Session 8. Handling Multiple Constraints

How to Handle Multiple Constraints?

- It is beneficial to use multiple constraints in pattern mining
- But different constraints may require potentially conflicting item-ordering
  - If there exists an order *R* making both c_1 and c_2 convertible, try to sort items in the order that benefits pruning most
  - If there exists conflict ordering between c_1 and c_2
    - Try to sort data and enforce *one constraint* first (which one?)
    - Then enforce the other when mining the projected databases
- Ex. c_1: avg(*S*.profit) **>** 20, and c_2: avg(S.price) < 50
  - Sorted in profit descending order and use c_1 first (assuming c_1 has more pruning power)
  - For each project DB, sort trans. in price ascending order and use c_2 at mining

Summary

- Different kinds of constraints lead to different pruning strategies
- Pattern space pruning with
  - Pattern anti-monotonic constraints vs. pattern monotonic constraints
- Data space pruning with
  - Data anti-monotonic constraints
- Data and pattern space pruning with succinct constraints
- Pattern space pruning with convertible constraints
- Handling multiple constraints

Recommended Readings

- R. Srikant, Q. Vu, and R. Agrawal, “Mining association rules with item constraints”, KDD'97
- R. Ng, L.V.S. Lakshmanan, J. Han & A. Pang, “Exploratory mining and pruning optimizations of constrained association rules”, SIGMOD’98
- G. Grahne, L. Lakshmanan, and X. Wang, “Efficient mining of constrained correlated sets”, ICDE'00
- J. Pei, J. Han, and L. V. S. Lakshmanan, “Mining Frequent Itemsets with Convertible Constraints”, ICDE'01
- J. Pei, J. Han, and W. Wang, “Mining Sequential Patterns with Constraints in Large Databases”, CIKM'02
- F. Bonchi, F. Giannotti, A. Mazzanti, and D. Pedreschi, “ExAnte: Anticipated Data Reduction in Constrained Pattern Mining”, PKDD'03
- F. Zhu, X. Yan, J. Han, and P. S. Yu, “gPrune: A Constraint Pushing Framework for Graph Pattern Mining”, PAKDD'07