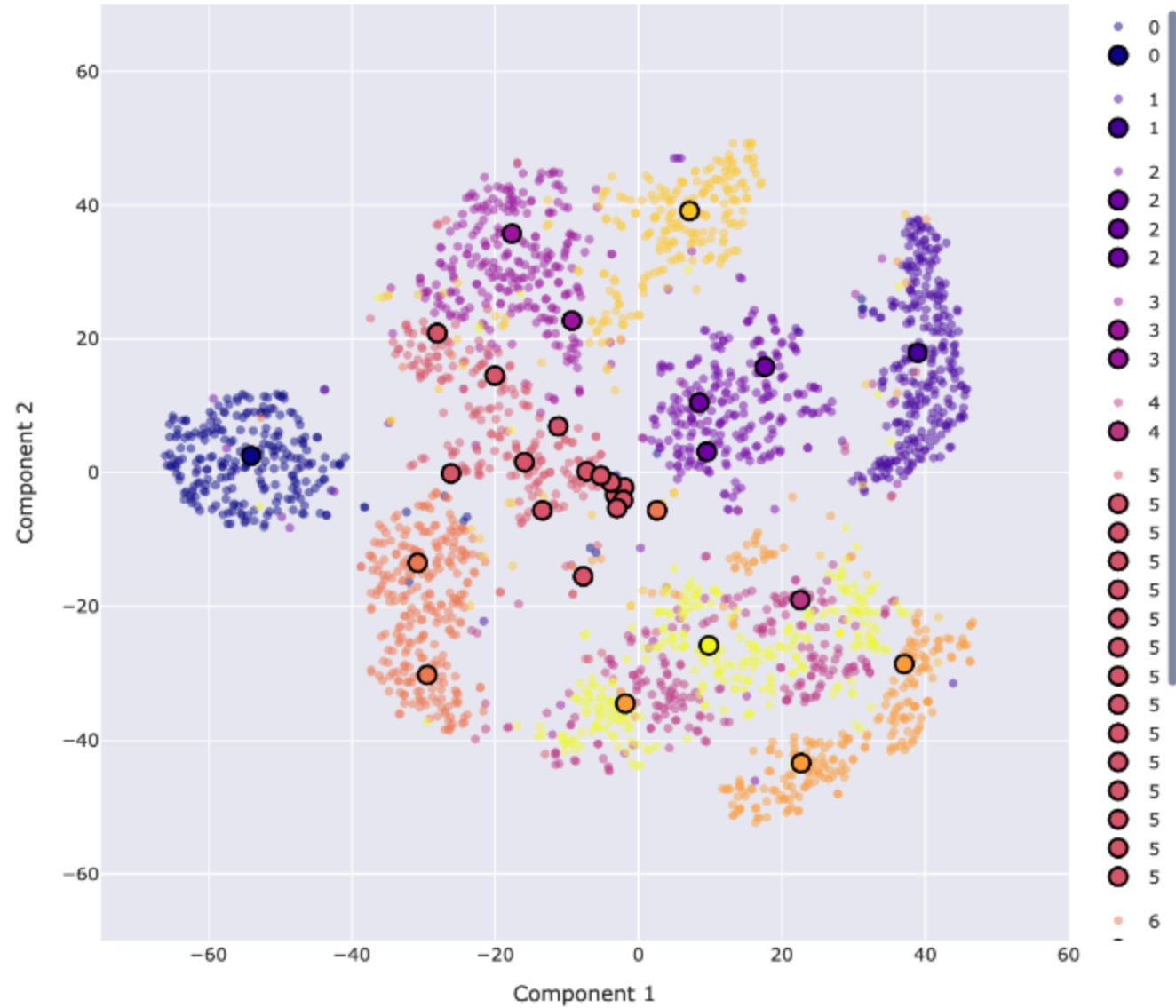# Clusters

Gradient-Based Clustering

The optimization problem is:

$$\arg \min_{S, \gamma_j \geq 0} |S| \quad \text{s.t.} \quad \max_{w \in W} ||\nabla_w F(w, V) - \nabla_w F(w, S)|| \leq \epsilon$$

Greedy Algorithms

1. **Subset Selection**:

$$F(S_k) \geq \left(1 - \frac{1}{e}\right) F(\text{OPT})$$

2. **Complexity**:

- Time Complexity: $O(nk)$.