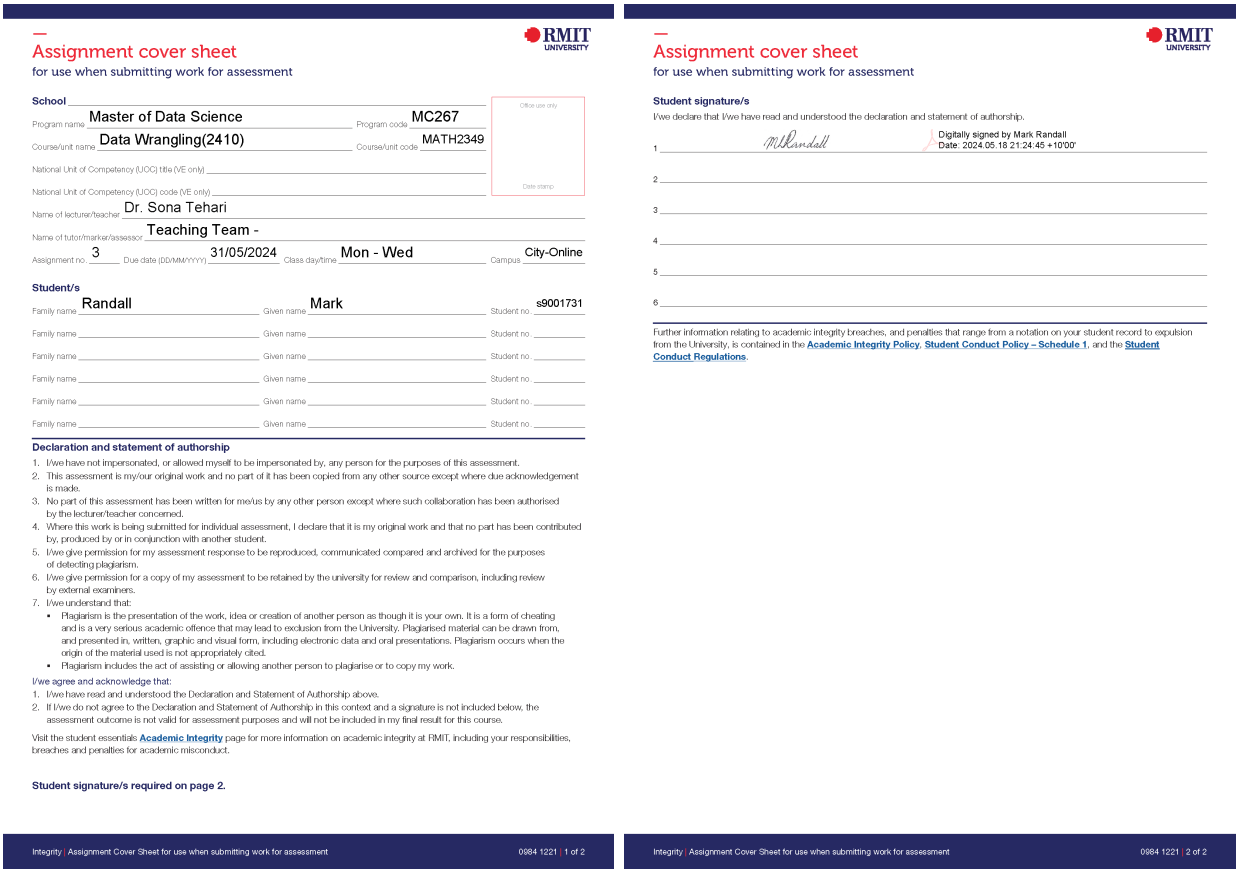
# Data Wrangling (Data Preprocessing)

## Practical Assessment 2

s9001731 Mark randall

2024-05-23



Assignment cover sheet

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RMIT UNIVERSITY

School

Program name: Master of Data Science — Program code: MC267

Course/unit name: Data Wrangling(2410) — Course/unit code: MATH2349

National Unit of Competency (UOC) title (VE only)

National Unit of Competency (UOC) code (VE only)

Office use only — Date stamp

Name of lecturer/teacher: Dr. Sona Tehari

Name of tutor/marker/assessor: Teaching Team -

Assignment no.: 3 — Due date (DD/MM/YYYY): 31/05/2024 — Class day/time: Mon - Wed — Campus: City-Online

**Student/s**

Family name: Randall — Given name: Mark — Student no.: s9001731

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2

3

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# Student names, numbers and percentage of contributions

Table 1: Group information

| Student name | Student number | Percentage of contribution |
|---|---|---|
| Mark Randall | s9001731 | 100 |

## Library Load

Package 1 : OpenStreetMap (Fellows & JMapViewer library by Jan Peter Stotz 2023)
Package 2 : tidyterra (Hernangómez 2024)
Package 3 : maptiles (Giraud 2024)
Package 4 : sf (Pebesma 2024)
Package 5 : sn (Azzalini 2023)
Package 6 : stats4 (R Core Team 2024a)
Package 7 : moments (Komsta & Novomestky 2022)
Package 8 : ggnewscale (Campitelli 2024)
Package 9 : Hmisc (Harrell Jr 2024)
Package 10 : validate (van der Loo & de Jonge 2024)
Package 11 : deducorrect (van der Loo, de Jonge & Scholtus 2015)
Package 12 : editrules (de Jonge & van der Loo 2024)
Package 13 : igraph (Csárdi et al. 2024)
Package 14 : deductive (van der Loo & de Jonge 2021)
Package 15 : tidyselect (Henry & Wickham 2024)
Package 16 : rvest (Wickham 2024)
Package 17 : here (Müller 2020)
Package 18 : glue (Hester & Bryan 2024)
Package 19 : magrittr (Bache & Wickham 2022)
Package 20 : lubridate (Spinu, Grolemund & Wickham 2023)
Package 21 : forcats (Wickham 2023a)
Package 22 : stringr (Wickham 2023b)
Package 23 : purrr (Wickham & Henry 2023)
Package 24 : tibble (Müller & Wickham 2023)
Package 25 : ggplot2 (Wickham et al. 2024)
Package 26 : tidyverse (Wickham 2023c)
Package 27 : kableExtra (Zhu 2024)
Package 28 : knitr (Xie 2024)
Package 29 : readxl (Wickham & Bryan 2023)
Package 30 : readr (Wickham, Hester & Bryan 2024)
Package 31 : dplyr (Wickham et al. 2023)
Package 32 : tidyr (Wickham, Vaughan & Girlich 2024)
Package 33 : openxlsx (Schauberger & Walker 2023)
Package 34 : stats (R Core Team 2024b)
Package 35 : graphics (R Core Team 2024c)
Package 36 : grDevices (R Core Team 2024d)
Package 37 : utils (R Core Team 2024e)
Package 38 : datasets (R Core Team 2024f)
Package 39 : methods (R Core Team 2024g)
Package 40 : base (R Core Team 2024h)

## Abstract

***"Most vehicular accidents in Victoria involve a male driver between 18 to 30 years of Age and a high powered car."***

This project will use some empirical data collected by the Victorian State Government(Vic 2024) to examine

this statement.

## Executive Summary

The Victoria Road Crash Data URL(Vic 2024) contains nine comma-separated value (csv) and one geo spatial java script object notation (GeoJSON) file. These were downloaded to a Data folder for examination. The files are:

```
csvFileNames <- list.files("../../Data",pattern = "*.csv", full.names = TRUE)
fullFileNames <- list.files("../../Data", full.names = TRUE)

for (file in fullFileNames) {
  cat(paste("-\t", file,"\n"))
}
```

- ../../Data/ACCIDENT.csv
- ../../Data/ACCIDENT_EVENT.csv
- ../../Data/ACCIDENT_LOCATION.csv
- ../../Data/ATMOSPHERIC_COND.csv
- ../../Data/NODE.csv
- ../../Data/PERSON.csv
- ../../Data/ROAD_SURFACE_COND.csv
- ../../Data/SUB_DCA.csv
- ../../Data/VEHICLE.csv
- ../../Data/VICTORIAN_ROAD_CRASH_DATA.geojson

```
#Create data frames fro csv files
vicRoadsDFList <- sapply(csvFileNames, read.csv)
#Change Key of list to mor HR form
names(vicRoadsDFList) <- c(gsub("../../Data/","", names(vicRoadsDFList)))
```

The URL indicates that the metadata was updated 29 April 2024, data observations updated as at 27 November 2024 and that observations temporal start was 1 January 2012.

```
posnOfDF <- 1
cat("These files have duplicated accident number keys in the data frame:")
```

These files have duplicated accident number keys in the data frame:

```
for (tmpDF in vicRoadsDFList) {
  if (n_distinct(tmpDF$ACCIDENT_NO) < dim(tmpDF)[[1]]) {
    cat(paste("-\t",names(vicRoadsDFList)[[posnOfDF]],"\n"))
  }
  posnOfDF <- posnOfDF + 1
}
```

- ACCIDENT_EVENT.csv
- ATMOSPHERIC_COND.csv
- NODE.csv

- PERSON.csv
- ROAD_SURFACE_COND.csv
- SUB_DCA.csv
- VEHICLE.csv

This would suggest that the ACCIDENT_NO key/attribute is a foreign key in these files. The following is a lst of the attributes/column names by data frame.

```
vecColNamesDF <- list()
posnCN <- 1
for (df in vicRoadsDFList) {
    vecColNamesDF[[names(vicRoadsDFList)[[posnCN]]]] <- colnames(df)

    posnCN <- posnCN + 1
}
# https://stackoverflow.com/questions/60199801/how-to-view-a-list-like-table-style-in-r
max_len <- max(lengths(vecColNamesDF))
df <- purrr::map_df(vecColNamesDF, ~c(., rep("", max_len -
    length(.))))
df[, 1:5] %>%
    kable(caption = "Attributes Files 1-4", longtable = TRUE,
        format = "latex", booktabs = TRUE) %>%
    kable_styling(font_size = 5)
```

Table 2: Attributes Files 1-4

| ACCIDENT.csv | ACCIDENT_EVENT.csv | ACCIDENT_LOCATION.csv | ATMOSPHERIC_COND.csv | NODE.csv |
|---|---|---|---|---|
| ACCIDENT_NO | ACCIDENT_NO | ACCIDENT_NO | ACCIDENT_NO | ACCIDENT_NO |
| ACCIDENT_DATE | EVENT_SEQ_NO | NODE_ID | ATMOSPH_COND | NODE_ID |
| ACCIDENT_TIME | EVENT_TYPE | ROAD_ROUTE_1 | ATMOSPH_COND_SEQ | NODE_TYPE |
| ACCIDENT_TYPE | EVENT_TYPE_DESC | ROAD_NAME | ATMOSPH_COND_DESC | AMG_X |
| ACCIDENT_TYPE_DESC | VEHICLE_1_ID | ROAD_TYPE | | AMG_Y |
| DAY_OF_WEEK | VEHICLE_1_COLL_PT | ROAD_NAME_INT | | LGA_NAME |
| DAY_WEEK_DESC | VEHICLE.1.COLL.PT.DESC | ROAD_TYPE_INT | | DEG_URBAN_NAME |
| DCA_CODE | VEHICLE_2_ID | DISTANCE_LOCATION | | LATITUDE |
| DCA_DESC | VEHICLE_2_COLL_PT | DIRECTION_LOCATION | | LONGITUDE |
| LIGHT_CONDITION | VEHICLE.2.COLL.PT.DESC | | | POSTCODE_CRASH |
| NODE_ID | PERSON_ID | | | |
| NO_OF_VEHICLES | OBJECT_TYPE | | | |
| NO_PERSONS_KILLED | OBJECT_TYPE_DESC | | | |
| NO_PERSONS_INJ_2 | | | | |
| NO_PERSONS_INJ_3 | | | | |
| NO_PERSONS_NOT_INJ | | | | |
| NO_PERSONS | | | | |
| POLICE_ATTEND | | | | |
| ROAD_GEOMETRY | | | | |
| ROAD_GEOMETRY_DESC | | | | |
| SEVERITY | | | | |
| SPEED_ZONE | | | | |
| RMA | | | | |

```
df[, 6:9] %>%
    kable(caption = "Attributes Files 5-9", longtable = TRUE,
        format = "latex", booktabs = TRUE) %>%
    kable_styling(font_size = 5)
```

Table 3: Attributes Files 5-9

| PERSON.csv | ROAD_SURFACE_COND.csv | SUB_DCA.csv | VEHICLE.csv |
|---|---|---|---|
| ACCIDENT_NO | ACCIDENT_NO | ACCIDENT_NO | ACCIDENT_NO |
| PERSON_ID | SURFACE_COND | SUB_DCA_CODE | VEHICLE_ID |
| VEHICLE_ID | SURFACE_COND_DESC | SUB_DCA_SEQ | VEHICLE_YEAR_MANUF |
| SEX | SURFACE_COND_SEQ | SUB_DCA_CODE_DESC | VEHICLE_DCA_CODE |
| AGE_GROUP | | | INITIAL_DIRECTION |
| INJ_LEVEL | | | ROAD_SURFACE_TYPE |
| INJ_LEVEL_DESC | | | ROAD_SURFACE_TYPE_DESC |
| SEATING_POSITION | | | REG_STATE |
| HELMET_BELT_WORN | | | VEHICLE_BODY_STYLE |
| ROAD_USER_TYPE | | | VEHICLE_MAKE |
| ROAD_USER_TYPE_DESC | | | VEHICLE_MODEL |
| LICENCE_STATE | | | VEHICLE_POWER |
| TAKEN_HOSPITAL | | | VEHICLE_TYPE |
| EJECTED_CODE | | | VEHICLE_TYPE_DESC |
| | | | VEHICLE_WEIGHT |
| | | | CONSTRUCTION_TYPE |
| | | | FUEL_TYPE |
| | | | NO_OF_WHEELS |
| | | | NO_OF_CYLINDERS |
| | | | SEATING_CAPACITY |
| | | | TARE_WEIGHT |
| | | | TOTAL_NO_OCCUPANTS |
| | | | CARRY_CAPACITY |
| | | | CUBIC_CAPACITY |
| | | | FINAL_DIRECTION |
| | | | DRIVER_INTENT |
| | | | VEHICLE_MOVEMENT |
| | | | TRAILER_TYPE |
| | | | VEHICLE_COLOUR_1 |
| | | | VEHICLE_COLOUR_2 |
| | | | CAUGHT_FIRE |
| | | | INITIAL_IMPACT |
| | | | LAMPS |
| | | | LEVEL_OF_DAMAGE |
| | | | TOWED_AWAY_FLAG |
| | | | TRAFFIC_CONTROL |
| | | | TRAFFIC_CONTROL_DESC |

The following details those tables with common attribute names and what those names are.

```
namesOfFile <- names(vecColNamesDF)
for (posnOne in 1:length(namesOfFile)) {
    cat(namesOfFile[[posnOne]], "at list no.", posnOne,
        "intersects with the following file:")
    cat("  \n")
    if (posnOne == length(namesOfFile)) {
        break
    }
    for (posnTwo in (posnOne + 1):length(namesOfFile)) {
        cat("-\t", namesOfFile[[posnTwo]], "at list no.",
            posnTwo, " with these attributes:")
        cat("  \n")
        cat("\t\t-\t", intersect(vecColNamesDF[[posnOne]],
            vecColNamesDF[[posnTwo]]))
        cat("  \n")

        posnTwo <- posnTwo + 1
    }
    cat("  \n")
    posnOne <- posnOne + 1

}
```

ACCIDENT.csv at list no. 1 intersects with the following file:
- ACCIDENT_EVENT.csv at list no. 2 with these attributes:

- ACCIDENT_NO
- ACCIDENT_LOCATION.csv at list no. 3 with these attributes:
- ACCIDENT_NO NODE_ID
- ATMOSPHERIC_COND.csv at list no. 4 with these attributes:
- ACCIDENT_NO
- NODE.csv at list no. 5 with these attributes:
- ACCIDENT_NO NODE_ID
- PERSON.csv at list no. 6 with these attributes:
- ACCIDENT_NO
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:
- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

ACCIDENT_EVENT.csv at list no. 2 intersects with the following file:
- ACCIDENT_LOCATION.csv at list no. 3 with these attributes:
- ACCIDENT_NO
- ATMOSPHERIC_COND.csv at list no. 4 with these attributes:
- ACCIDENT_NO
- NODE.csv at list no. 5 with these attributes:
- ACCIDENT_NO
- PERSON.csv at list no. 6 with these attributes:
- ACCIDENT_NO PERSON_ID
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:
- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

ACCIDENT_LOCATION.csv at list no. 3 intersects with the following file:
- ATMOSPHERIC_COND.csv at list no. 4 with these attributes:
- ACCIDENT_NO
- NODE.csv at list no. 5 with these attributes:
- ACCIDENT_NO NODE_ID
- PERSON.csv at list no. 6 with these attributes:
- ACCIDENT_NO
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:
- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

ATMOSPHERIC_COND.csv at list no. 4 intersects with the following file:
- NODE.csv at list no. 5 with these attributes:
- ACCIDENT_NO
- PERSON.csv at list no. 6 with these attributes:
- ACCIDENT_NO
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:
- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

NODE.csv at list no. 5 intersects with the following file:
- PERSON.csv at list no. 6 with these attributes:
- ACCIDENT_NO
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:
- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

PERSON.csv at list no. 6 intersects with the following file:
- ROAD_SURFACE_COND.csv at list no. 7 with these attributes:

- ACCIDENT_NO
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO VEHICLE_ID

ROAD_SURFACE_COND.csv at list no. 7 intersects with the following file:
- SUB_DCA.csv at list no. 8 with these attributes:
- ACCIDENT_NO
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

SUB_DCA.csv at list no. 8 intersects with the following file:
- VEHICLE.csv at list no. 9 with these attributes:
- ACCIDENT_NO

VEHICLE.csv at list no. 9 intersects with the following file:

## Data

Provide explanations here.

```
# Import the data, provide your R codes here.
```

## Understand

```
# This is the R chunk for the Understand Section
```

Provide explanations here.

## Tidy & Manipulate Data I

```
# This is the R chunk for the Tidy & Manipulate Data I
```

Provide explanations here.

## Tidy & Manipulate Data II

```
# This is the R chunk for the Tidy & Manipulate Data II
```

Provide explanations here.

## Scan I

```
# This is the R chunk for the Scan I
```

Provide explanations here.

## Scan II

```
# This is the R chunk for the Scan II
```

Provide explanations here.

## Transform

```
# This is the R chunk for the Transform Section
```

Provide explanations here.

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