Homework 5

Association Rule Mining

1. Trace the results of using the Apriori algorithm on the grocery shop with support threshold 33.34% and confidence threshold 60%. Show the candidate and frequent itemsets for each database scan. Enumerate all the final frequent itemsets. Also indicate the association rules that are generated and highlight the strong ones, sort them by confidence.

   T1: Hot Dogs, Buns, Ketchup
   T2: Hot Dogs, Buns
   T3: Hot Dogs, Coke, Chips
   T4: Chips, Coke
   T5: Chips, Ketchup
   T6: Hot Dogs, Coke, Chips

2. Trace the results of using the Apriori algorithm on the computer shop with support threshold 70% and confidence threshold 80%. Show the candidate and frequent itemsets for each database scan. Enumerate all the final frequent itemsets. Also indicate the association rules that are generated and highlight the strong ones, sort them by confidence.

   T1: Tri-pod, Lens, bag
   T2: Camera, Lens, bag
   T3: Camera, Tri-pod, Lens, Memory card
   T4: Camera, Tri-pod, Lens, bag
   T5: Lens, Memory card, bag

Optimization

1. Use the hill climbing strategy discussed in class to solve the following bin packing problem. Use the heuristic of selecting the smallest item next.

   Capacity of each bin is 10.

   The height of the items are 2, 4, 3, 7, 5, 6, 8, 3, 4

2. Using the simulated annealing strategy described in class to see if you can find a better solution than the hill climbing strategy using 5 iterations. Here is what you’ll need to know:

   a. T = 5 initially. It decreased by 1 after each iteration
   b. You decide (randomly) whether to merge or split
   c. You decide (randomly) which bin to split (and how) or which two bins to merge
d. Here are the random numbers that you’ll need to decide if you need to reject:

0.4
0.85
0.6
0.9
0.01

You reject if <insert random number> is greater than $e^{(-\Delta B/T)}$

Clearly explain your random choices.
Clearly indicate your steps and the 5 iterations.