Appendix

Pseudo-codes for the exact algorithm and the heuristic derived from this approach

Algorithm 2 Pseudo-code for the algorithm by Roodbergen & de Koster (2001a)

Input: problem data (containing number of picking aisles m);

compute sum of edge weights for each configuration and picking aisle;
construct L_1^{+1}-PTS by adding configurations for subaisle 1 of block #1 to an empty graph;
for equivalence classes $i = 1$ to 25 **do**
  determine the L_1^{+1}-PTS of class i with the smallest sum of edge weights;
end for
for equivalence classes $i = 1$ to 25 **do**
  construct L_1^{+2}-PTS by adding configurations for subaisle 1 of block #2 to L_1^{+1}-PTS of class i;
end for
for equivalence classes $i = 1$ to 25 **do**
  determine the L_1^{+2}-PTS of class i with the smallest sum of edge weights;
end for
for picking aisles $j = 2$ to m **do**
  for equivalence classes $i = 1$ to 25 **do**
    construct L_j^{-}-PTS by adding configurations for movements between picking aisles $j-1$ and j to L_{j-1}^{+2}-PTS of class i;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    determine the L_j^{-}-PTS of class i with the smallest sum of edge weights;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    construct L_j^{+1}-PTS by adding configurations for subaisle j of block #1 to L_j^{-}-PTS of class i;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    determine the L_j^{+1}-PTS of class i with the smallest sum of edge weights;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    construct L_j^{+2}-PTS by adding configurations for subaisle j of block #2 to L_j^{+1}-PTS of class i;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    determine the L_j^{+2}-PTS of class i with the smallest sum of edge weights;
  end for
end for
out of classes $2, 3, \ldots, 9$, determine the L_m^{+2}-PTS with the smallest sum of edge weights;

Algorithm 3 Pseudo-code for the heuristic derived from the exact solution approach

Input: problem data (containing number of picking aisles $\tilde{m}$), percentage p;

compute sum of edge weights for each configuration and picking aisle;
apply the algorithm by Roodbergen & de Koster (2001a) with $m := \lceil p \cdot \tilde{m} \rceil$;
for pickings aisles $j = \lceil p \cdot \tilde{m} \rceil + 1$ to $\tilde{m}$ **do**
  for equivalencees class $i = 1$ to 25 **do**
    construct L_j^--PTS by adding configurations for movements between picking aisles $j - 1$ and j to L_{j-1}^{+2}-PTS of class i;
  end for
  determine the L_j^--PTS (denoted by L_j^*) with the smallest sum of edge weights;
  construct L_j^{+1}-PTS by adding configurations for subaisle j of block #1 to L_j^*;
  if L_j^* does not belong to any of the classes $3, 4, 6, 7, 8$ or 9 **then**
    out of classes $3, 4, 6, 7, 8$ and 9, determine the L_j^--PTS (denoted by L_j^{**}) with the smallest sum of edge weights;
    construct additional L_j^{+1}-PTS by adding configurations for subaisle j of block #1 to L_j^{**};
  end if
  for equivalence classes $i = 1$ to 25 **do**
    determine the L_j^{+1}-PTS of class i with the smallest sum of edge weights;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    construct L_j^{+2}-PTS by adding configurations for subaisle j of block #2 to L_j^{+1}-PTS of class i;
  end for
  for equivalence classes $i = 1$ to 25 **do**
    determine the L_j^{+2}-PTS of class i with the smallest sum of edge weights;
  end for
end for
out of classes $2, 3, \ldots, 9$, determine the L_m^{+2}-PTS with the smallest sum of edge weights;