1023-90-1158   **Jeffrey Heath*** (`jheath@math.umd.edu`), Department of Mathematics, Mathematics Building, Univ. of Maryland, College Park, MD 20742-4015, and **Michael Fu** and **Wolfgang Jank**. *Global Optimization in Model-Based Clustering.*

The Expectation-Maximization (EM) algorithm is a very popular optimization tool in model-based clustering problems. However, while the algorithm is convenient to implement, it only produces solutions that are locally optimal, and thus may not achieve the globally optimal solution. This paper introduces several new algorithms designed to produce global solutions in model-based clustering problems. The building blocks for these algorithms are methods from the operations research community, namely the Cross-Entropy (CE) method and Model Reference Adaptive Search (MRAS). One problem with applying these algorithms directly is the efficient simulation of positive definite covariance matrices. We propose several solutions to this problem. One solution is to apply the principles of EM, which leads to two new algorithms, CE-EM and MRAS-EM. We also propose two additional algorithms, CE-CD and MRAS-CD, which rely on the Cholesky decomposition. From our numerical experiments, we find that although the new algorithms are slower than EM, they have the potential of producing significantly better global solutions to the model-based clustering problem. (Received September 25, 2006)