

1 Question 1:

The optimal parameters for determining the sum of a set of integers would be bias equal to zero, and the weights of all fully connected layers equal to 1. Indeed, sets are padded with zeros, and each non-zero element of the set has a weight of 1 in the sum of the set. Between the two convolution layers there is already a sum-aggregator which sums the outputs of the first fully connected layer.

2 Question 2:

In DeepSets the same function ϕ is used for all element in the set, while in GNN the function ϕ applied to nodes might change from one node to one another. A set and a graph without edges are unordered series of elements, therefore there is no difference between the two.

3 Question 3:

The embedding layer to map the nodes into a vector space allows to compare nodes between them. They are all into the same continuous vector space, it's possible to use operations on nodes. On the contrary, in the space of node, the only comparison possible between two nodes is the node Id, which carries no information ! The fully connected layer would be confused by this ordered relation between nodes, and won't work well.

4 Question 4:

DeepSets shouldn't be applied to the above problem. The recommendation task depends a lot of the order between items, because there the clicks of an internet user are ordered (in time), while DeepSets works on unordered data.