Correlation between the affection value and trust

The affection values in the data are from -2 to 2 (enemy, dislike, neutral, like, friend) and trust is a binary variable. In order to calculate correlations between the affection and trust, 5 separate binary matrices are created:

Enemy matrix: 1 where the affection matrix is -2, otherwise 0
Dislike matrix: 1 where the affection matrix is -1, otherwise 0
Neutral matrix: 1 where the affection matrix is 0, otherwise 0
Like matrix: 1 where the affection matrix is 1, otherwise 0
Friend matrix: 1 where the affection matrix is 2, otherwise 0

The matrices are created for each class at time 1 and at time 2. Afterwards, the nan values in the trust matrix (e.g. on the diagonal) are replaced by 0 and all matrices, including the trust matrix, are vectorized.

Then, the correlations between the trust vector and the affection vectors are calculated, attached to a list and the mean value for each affection type is calculated. The result is the following:

	Time 1	**Time 2**
Enemy	0.4850	0.4809
Dislike	0.4696	0.4662
Neutral	0.3911	0.3843
Like	0.4449	0.4443
Friend	0.7206	0.7441

Table 1: Average correlation between the trust vector and the affection vectors at two different times.

The problem with this correlation is that most values are 0 in the trust matrix and in the affection matrices. Therefore, there is a high correlation coefficient even if there is no position where both matrices have a 1. Therefore weighted correlation is introduced. Half of the weight is distributed between the positions that have a 0 in the trust matrix and half of the weight is distributed between the positions that have a 1 in the trust matrix. Thus, the weight is proportional to the inverse of the fraction of zeros and respectively ones.

We get: $w_1 = \frac{N_1 + N_0}{N_1}$ and $w_0 = \frac{N_1 + N_0}{N_0}$ where N_0 is the number of zeros in the trust matrix and N_1 is the number of ones in the trust matrix.

The resulting correlations are the following:

	Time 1	**Time 2**
Enemy	-0.0822	-0.0961
Dislike	-0.1449	-0.1606
Neutral	-0.4581	-0.4899
Like	-0.2148	-0.2218
Friend	0.6395	0.6897

Table 2: Average weighted correlation between the trust vector and the affection vectors at two different times.

This shows that there is a strong correlation between friendship and trust and no or negative correlation between enemy, dislike, like and trust.