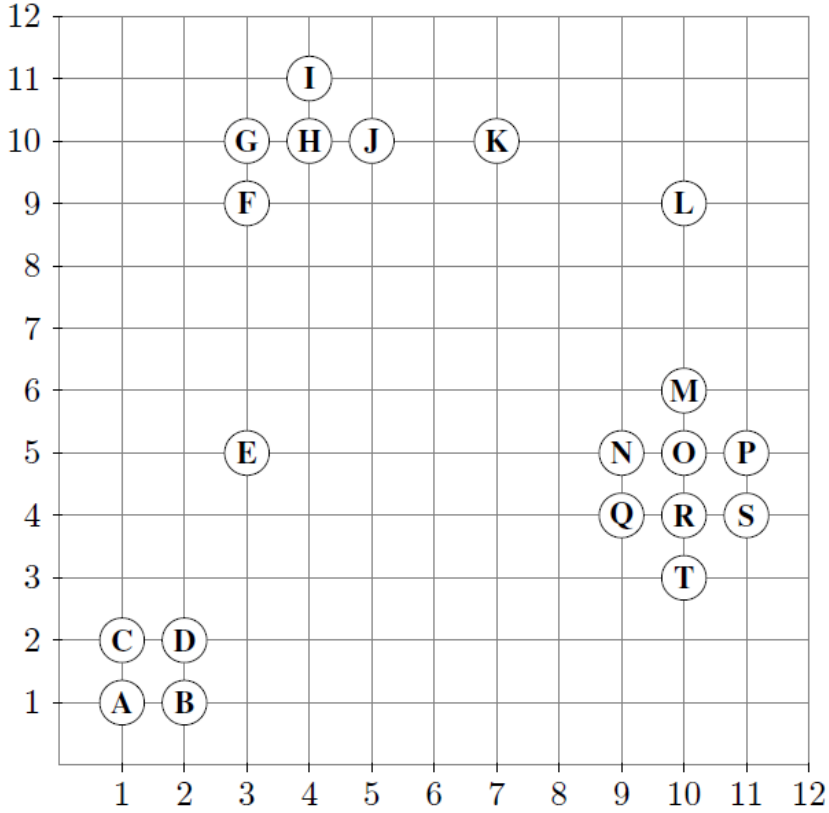
Exercise 1: Agglomerative Clustering

- Given the following dataset D in the 2-d feature space:



- Using Manhattan distance (L1 norm) as distance function,
  - compute the dendrogram using the single-link method.
  - compute the dendrogram using the group-average method.

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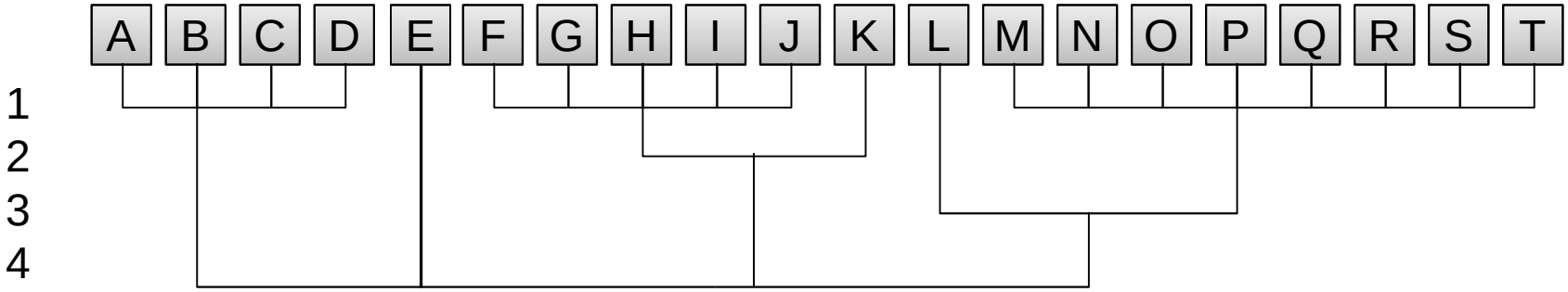
- Single-link:



$$dis_{sl}(C_i, C_j) = \min_{x,y}\{d(x,y) | x \in C_i, y \in C_j\}$$

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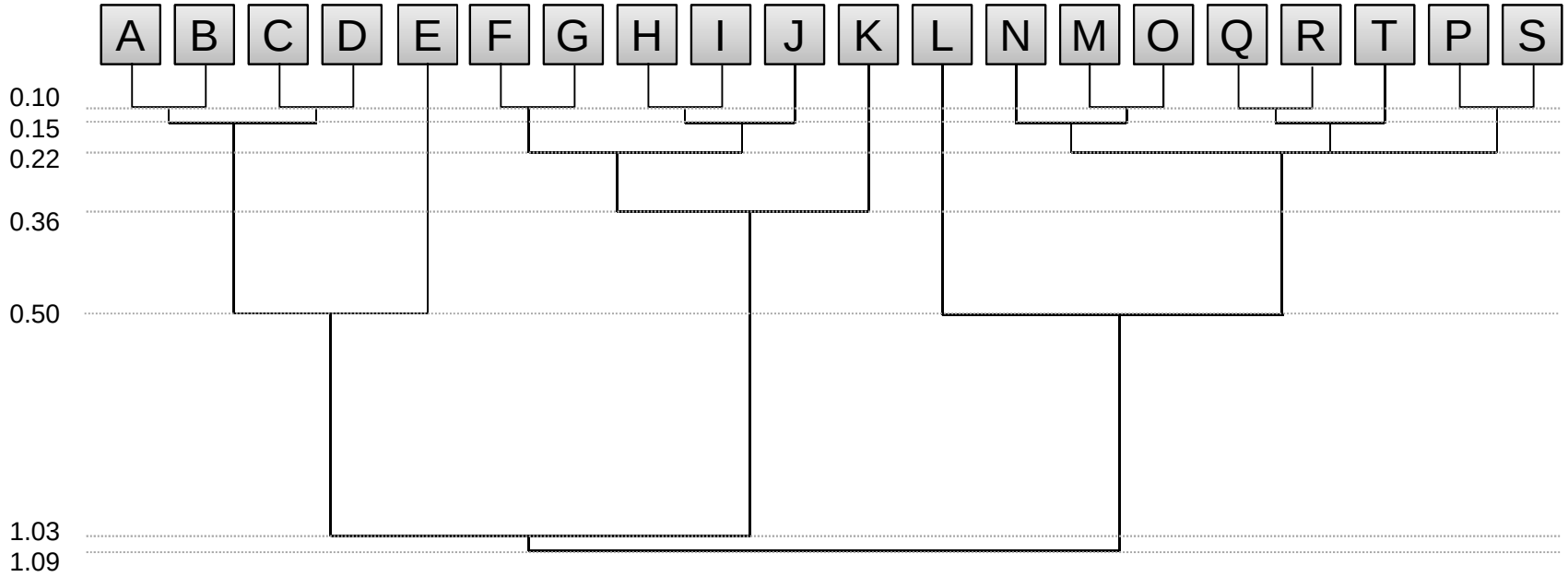
- Average-group-link:



$$dis_{avg}(C_i, C_j) = \frac{\sum_{x \in C_i, y \in C_j} d(x, y)}{|C_i||C_j|}$$