**INTER-RATER RELIABILITY**

Cohen’s Kappa is a measure of the agreement between the two raters where agreement due to chance is factored out.

Fleiss’s Kappa is an extension of Cohen’s Kappa where number of raters can be more than two.

**Calculating Fleiss Kappa**

Categories are taken as columns. For our project, we will have 6 emotions – love, joy, surprise, anger, sadness and fear as categories.

Items are taken as rows. For our project, comments will be taken as items.

Here, we take an example consisting of 5 categories, 10 items and 14 raters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **CATEGORIES** |  |  |  |  |
|  |  | **Strongly Disagree** | **Mildly Disagree** | **Neutral** | **Mildly Agree** | **Strongly Agree** | **PAR** |
|  | **1** | 0 | 0 | 0 | 0 | 14 | **1** |
|  | **2** | 0 | 2 | 6 | 4 | 2 | **0.252747** |
|  | **3** | 0 | 0 | 3 | 5 | 6 | **0.307692** |
|  | **4** | 0 | 3 | 9 | 2 | 0 | **0.43956** |
| **ITEMS** | **5** | 2 | 2 | 8 | 1 | 1 | **0.32967** |
|  | **6** | 7 | 7 | 0 | 0 | 0 | **0.461538** |
|  | **7** | 3 | 2 | 6 | 3 | 0 | **0.241758** |
|  | **8** | 2 | 5 | 3 | 2 | 2 | **0.175824** |
|  | **9** | 6 | 5 | 2 | 1 | 0 | **0.285714** |
|  | **10** | 0 | 2 | 2 | 3 | 7 | **0.285714** |
|  | **PAC** | **0.142857** | **0.2** | **0.278571** | **0.15** | **0.228571** |  |

* For each row, we first calculate **proportionate of agreement** as -

(Sum of squares of all the values in a particular row) – Number of raters

Number of raters X (Number of raters – 1)

Eg. For row 2,

[ (2^2 + 6^2 + 4^2 + 2^2) – 14 ] / (14 X 13) = (60 – 14) / (14 X 13) = 0.252747

* For each column, we calculate **proportionate of agreement** as –

Sum of all the values in a particular column

Number of raters X Number of items

Eg. For column 2,

( 0+2+0+3+2+7+2+5+5+2) / (14 X 10) = 28 / 140 = 0.2

* Now, we define two values **Pbar** and **Pe** as mentioned below –

Pbar = Average of all the values in the column PAR

= 0.378021978

Pe = Sum of squares of all the values in the row PAC

= 0.212755102

* Finally we calculate **Kappa** value using Pbar and Pe as follows –

K = ( Pbar – Pe ) / ( 1 – Pe )

= 0.209930704

|  |  |
| --- | --- |
| **K Value** | **Interpretation of Agreement between Raters** |
| <0 | Poor |
| 0 - 0.20 | Slight |
| 0.21 - 0.40 | Fair |
| 0.41 - 0.60 | Moderate |
| 0.61 - 0.80 | Substantial |
| 0.81 - 1.0 | Almost perfect |