Pros and Cons of the k-means Algorithm

Advantages

✓ simple to understand and implement

✓ very fast (compute distances $+ \arg\min$ and mean operations)

Convergence analysis

✗ only converges to a local minimum of $J(\mathcal{C})$

✗ many restarts are necessary in practice (thousands)

Limitations

✗ each instance belongs to one cluster (crisp assignment)

✗ fuzzy extensions compute memberships to each cluster