to merged\_data.csv file for reusability purposes during later analysis.

### 7.3 Visualisation and Analysis (Bar Plots and Scatter Plots)

Bar plots is used to display the frequency of offence rate per year (Fig 1). Moreover, segmentation analysis (crime type A – crime type F) is also visualised using bar plot which provide in-depth information for specific crime type throughout years (Fig 2).

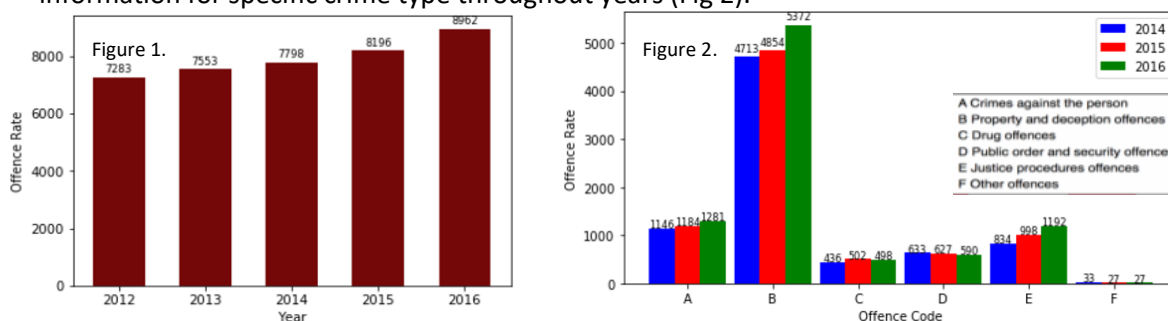
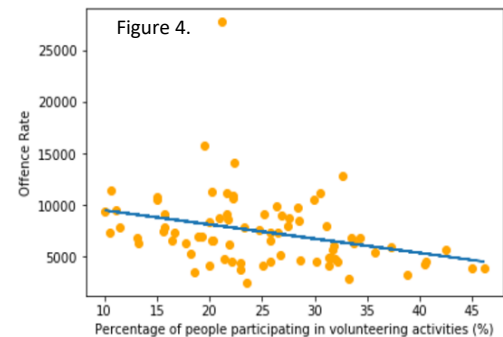


Figure 3

Organization	Percentage (%)
Alison	31
Azant	30
Barnardos	22
Barnes	24
Barnes	22
Barnes	28
Barnes	25
Barnes	11
Barnes	27
Barnes	18
Barnes	13
Barnes	27
Barnes	32
Barnes	26
Barnes	32
Barnes	27
Barnes	15
Barnes	35
Barnes	20
Barnes	31
Barnes	23
Barnes	23
Barnes	16
Barnes	22
Barnes	20
Barnes	40
Barnes	30
Barnes	15
Barnes	32
Barnes	12
Barnes	16
Barnes	17
Barnes	37
Barnes	19
Barnes	25
Barnes	18
Barnes	31
Barnes	15
Barnes	26
Barnes	21
Barnes	11
Barnes	22
Barnes	21
Barnes	26
Barnes	18
Barnes	16
Barnes	21
Barnes	15
Barnes	33
Barnes	33
Barnes	33
Barnes	31
Barnes	29
Barnes	22
Barnes	20
Barnes	38
Barnes	31
Barnes	31
Barnes	34
Barnes	21
Barnes	31
Barnes	28
Barnes	28
Barnes	40
Barnes	26
Barnes	26
Barnes	26
Barnes	22
Barnes	45
Barnes	15
Barnes	21
Barnes	21
Barnes	22
Barnes	21
Barnes	46



## 8. Continuation of the Project

There are 3 factors which makes this project feasible and interesting. First factor regarding the offence rate discussed in investigation. Crime clearly is one of the major issue in Victoria. The number of crime rate for the past 5 years has increased with a total of 23.05%. This rapid increase should have alarmed Victoria Government and push them to think for a solution. Second factor is about the volunteering participation percentage. According to the data, the participation rate is less than 50% in every LGA, which therefore implicitly implies that there haven't been many volunteering activities. By observing this result, government and volunteer organisations can use this as an opportunity to increase volunteering events that will benefits people in the society. Finally, correlation between offence rate and volunteering event has showed an interesting result. From data wrangling using python, crime rate and participation is inversely related. It correlation is  $-0.32$ , which is moderately strong. This suggest that with increasing participation in volunteering activities, might reduce the number of offence rate. Therefore, volunteering activities might be a possible new solution for resolving the issue of crime. Note that volunteering events is also budget friendly and relatively easy to execute compare to other solutions. In addition, it also helps overcome connectedness issue which is a definite source of crime.