**Parallel Approximation Algorithms for Bin Packing**

Bin packing takes a given number of items and bins, each of a pre-defined volume, and seeks to find a way to pack the items in the fewest possible bins. An optimal solution to this problem has important real world consequences since bin packing is an important function for many businesses such as freight shipping companies.[2] Efficient bin packing algorithms could also be used to schedule processor tasks based on their expected run time. [1]

The bin packing problem is NP-complete, which means the algorithm is not parallelizable. Approximation algorithms for bin packing may be parallelizable, and in this paper the authors demonstrate a parallel implementation of the First Fit Decreasing (FFD) heuristic algorithm that runs in O(log n) time. [1]

FFD looks at the items to be packed in size order from largest to smallest and places each item in the first available bin large enough to hold the item. Anderson et al. provide a proof that the FFD algorithm is P-Complete, which means the algorithm is inherently sequential. [1]

Anderson et al. produce an algorithm that approximates FFD. In their version of FFD the size of all items are between 0 and 1. The algorithm runs in two steps. First it packs all items of size greater than or equal to 1/6 according. In the second step it packs the remaining items in a greedy fashion, ensuring that each bin is filled to a value of at least 5/6 before filling any further bins. [1]

[1]R. Anderson, E. Mayr and M. Warmuth, 'Parallel approximation algorithms for bin packing', *Information and Computation*, vol. 82, no. 3, pp. 262-277, 1989.

[2] American Mathematical Society, 'Feature Column from the AMS - Bin Packing', 2015. [Online]. Available: http://www.ams.org/samplings/feature-column/fcarc-bins1.