



# BioTriangle

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--BioCCI, BioPPI, BioDDI



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The descriptor calculation of chemical-chemical interaction, protein-protein interaction, and DNA/RNA-DNA/RNA interaction is similar to each other in BioCCI, BioPPI and BioDDI. Next, we will show how to construct an interaction feature by the protein-protein interaction example.

### **Protein-protein interaction descriptors**

Let  $\mathbf{F}_a = \{\mathbf{F}_a(i), i = 1, 2, \dots, p\}$  and  $\mathbf{F}_b = \{\mathbf{F}_b(i), i = 1, 2, \dots, p\}$  are the two descriptor vectors for interaction protein A and protein B, respectively. There are three methods to construct the interaction descriptor vector  $\mathbf{F}$  for A and B:

(1) Two vectors  $\mathbf{F}_{ab}$  and  $\mathbf{F}_{ba}$  with dimension of  $2p$  are constructed:  $\mathbf{F}_{ab} = (\mathbf{F}_a, \mathbf{F}_b)$  for interaction between protein A and protein B and  $\mathbf{F}_{ba} = (\mathbf{F}_b, \mathbf{F}_a)$  for interaction between protein B and protein A.

(2) One vector  $\mathbf{F}$  with dimension of  $2p$  is constructed:  $\mathbf{F} = \{\mathbf{F}_a(i) + \mathbf{F}_b(i), \mathbf{F}_a(i) \times \mathbf{F}_b(i), i = 1, 2, \dots, p\}$ .

(3) One vector  $\mathbf{F}$  with dimension of  $p^2$  is constructed by the tensor product:  $\mathbf{F} = \{\mathbf{F}(k) = \mathbf{F}_a(i) \times \mathbf{F}_b(j), i = 1, 2, \dots, p, j = 1, 2, \dots, p, k = (i-1) \times p + j\}$ .