A best fit algorithm for the three dimensional bin packing problem

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In this work, we consider the problem of selecting containers in order to pack a set of cuboid boxes in minimizing the unused space inside the selected containers. The set of boxes is highly heterogeneous while there are few types of containers to select. In the literature, this problem is called a three dimensional Multiple Bin Size Bin Packing Problem (MBSBPP). In addition to the geometry constraints, some additional constraints encountered in practical packing situations are considered: the container weight limit, the orientation constraints, the load stability, the load-bearing strength or fragility of the boxes and the weight distribution within a container. Moreover, as the original problem is an air cargo application, we extend the definition of the MBSBPP to include situations in which the bins may be truncated parallelepipeds. Indeed, in this context, containers are called Unit Load Devices (ULD) and may have specific shapes to fit inside aircraft.

We present here a best fit decreasing algorithm for this specific problem and test it on sets of real data. The aim is to find good initial solutions in short computational times. The results are compared to those obtained with a traditional branch-and-bound resolution.