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**Algorithm 1:** Algorithm with Prediction for the Bounded Allocation Problem.

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1 Initialize the variables and the level sets
2 for each new item  $j$  do
3   Let  $i^*$  be the predicted buyer of item  $j$ , formally,  $\text{pred}(j) = i^*$ 
4   while there exists  $i \in S_j$  who spends less than  $\eta$  fraction of its budget do
5      $\lfloor$  Continuously allocate fractions of  $j$  to buyers on the lowest levels // Stage 1
6
7   repeat
8      $\lfloor$  Continuously allocate fractions of  $j$  to  $i^*$  // Stage 2
9   until either:
      •  $(1 - \eta)$  fraction has been allocated to  $i^*$ 
      • or  $j$  is completely sold
      • or  $i^*$  exhausted its budget
10
11 while there exists  $i \in S_j$  with non-exhausted budget and  $j$  is not completely sold do
12    $\lfloor$  Continuously allocate fractions of  $j$  to buyers on the lowest levels // Stage 3
```

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