# Modeling attractive and repulsive forces between semantic structures

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## Initial Notes

The attractive / repulsive force between semantic structures (**SARF**) acts on different (larger) scales compared to the attractive / repulsive force between properties (**PARF**).

Discovery of mutual attraction happens through regional exploration. Let us have a new semantic structure constructed from recently parsed data. The chances are that all semantic structures which are attracted to are in the vicinity of .

Let us consider a newly formed semantic structure . The closest already formed semantic structure will be denoted with . On an aggregation level the nearby semantic structure can be represented as a graph of substructures all of which belong to the set . With we denote the power set of . We want to compute the attractive force between and .

**Case 1)**. There are already formed instances of *substructures* from which are close to some of the already formed instances of .

Let us assume that there are other structures involving previous instances of - , , …, . For brevity we will denote the set with . Let us assume that in the neighborhoods of the elements of there are instances of elements in .

Let us denote with the instances of the elements from which are in the neighborhood of . Let us denote with the number of those instances . We will denote each element of by where .

Obviously, we know masses, energy signatures and the semantic distances between and the elements of .

We would like to estimate the attractive force between and by using the information stored in the pairs and for and . Let us assume that we know the attractive / repulsive force for each of those pairs for the current moment in time . Let us denote the masses of those two sets of structures with and accordingly for and . Let us denote with the semantic distance between the pair and for the current moment in time .

**Case 2)** There are already formed instances of *substructures* from which are close to some of the already formed instances of .

**Case 3)** There are already formed instances of *substructures* from which are close to some of the already formed instances of *substructures* of .

**Case 4)** There are neither previously formed instances nor instances of substructures for both A and B.

In this case we will look for similarity and assess the degree of similarity.

## Estimation of the attractive force between two structures

Let us have two structures and which are in bound positions. We will denote with the position of the centroid of in general. Similarly, with we denote the position of the centroid of in general. The centroid of the compound structure is given with . We denote with and the semantic distances from the bound positions of and to the centroid of the compound structure . Let us denote with and the semantic energies of and in bound state. With and we denote the semantic masses of and .

Let us denote by the set of structures which are already assigned force particles such that . With we denote the set of structures which are already assigned force particles such that