

Figure 2. Identifying different COI relationships.

$$W_{i,j}^{NCite} = e^{-(\rho/\tau)(T^{Now} - T^{Cite} + 1)} W_{i,j}^{NCOI} \quad (1)$$

where  $W_{i,j}^{NCite}$  ranges (0,1],  $\rho$  is a constant value to indicate predefined decay parameter.  $\tau$  represents the number of citing papers produced from *authors* either with prior collaborative experiences or belonging to the same affiliation.  $T^{Now}$  denotes present time,  $T^{Cite}$  denotes citing time of a paper,  $T^{Now} - T^{Cite} + 1$  is the citing time interval,  $W_{i,j}^{NCOI}$  is the negative COI strength between citing paper and cited paper. Its value is determined by citing times, the interval of citing time, collaboration times, the interval of collaboration time and the team of citing authors. If two papers have negative suspected COI relationship, the citing strength is defined as follows:

$$W_{i,j}^{NSCite} = e^{-(\rho/\tau)(T^{Now} - T^{Cite} + 1)} W_{i,j}^{NSCOI} \quad (2)$$

where  $W_{i,j}^{NSCite}$  ranges (0,1], indicating the negative suspected COI strength between citing paper and cited paper.  $W_{i,j}^{NSCOI}$  is determined by above mentioned five factors. *Lastly*, based on CAJTRank algorithm [1], we construct a weighted PageRank algorithm, with HITS algorithm to rank publications and list top K publications. Meanwhile, in order to reasonably allocate the impact of one publication to different signed authors, a credit allocation algorithm is adopted [2]. The score of a publication is demonstrated as follows:

$$S(P_i) = \alpha \cdot WP(P_i) + \beta \cdot CA(P_i) + \gamma \cdot J(P_i) + \delta \cdot R(P_i) + (1 - \alpha - \beta - \gamma - \delta)/n \quad (3)$$

where  $S(P_i)$  is the prestige score of a manuscript.  $WP(P_i)$  is the score of weighted PageRank.  $CA(P_i)$  represents the credit score of the different signed authors of one paper.  $J(P_i)$  and  $R(P_i)$  are the prestige scores of journal and reference of one paper, respectively. Experimentally, the probability of random jump is set as 0.15,  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  are constants, ranging from 0 and 1, the sum of  $\alpha + \beta + \gamma + \delta$  is set as 0.85.

### 3. EXPERIMENTS & RESULTS

We evaluate the performance of the proposed PNCOIRank on two subsets PRC and PRE of American Physical Society dataset (<http://publish.aps.org>), including 71287 papers. Furthermore, we compare PNCOIRank with two representative schemes: CAJTRank and FutureRank algorithms, as shown in Figure 3. A multivariate linear regression is used to estimate the parameters of

the PNCOIRank, CAJTRank and FutureRank algorithms [3], and three groups of optimal parameters are estimated for the comparison of the accuracy of Recommendation Intensity (RI) [4]. According to Figure 3, we observe that the accurate rates of RI in CAJTRank and FutureRank algorithms are in between 0.557 and 0.7, and between 0.28 and 0.5 respectively. In comparison, accurate rates of RI of PNCOIRank are between 0.615 and 0.8, indicating that PNCOIRank outperforms CAJTRank and FutureRank over various K. The above observations demonstrate that PNCOIRank is better than the other two algorithms in terms of RI. By comparing CAJTRank and FutureRank, we find that the journal dimension is beneficial to improve the evaluation performance. Meanwhile, by comparing PNCOIRank and CAJTRank, the preceding results indicate that COI relationships, weighted PageRank and credit allocation algorithm of the authors can enhance the evaluation performance as well.

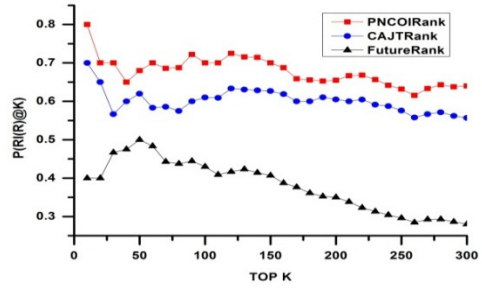


Figure 3. The probabilities of Recommendation Intensity of PNCOIRank, CAJTRank, and FutureRank algorithms.

### 4. CONCLUSION

This poster explores the effect of COI relationships and team relationships in evaluating the impact of scholarly publications. By joining the factors of citing times, the interval of citing time, collaboration times, the interval of collaboration time, and team of citing authors into the positive and negative COI-based evaluation method, we illustrate that COI relationships are universal phenomenon, and understanding the COI and team relationships is of great importance to effectively evaluate scientific entities, such as scholarly publications, scholars, journals and institutions. Meanwhile, our PNCOIRank algorithm can evaluate the impact of scholarly articles more objectively.

### 5. REFERENCES

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