

STAT40830 - Homework 1

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Introduction

This analysis presents a relationship between the **number of drivers killed** and time, before and after seatbelt legislation was introduced in the UK. The legislation came into effect in **January 1983**, and its impact can be observed through changes in the number of monthly road casualties.

The R built-in dataset used in this report is **Seatbelts** from the **datasets** package. It contains monthly UK road casualty statistics from **January 1969 to December 1984**, across various categories.

Understanding Dataset :

```
Time-Series [1:192, 1:8] from 1969 to 1985: 107 97 102 87 119 106 110 106 107 134 ...
- attr(*, "dimnames")=List of 2
..$ : NULL
..$ : chr [1:8] "DriversKilled" "drivers" "front" "rear" ...
```

The **Seatbelts** dataset has **192 monthly observations** and includes the following variables:

	DriversKilled	drivers	front	rear	kms	PetrolPrice	VanKilled	law
[187,]	79	1222	601	472	21486	0.1149360	7	1
[188,]	96	1284	644	521	21626	0.1147970	5	1
[189,]	122	1444	643	429	20195	0.1140932	7	1
[190,]	120	1575	641	408	19928	0.1164655	7	1
[191,]	137	1737	711	490	18564	0.1160261	4	1
[192,]	154	1763	721	491	18149	0.1160667	7	1

DriversKilled : Car drivers killed
drivers : Car drivers killed or seriously injured
front : Front-seat passengers killed or seriously injured
rear : Rear-seat passengers killed or seriously injured
kms : Distance driven (km)
PetrolPrice : Petrol price
VanKilled : Van driver casualties
law : 1 if seatbelt law is in effect, 0 otherwise

Data Summary :

Below is a descriptive summary of the main variable - 'DriversKilled' used in the graph:

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
60.0	104.8	118.5	122.8	138.0	198.0

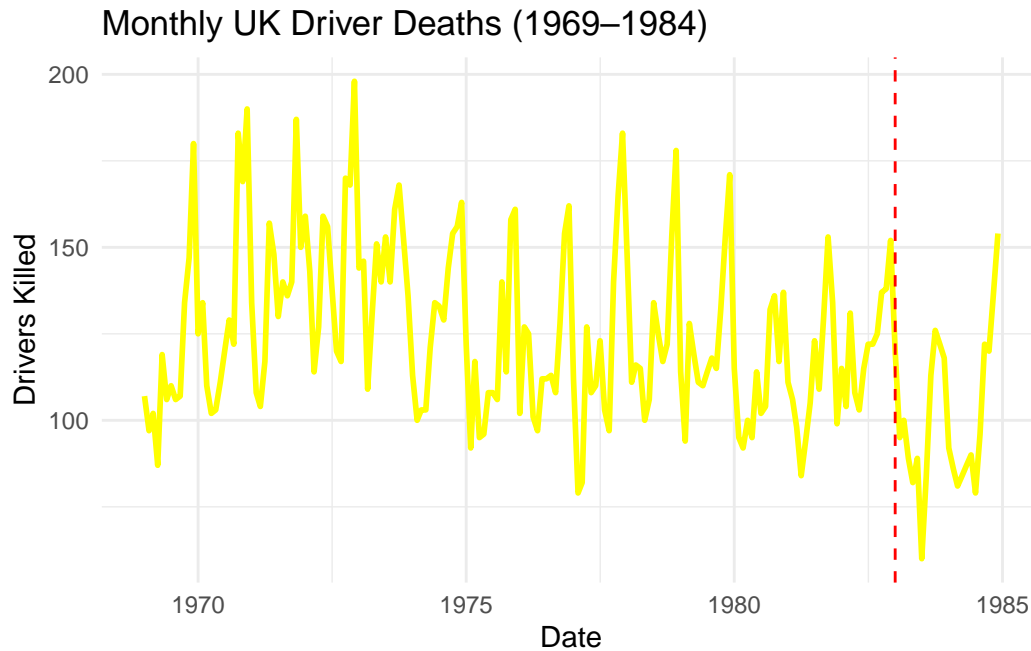
The number of drivers killed per month ranges from a **minimum of 60** to a **maximum of 198**, with a **median of 118.5**, indicating that half of the observations fall below this value.

The **mean is 122.8**, which is slightly higher than the median, suggesting a slight **right-skew** in the distribution.

The **1st quartile** is 104.8 and the **3rd quartile** is 138.0, showing that 50% of the values lie within this range.

Plot :

The following plot displays the number of **drivers killed per month**, with a red dashed line indicating the start of the seatbelt law.



Description of the Plot :

The time series plot illustrates the **monthly number of drivers killed in the UK from 1969 to 1984**. A clear **seasonal pattern** is visible, with regular peaks and troughs occurring each year, typically higher in certain months, likely corresponding to increased travel periods.

A **red dashed vertical line** marks **January 1983**, when **seatbelt legislation** was introduced. Following this date, there is a **notable decrease in fatalities**, suggesting that the implementation of mandatory seatbelt use had a **positive impact on road safety**, reducing the number of driver deaths in subsequent months.