

Statistical Modeling I

Practical in R

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In this practical, we will work with the Fire dataset. We will look at the predictive values and the creation of confidence and predictive intervals.

A fire insurance company wants to relate the amount of fire damage in major residential fires to the distance between the residence and the nearest fire station. The study was conducted in a large suburb of a major city; a sample of fifteen recent fires in the suburb was selected. The amount of damage, y (£000), and the distance, x (km), between the fire and the nearest fire station are given in the following table.

x	3.4	1.8	4.6	2.3	3.1	5.5	0.7	3.0
y	26.2	17.8	31.3	23.1	27.5	36.0	14.1	22.3
x	2.6	4.3	2.1	1.1	6.1	4.8	3.8	
y	19.6	31.3	24.0	17.3	43.2	36.4	26.1	

We define the values of x and y

```
> x<- c(3.4, 1.8, 4.6, 2.3, 3.1, 5.5, 0.7, 3.0, 2.6, 4.3, 2.1, 1.1, 6.1, 4.8,
        3.8)
> y<- c(26.2, 17.8, 31.3, 23.1, 27.5, 36.0, 14.1, 22.3, 19.6, 31.3, 24.0,
        17.3, 43.2, 36.4, 26.1)
```

Once we import the two variables in R, we can proceed with the Practical

1. Produce the fitted line plot
2. We set the values at which the confidence and prediction intervals are to be calculated from the smallest x to the largest. We call them $newx$ and one hundred values should be enough.

```
> newx <- seq(min(x), max(x), length.out=100)
```
3. Calculate the new predictive values and the relative confidence interval at all the values of $newx$
4. Similarly, calculate the new predictive values and the relative prediction interval
5. Looking at the values predictive with the confidence interval, what are we refer with $preds[2]$ and $preds[3]$?
6. Add the intervals to the plot by using the following commands:

```
> lines(newx, preds[,3], lty = 'dashed', col = 'blue')
> lines(newx, preds[,2], lty = 'dashed', col = 'blue')
> lines(newx, preds1[,3], lty = 'dashed', col = 'red')
> lines(newx, preds1[,2], lty = 'dashed', col = 'red')
```

what is in red and in blue? What can you say about the intervals?