Unemployment – Lab

**Goals**

* Revisit key concepts in probability using R

**Data Description**

* a cross-section from 1972
* number of observations: 4877

**References**

* Verbeek, Marno (2004) A guide to modern econometrics, John Wiley and Sons, http://www.econ.kuleuven.ac.be/GME, Chapter 7.
* Journal of Business Economics and Statistics web site : <http://www.amstat.org/publications/jbes/>.

**Variable definitions**

* **stateur:** state unemployment rate (in %)
* **statemb**: state maximum benefit level
* **state**: state of residence code
* **age**: age in years
* **tenure**: years of tenure in job lost
* **joblost**: multiple levels
* **nwhite** non-white ?
* **school12**: more than 12 years of school ?
* **sex**: (male, female)
* **bluecol**: blue collar worker ?
* **married**: married ?
* **dkids**: has kids ?
* **dykids**: has young kids (0-5 yrs) ?
* **yrdispl**: year of job displacement (1982=1,..., 1991=10)
* **head**: is head of household ?
* **ui**: applied for (and received) UI benefits ?

**Computing Independence of Events:**

A = Job lost due to slacking

B = Tenure less than 10 years

a) Are events A and B independent?

* Solve in a new data frame with the name: **independence**
* P(A) = Compute the probability of jobs lost due to slacking
* P(B) = Compute the probability of jobs lost with tenure less than 10 years
* Review:

Two events A and B are independent if and only if:

P(B | A) = P( B & A)/P(A) == 0.87209 != P(B) = 0.810949

P(A|B) = 0.51201 != P(A) == 0.47611

A and B are not independent events

**Computing conditional probability of events:**

Given that a person lost their job because they were slacking in their job, what is the probability that they are a white male?

A = Job lost due to slacking

B = Person is white

C = Person is male

b) What is P(BC|A)?

* Solve in a new data frame with the name: **conditioning**

P(B AND C AND A )/P(A) = .682601205

**PAUSE HERE, CHECK ANSWERS WITH CLASS, BRING FORWARD ANY QUESTIONS**

**Computing joint probability of events:**

A = Probability that the person is female

B = Probability that the person has young children

c) What is the probability that the unemployed is a female with young children?

* P(AB) = P(A) \* P(B|A)
* Solve in a new data frame with the name: **joint\_probability**

P(A and B) = 0.043674

**Computing additive probability of events:**

A = Probability that the person slacked at work

B = Probability that the position was abolished

d) What is the probability that a person loses their job because of slacking at work or position abolished?

* Compute: P(A) + P(B)
* Solve in a data frame with the name: **additive\_probability**

P(A) + P(B) = 0.55854

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**More open ended exercises:**

**What is the probability:**

1. That the unemployed is a non-white female with young children who lost her job because of slacking?

P(non white & female & has young kids & slacked) = 0.005741

1. That the unemployed are head of households in their 20s?

P(heads & age > 19 & age < 30) = 0.175927

1. That the unemployed lost one’s job after less than 5 years of employment

P(tenure < 5) = 0.6134919

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**More exercises:**

1. Is there a greater probability of unemployment due to slacking or due to other reasons?

P(slack) = 0.47611

P(other) = 0.405167

Greater probability of unemployment due to slacking

1. Is there a greater probability that the unemployed is male or female?

P(male) = 0.764199 P(female) = 0.235800

greater probability that the unemployed is male

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