Partitional and Hierarchical Clustering in Python

Members

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Dataset

Amino Acid Sequences (amino.fasta)

Similarity Metric

- Used the Global Sequence Alignment metric for similarity.

K-Means

- **K=3**

```
1 th Cluster
0, 3, 5, 7, 8, 9, 10, 11, 16, 18, 20, 21, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, 38, 44, 45, 50, 51, 53, 54, 55, 56, 57,
58, 59, 61, 62, 63, 64, 65, 66, 68, 71, 73, 77, 79, 80, 81, 83, 85, 86, 89, 91, 92, 93, 96, 97, 100, 101, 102, 103, 104, 105,
106, 112, 113, 114, 115, 116, 117, 118, 121, 122, 123, 125, 126, 128, 132, 133, 135, 138, 139, 140, 141, 146, 147, 151, 153, 1
54, 157, 158, 162, 163, 164, 167, 170, 173, 176, 177, 179, 180, 182, 183, 185, 186, 190, 192, 194, 195, 196, 198, 199, 200, 20
1, 203, 204, 206, 208, 210, 211, 213, 214, 215, 216, 219, 220, 221, 223, 224, 228, 229, 231, 233, 234, 235,

2 th Cluster
1, 4, 12, 13, 15, 17, 19, 24, 37, 39, 40, 49, 52, 60, 67, 69, 70, 72, 75, 78, 84, 88, 94, 98, 99, 108, 110, 111, 119, 120, 12
4, 127, 131, 136, 137, 144, 148, 149, 150, 156, 161, 165, 168, 171, 174, 175, 178, 181, 184, 187, 188, 197, 205, 207, 212, 21
7, 218, 222, 225, 227, 232,

3 th Cluster
2, 6, 14, 22, 23, 33, 41, 42, 43, 46, 47, 48, 74, 76, 82, 87, 90, 95, 107, 109, 129, 130, 134, 142, 143, 145, 152, 155, 159, 1
60, 166, 169, 172, 189, 191, 193, 202, 209, 226, 230,
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- **K=5**

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1 th Cluster
0, 5, 7, 8, 9, 10, 11, 16, 18, 21, 25, 26, 28, 29, 30, 31, 32, 34, 35, 36, 38, 45, 50, 51, 53, 54, 55, 57, 58, 61, 62, 64, 68,
71, 77, 79, 81, 83, 85, 86, 89, 91, 93, 97, 101, 102, 103, 104, 105, 106, 112, 113, 114, 115, 116, 117, 118, 122, 123, 125, 12
6, 128, 132, 133, 138, 139, 140, 141, 147, 151, 153, 154, 157, 158, 162, 163, 164, 167, 170, 173, 176, 177, 180, 182, 183, 18
5, 186, 190, 192, 194, 195, 196, 198, 199, 200, 201, 203, 204, 206, 208, 210, 211, 213, 214, 215, 216, 219, 220, 221, 223, 22
4, 228, 229, 231, 233, 234, 235,

2 th Cluster
1, 12, 13, 15, 17, 19, 24, 37, 39, 40, 49, 52, 60, 67, 69, 70, 75, 78, 84, 88, 94, 98, 99, 108, 110, 111, 119, 120, 124, 127,
131, 136, 137, 144, 149, 150, 156, 161, 165, 168, 171, 174, 175, 178, 181, 184, 187, 188, 197, 205, 207, 217, 218, 222, 225, 2
27,

3 th Cluster
2, 6, 14, 22, 23, 33, 41, 42, 43, 46, 47, 48, 76, 82, 87, 90, 95, 107, 109, 129, 130, 134, 142, 143, 145, 152, 155, 159, 160,
166, 169, 172, 189, 193, 202, 209, 226, 230,

4 th Cluster
3,

5 th Cluster
4, 20, 27, 44, 56, 59, 63, 65, 66, 72, 73, 74, 80, 92, 96, 100, 121, 135, 146, 148, 179, 191, 212, 232,
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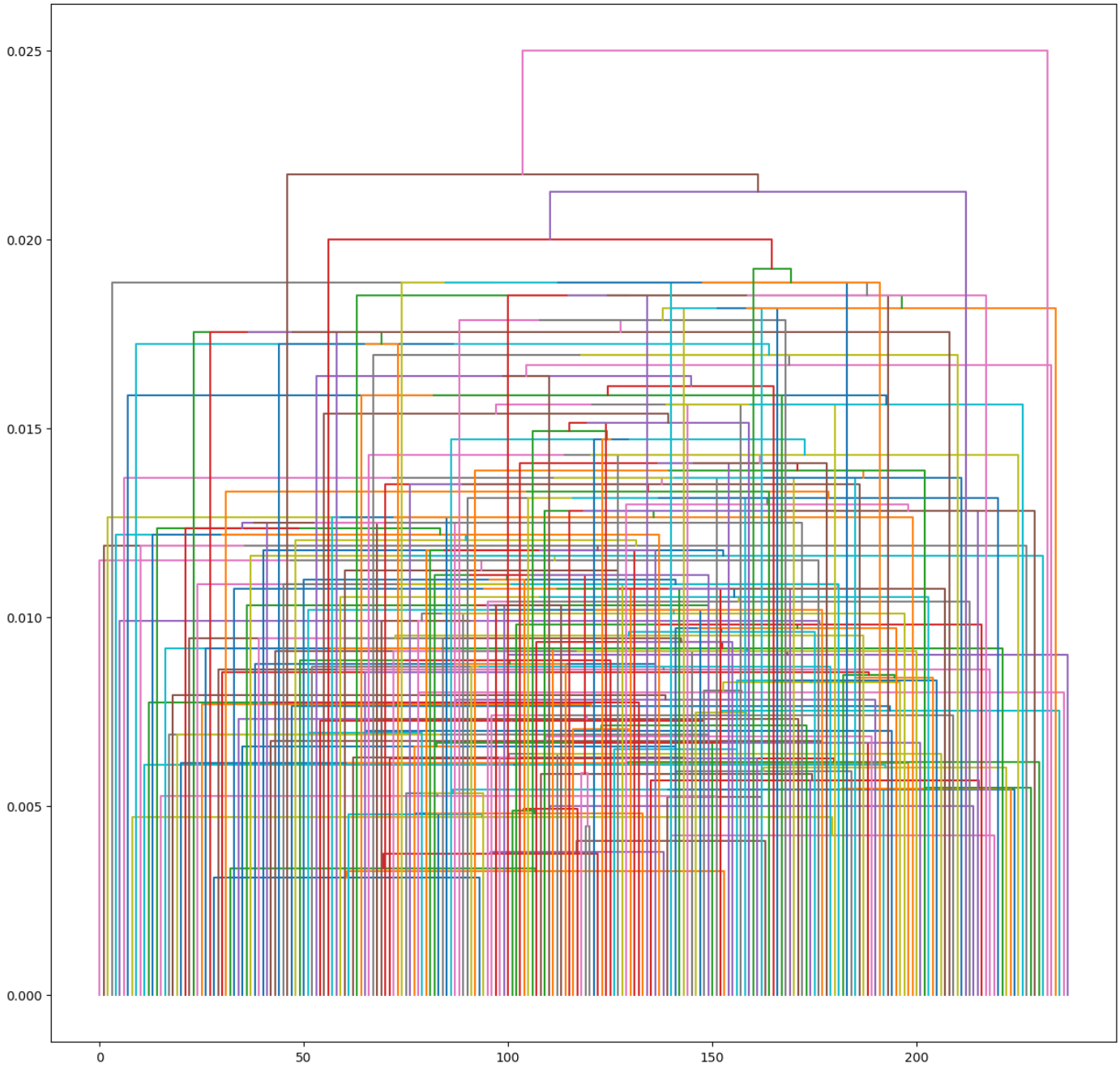
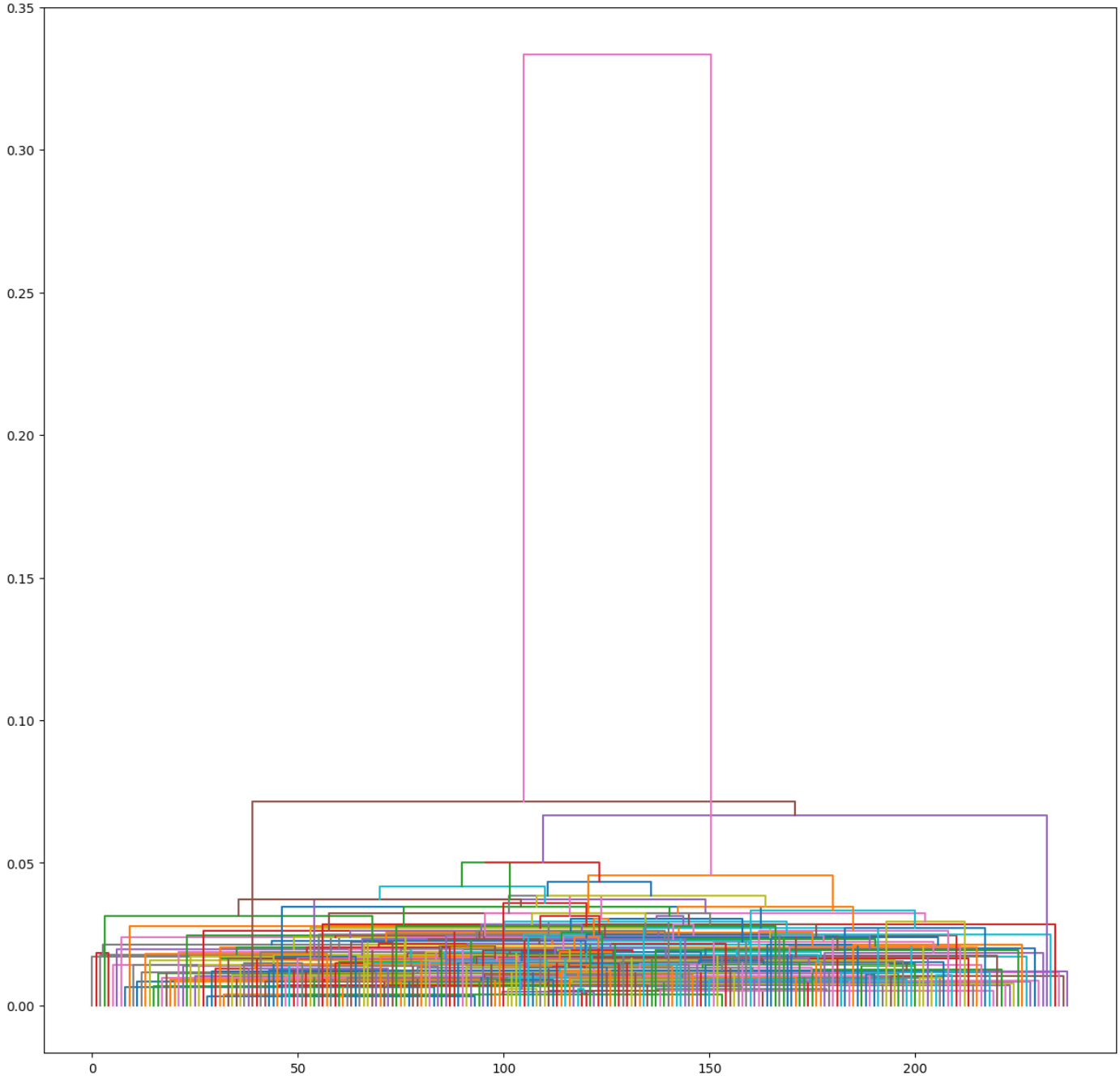
Agglomerative Hierarchical Clustering

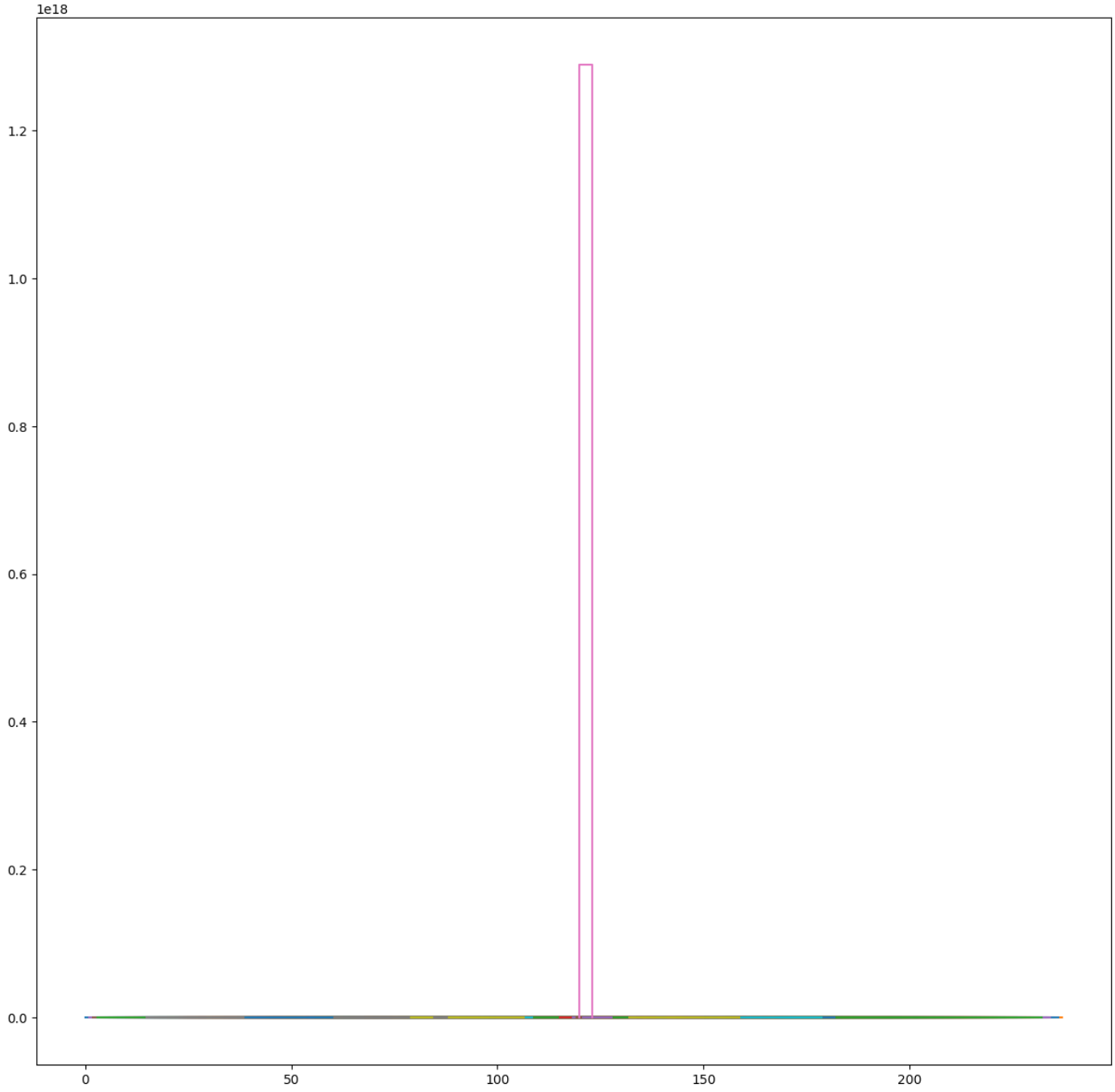
- Single-Linkage



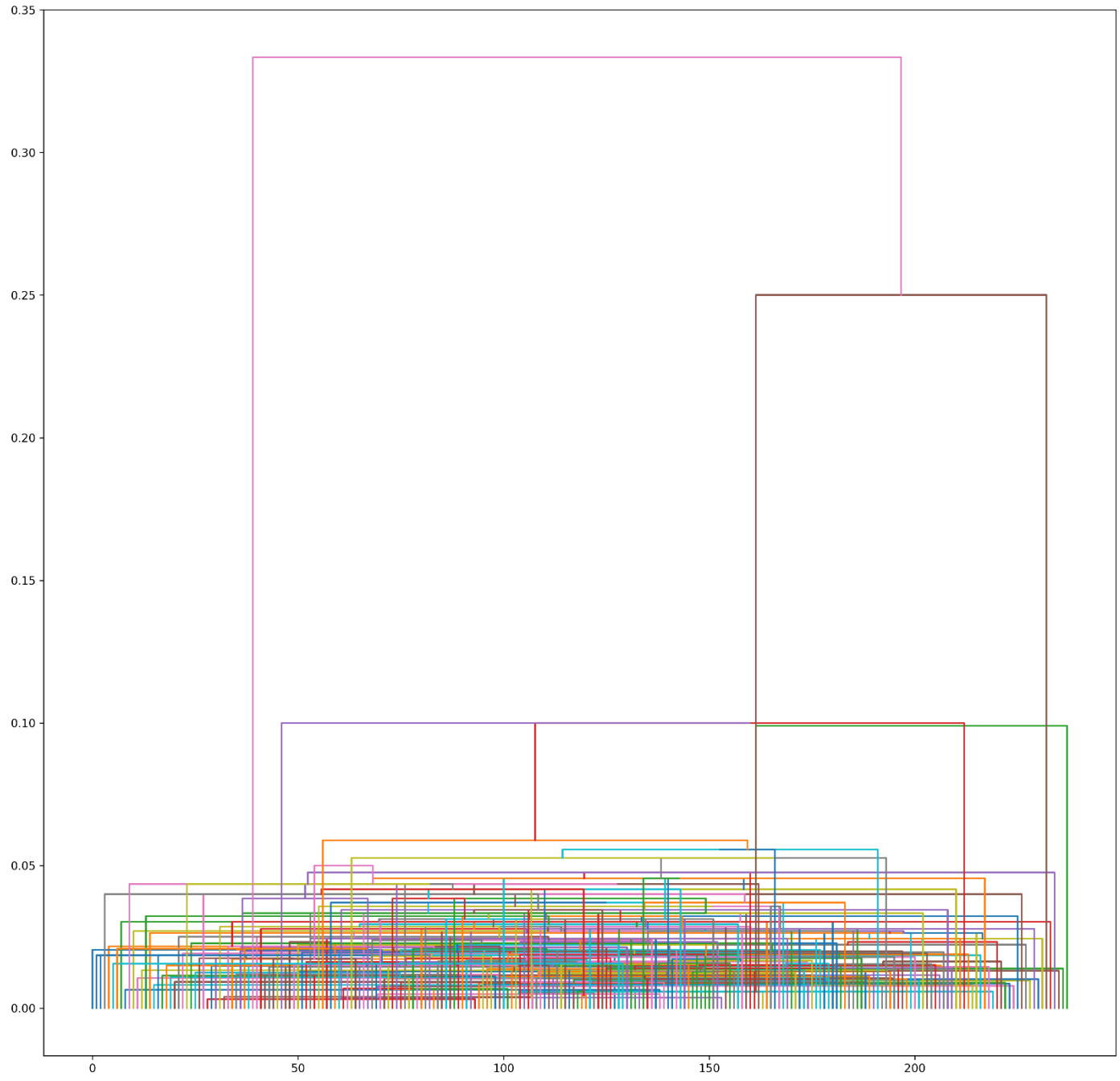
- Complete-Linkage



- Average-Linkage



Divisive Hierarchical Clustering (DIANA)



Comparison of K-Means and Hierarchical Clustering

As we can see, in K-Means each element is exclusive to a single cluster since it is partition-based clustering (unlike both approaches of hierarchical). Also, the number of clusters is user-defined.