Manual Annotation Reliability

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Where Does the Ground Truth Come From?

Convenience sample

- Star rating from customer reviews

Manual annotation

How Trustworthy Is Manual Annotation?

Reliability test

- If asking two or more people to mark the sentiment of a collection of tweets, to what extent will they agree with each other?

Inter-Coder Agreement

Raw agreement:

- a = count(agreed_items)/total_items

Problem with raw agreement:

- Skewed categories: 90% raw agreement in both tables

		Coder A	
		Positive	Negative
Coder B	Positive	45	5
	Negative	5	45

		Coder A	
		Positive	Negative
Coder B	Positive	90	10
	Negative	0	0

Cohen's Kappa

a = raw_agreement

c = chance_agreement

K = (a-c)/(1-c)

		Coder A	
		Positive	Negative
Coder B	Positive	45	5
	Negative	5	45

		Coder A	
		Positive	Negative
Coder B	Positive	90	10
	Negative	0	0

Cohen's Kappa

a = raw_agreement

c = chance_agreement

K = (a-c)/(1-c)

K=0.8

		Coder A	
		Positive	Negative
Coder B	Positive	45	5
	Negative	5	45

K=0

		Coder A	
		Positive	Negative
Coder B	Positive	90	10
	Negative	0	0

How to Calculate Kappa?

Given a confusion matrix of two coders

		Coder A	
		Positive	Negative
Coder B	Positive	45	5
	Negative	5	45

How to Calculate Kappa?

Calculate marginal distribution

		Coder A		
		Positive	Negative	
Coder B	Positive	45	5	50%
	Negative	5	45	50%
		50%	50%	

How to Calculate Kappa?

Calculate raw agreement (a = 0.9)

Calculate

- P (both A and B gives “positive” label) = 0.25
- P (both A and B gives “negative” label) = 0.25
- Chance_agreement: c = 0.25+0.25 = 0.5
- Kappa = (a-c)/(1-c) = (0.9-0.5)/(1-0.5) = 0.4/0.5 = 0.8

What Is Kappa for This?

		Coder A	
		Positive	Negative
Coder B	Positive	89	9
	Negative	1	1

$K = .139$

Tools to Calculate Kappa

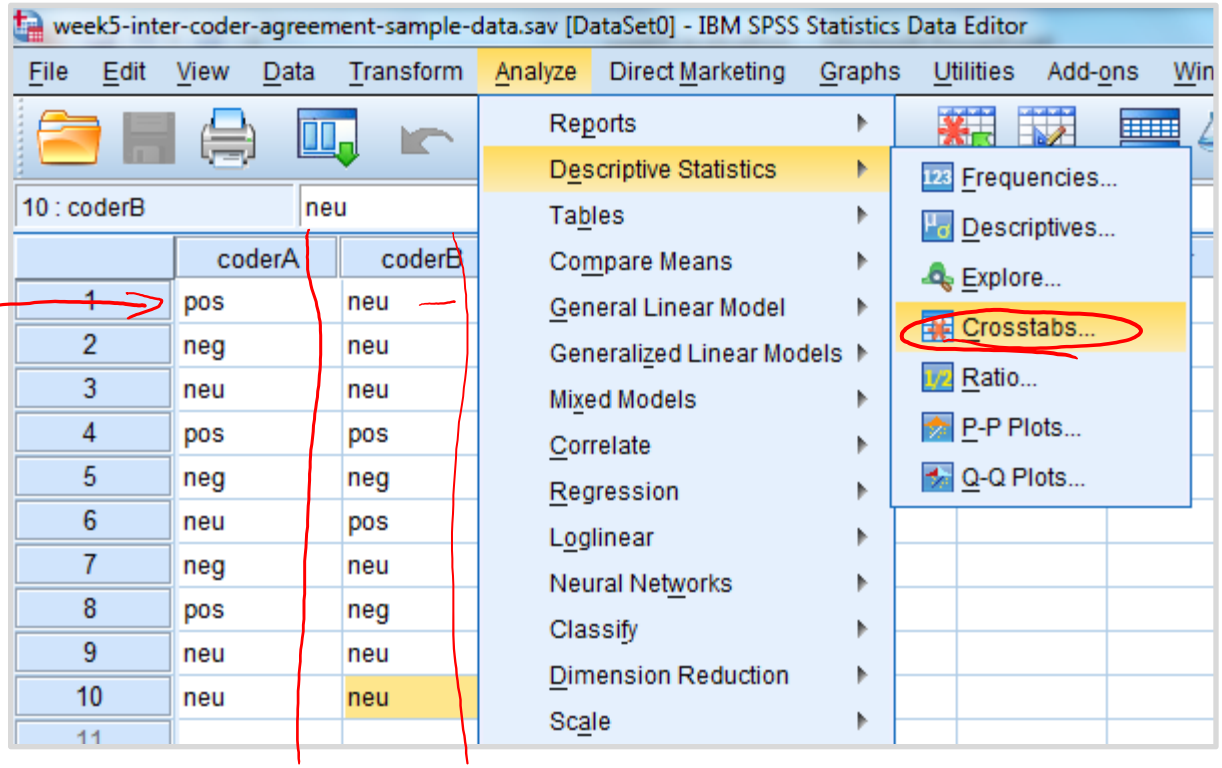
Online tool

- http://vassarstats.net/kappa.html

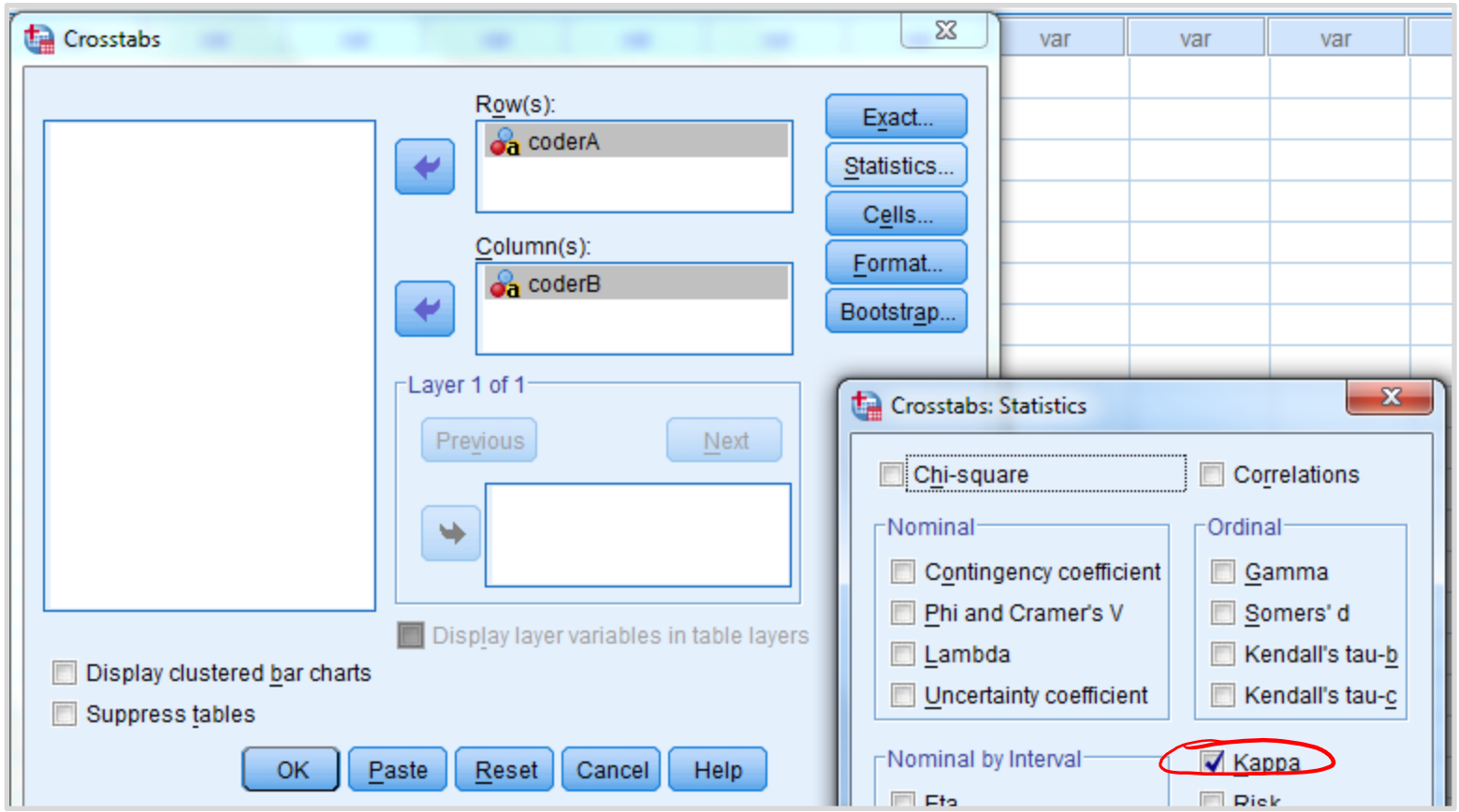
Statistical tools

- R package “irr”
- SPSS: crosstab function
- sklearn.metrics.cohen_kappa_score

Kappa Calculation in SPSS



Kappa Calculation in SPSS



Kappa Calculation in SPSS

coderA * coderB Crosstabulation

Count

		coderB			Total
		neg	neu	pos	
coderA	neg	1	2	0	3
	neu	0	3	1	4
	pos	1	1	1	3
Total		2	6	2	10

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	.219	.229	1.017	.309
N of Valid Cases		10			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Multiple Coders

Average Kappa

Kripendorff's Alpha

- http://afhayes.com/spss-sas-and-mplus-macros-and-code.html
- Search "kalpha"