

Analysing perception of the effectiveness of the Criminal Justice System using CSEW

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It all start with a question



Factors associated to the Confidence of the criminal Justice System

What are the factors associated with higher levels of confidence in the CJS?

Criminal Justice System (England and Wales)

- Police
- The Crown Prosecution Service (43 police forces E&W)
- The courts, HM Courts & Tribunals Service (HMCTS)
- The Ministry of Justice
- The Home Office
- The Attorney General Office
- Her Majesty's Prison & Probation Service
- The Crown Prosecution Service &
- Her Majesty's Crown Prosecution Service Inspectorate (HMCPPI)

Confidence and the Effectiveness of the CJS

- Effective justice systems protect the rights of all citizens against infringement of the law by others, including by powerful parties and governments (OECD, 2017).
- Trust and fairness also associated with confidence
- Effectiveness may be perceived differently according to the different CJS agencies
 - Effectiveness of the Courts
 - Effectiveness of prisons
 - Effectiveness of the police

Confidence in the effectiveness and fairness of the CJS is mixed, and varies according to demographic factors, as well as the type of involvement. (Sentencing Council, 2019)

“Predictors”

Involvement:

- Victims of crime or witnesses of certain types of crime were less likely to have confidence in the CJS than those who had not
- Those who reported having committed theft, vandalism or violence since the age of 16 were less likely to have confidence in the CJS than those who had not.

Demographics:

- Gender
- Age
- Ethnic group
- Income / level of neighbourhood deprivation

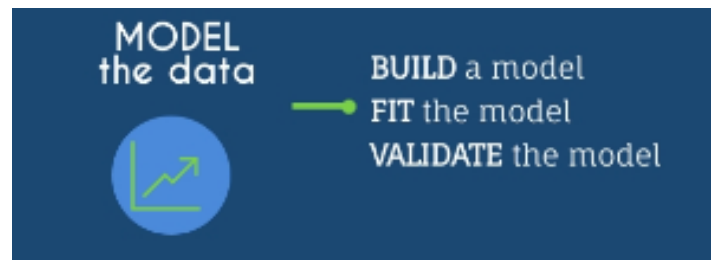
Where to start?



Data:

- Quantitative, qualitative (not covering here)
- Collecting our own data (expensive, long process, ethics, cumbersome)
- Using secondary data : CSEW, SCJS, etc

How to start?



Analytical model

- Capture the complexity of the topic:
 - theory, literature review
- Capture the complexity of the data
 - Different type of variables (continuous, binary, nominal, etc)
 - Fact measures facts: Age, ethnic groups, etc.
 - Subjective measures: opinion, perceptions, believes, etc

Multiple Linear Regression: A practical application

MLR models the **linear** association between a **continuous** dependent variable (also known as “outcome”) y and a set of **explanatory variables** (also known as “predictors”) $x_1, x_2, x_3 \dots x_n$.

$$y_i = \beta_0 + \beta_1 x_{i1} + \dots + \beta_n x_{in} + e_i$$

y_i = Outcome

β_0 = Intercept

β_1 = Slope (shows the effect of x on y)

e_i = residual

$x_1 \dots x_n$ = explanatory variables

Multiple Linear Regression: A practical application

This analysis **does not** allow us to make **causal inferences**, but it does allow us to investigate how a set of explanatory variables **is associated** with a dependent variable of interest.

Examples

- Estimate students' performance
- Estimate the confidence in the police

Brief: Simple Linear regression

- Predicts the value of a continuous dependent variable **y** and a **single explanatory variable x**

Example: Predicting dragons' weight given their heights



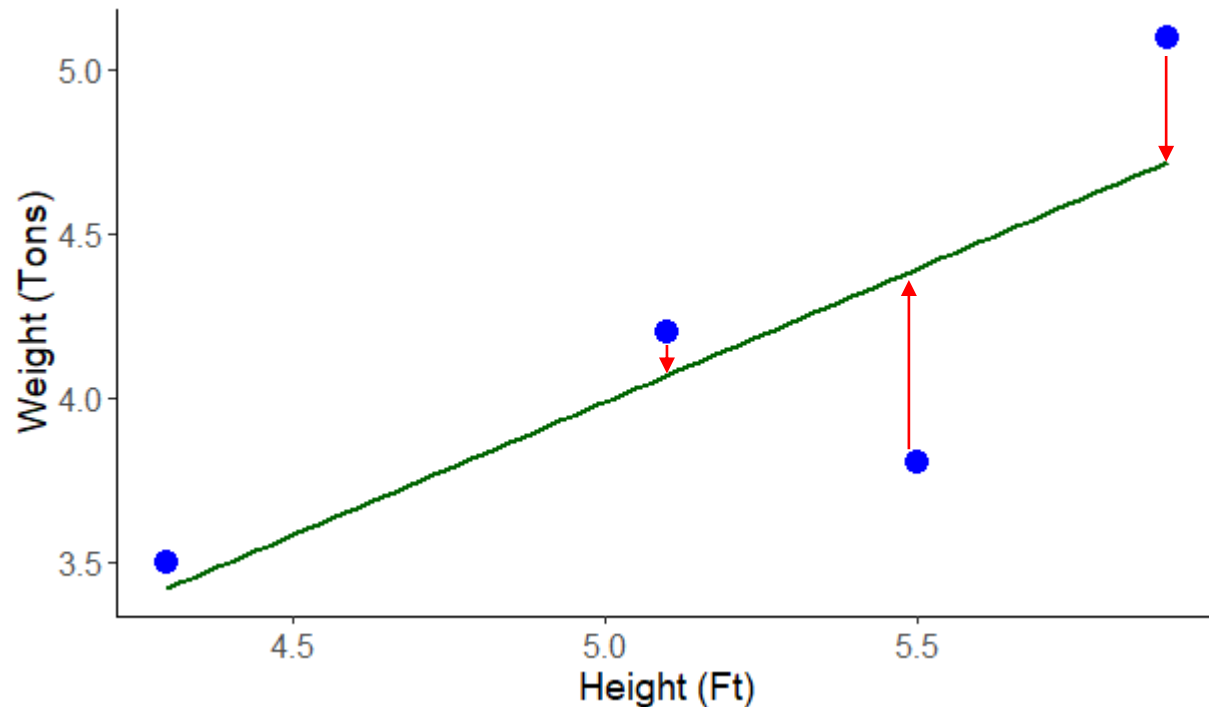
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pattern	weight	height
striped	4.2	5.1
spotted	3.5	43
spotted	3.8	5.5
striped	5.1	5.9

Predicting dragons' weight given height

We can predict one variable (weight) from the values of another variable (height).

But this relationship is never exact: Residuals e_i

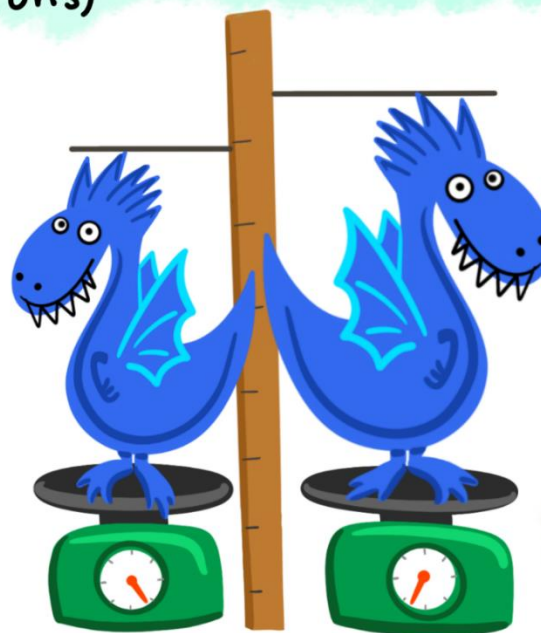


Predicting dragons' weight given heights

Interpretation of continuous explanatory variable: **height in tons**

	Estimate
(Intercept)	2.4
height	0.3

$$\text{Weight (tons)} = 2.4 + \underline{0.3}(\text{height}) + \dots$$



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if all other variables constant, we expect a 1 foot taller dragon to weigh 0.3 tons more, on average.

Predicting dragons' weight given height and pattern

Interpretation of binary explanatory variable:

Patter (0= striped and 1= spotted)

Coefficients:	
	Estimate
(Intercept)	2.4
height	0.3
pattern: spotted	0.6

$$\text{weight}_{(\text{tons})} = 2.4 + 0.6 * (\text{spotted}) + \dots$$

pattern reference
level: striped

if other variables constant,
spotted dragons will weigh
0.6 tons more than striped
dragons, on average.



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Predicting dragons' weight given height and pattern

Predicted value for weight (y): 3.9 tons

$$\text{Weight}_{(\text{tons})} = 2.4 + 0.6 * (\text{spotted}) + 0.3 * (\text{height}_{(\text{feet})})$$

0 5.1 ft

$$2.4 + 0.3 * 5.1 = 3.9 \text{ tons}$$

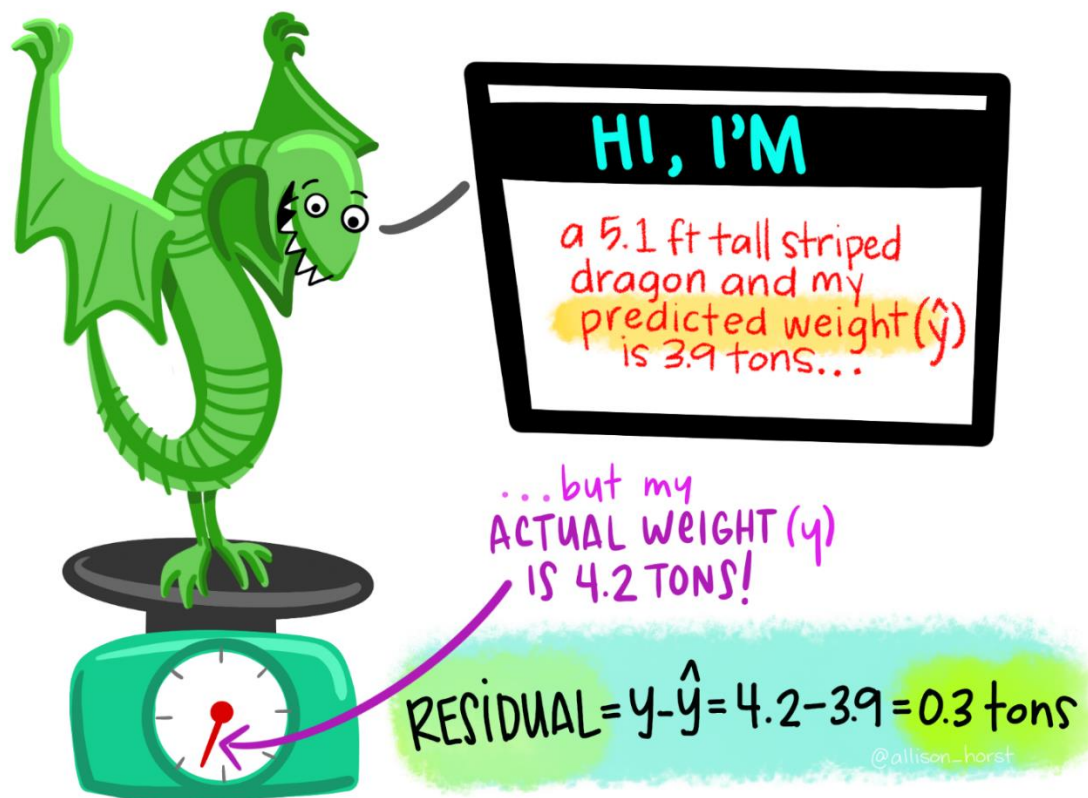


*dragons are dense

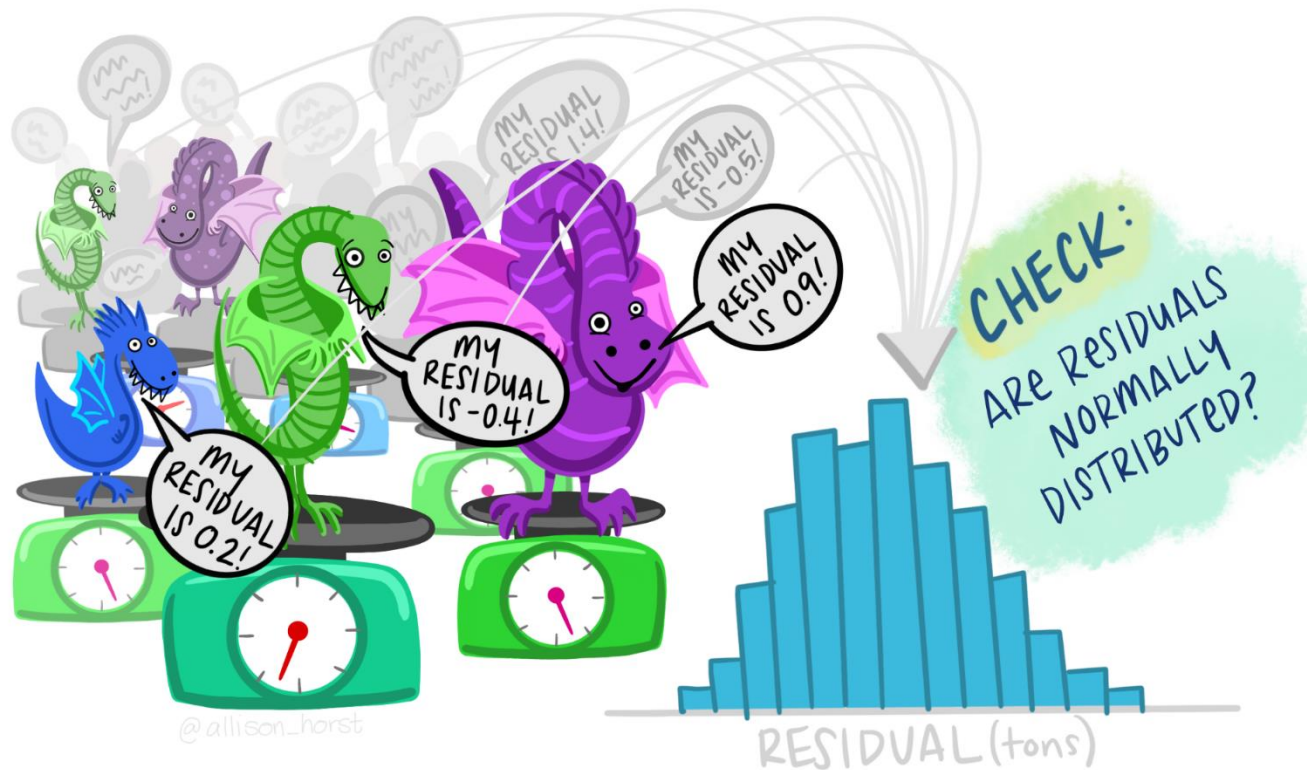
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Predicting dragons' weight given height and pattern

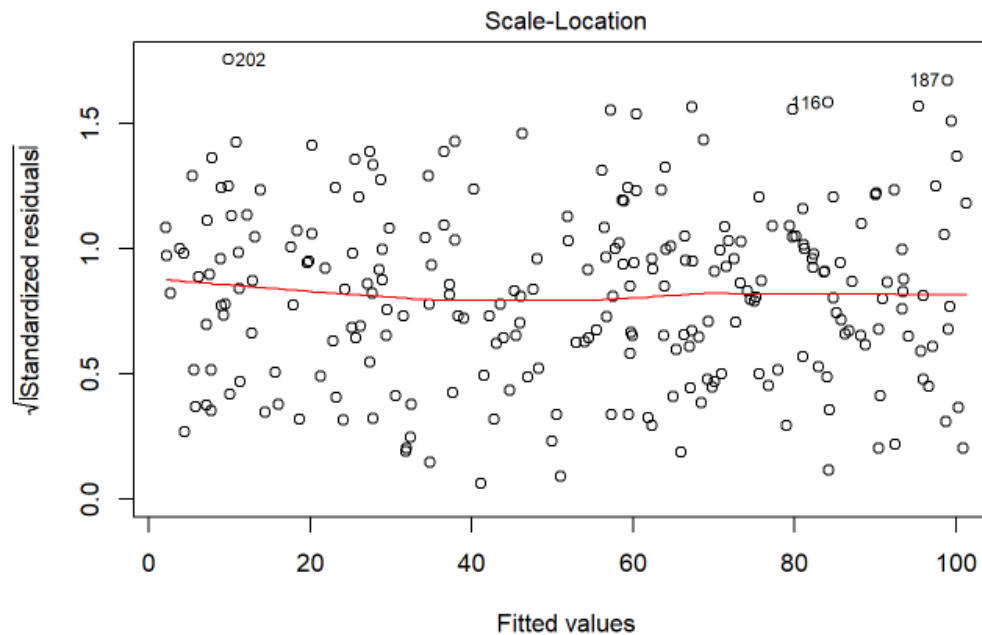
Residual (e): The **difference** between the actual value of y_i and the predicted \bar{y}_i



Assumptions: Normality of the residuals



MLR Assumptions: Equality of variance



Multiple Linear Regression

Aim

- To find a **straight line** to summarise the relationship between the dependent and independent variables
- This line is the line of **best fit** that minimises the sum of the squared residuals
 - Best does not mean necessarily “good”

Your turn using the CSEW teaching data set

Dependent variable:

Effectx: Effectiveness of Criminal Justice System (high score= high opinion) [**Derived from** cjspolb cjscpsb cjsrt2a cjsrt2b cjsp1b cjsp2b]

- **Cjspolb:** How confident are you that the police are effective at catching criminals? (Module A and B)
- **Cjscpsb:** How confident are you that the Crown Prosecution Service is effective at prosecuting people accused of committing a crime? (Module A and B)
- **Cjsrt2a:** How confident are you that the Courts are effective at dealing with cases promptly? (Module A and B)
- **Cjsrt2b:** How confident are you that the Courts are effective at giving punishments which fit the crime? (Module A and B)
- **Cjsp1b:** How confident are you that prisons are effective at punishing offenders who have been convicted of a crime? (Module A and B)
- **Cjsp2b:** How confident are you that prisons are effective at rehabilitating offenders who have been convicted of a crime? (Module A and B)

References

- OECD (2017), “Effectiveness and fairness of judicial systems”, in Government at a Glance 2017, OECD Publishing, Paris. (DOI: https://doi.org/10.1787/gov_glance-2017-91-en)
- Sentencing Council (2019). Public knowledge of and confidence in the Criminal Justice System and Sentencing. Retrieved online 28/01/2020: <https://www.sentencingcouncil.org.uk/wp-content/uploads/Public-Knowledge-of-and-Confidence-in-the-Criminal-Justice-System-and-Sentencing.pdf>
- Jansson, K. (2015). Public confidence in the Criminal Justice System – findings from the Crime Survey for England and Wales (2013/14). Retrieved online 28/01/2020: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/449444/public-confidence.pdf
- Field et al (2013). Discovering Statistics Using R. Sage Publications
- Gelman, A: Hill, J. (2007) Data Analysis using regression and multilevel/hierarchical models. Cambridge University Press.

Questions

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