

Assume that you are given a query vector $q=(2,3,1,2,5)$, three documents identified as relevant by a user (d_1, d_2, d_3), and two irrelevant documents (d_4, d_5).

$$\begin{aligned} d_1 &= (3,3,2,0,9) & d_4 &= (1,0,0,7,2) \\ d_2 &= (2,2,1,0,12) & d_5 &= (0,1,0,8,3) \\ d_3 &= (3,2,1,0,9) \end{aligned}$$

Compute the modified query, using the Standard Rochio method. Remember that the Rochio method is given by the formula:

$$\vec{q}' = \alpha \vec{q} + \frac{\beta}{|D_r|} \sum_{\forall \vec{d}_j \in D_r} \vec{d}_j - \frac{\gamma}{|D_n|} \sum_{\forall \vec{d}_j \in D_n} \vec{d}_j$$

where D_r is the set of the **known** relevant and D_n is the set of irrelevant documents. Use equal weight for the original query, the relevant documents, and the irrelevant ones, $\alpha=\beta=\gamma=1$.

q'	(4.16,4.83,2.33,-5.5,12.5)
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$$\text{ANS: } q' = (2,3,1,2,5) + (8,7,4,0,30)/3 - (1,1,0,15,5) /2 = (2,3,1,2,5) + (2.66,2.33,1.33,0,10) - (0.5,0.5,0,7.5,2.5) = (4.16,4.83,2.33,-5.5,12.5)$$

Solve the same problem for the Ide method and the Ide “Hi Dec” method.