Hierarchical Clustering

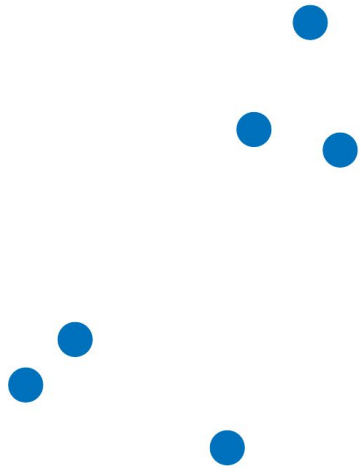
Hierarchical clustering

Building a hierarchy of clusters sequentially.

- Agglomerative (bottom-up): Start considering each point as a cluster then merge the closest ones and repeat
- Divisive (top-down): Start with one single cluster and divide to have groups with reduced variance

Let’s take a look at agglomerative hierarchical clustering (a.k.a. linkage)

Linkage algorithm



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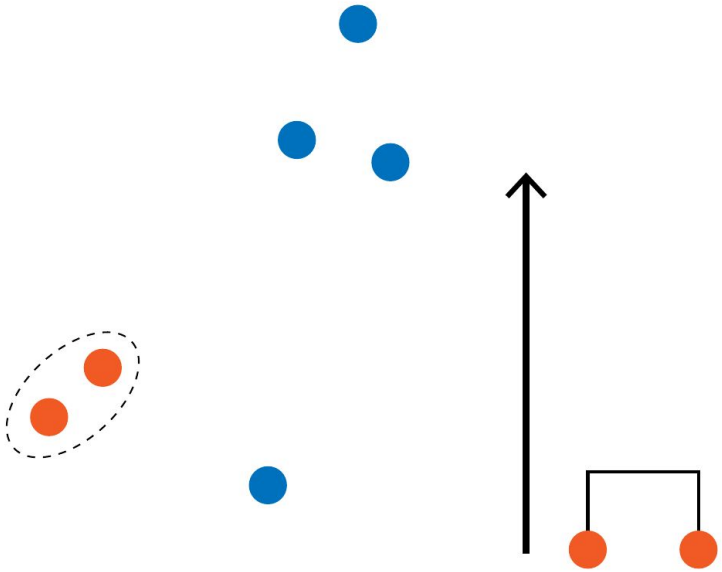
Linkage algorithm



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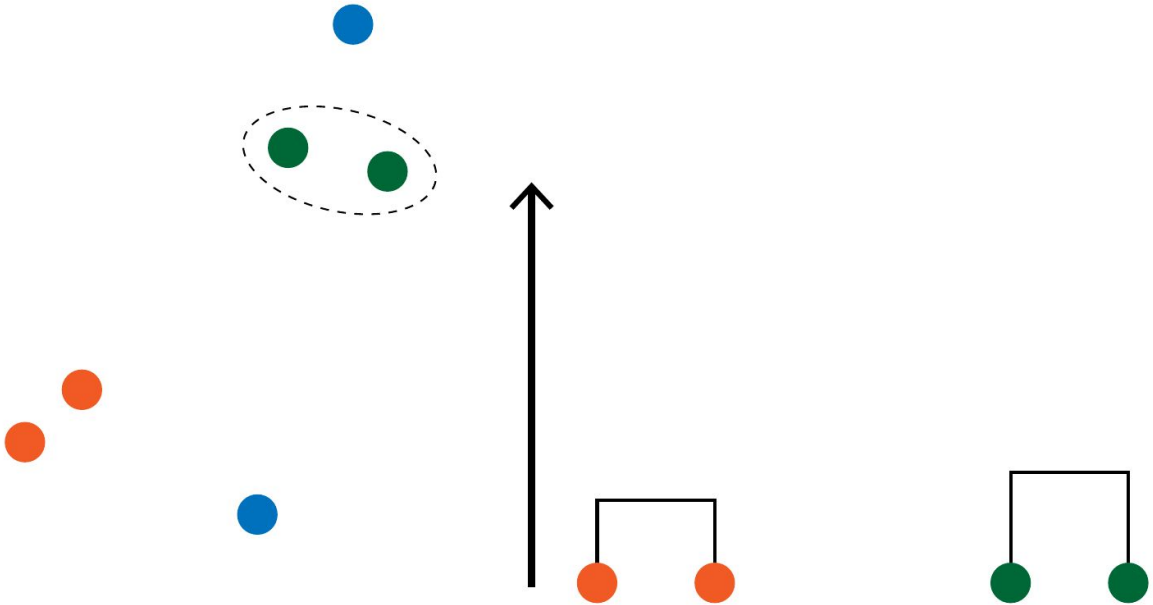
Linkage algorithm



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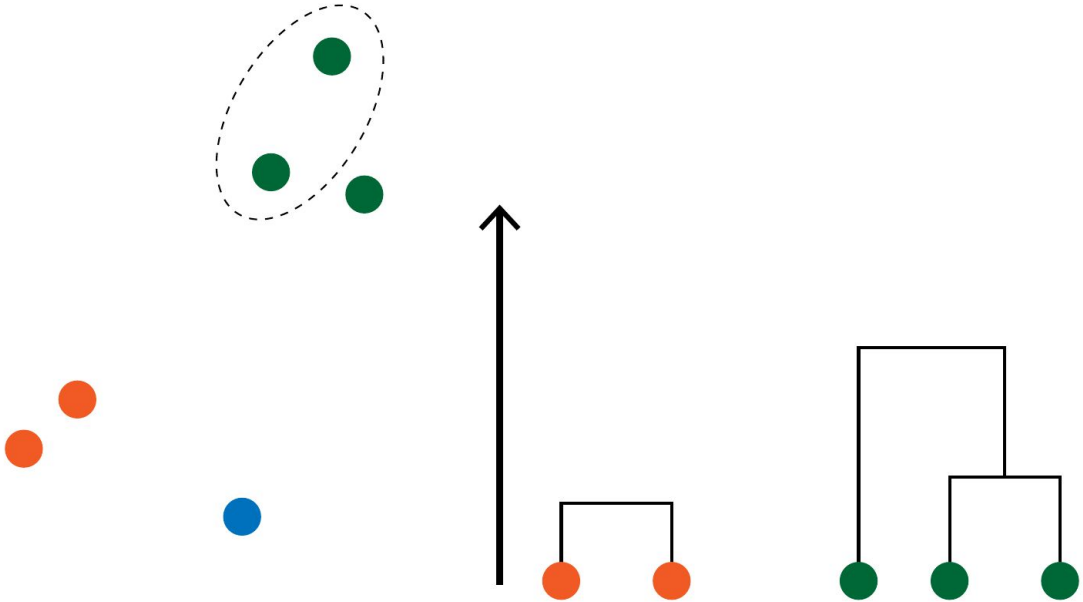
Linkage algorithm



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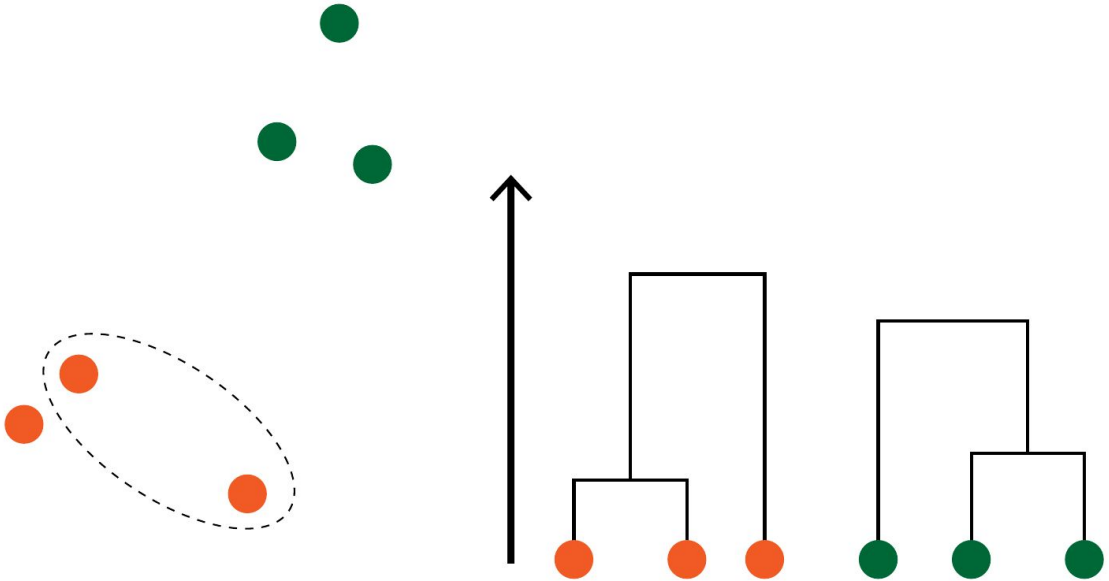
Linkage algorithm



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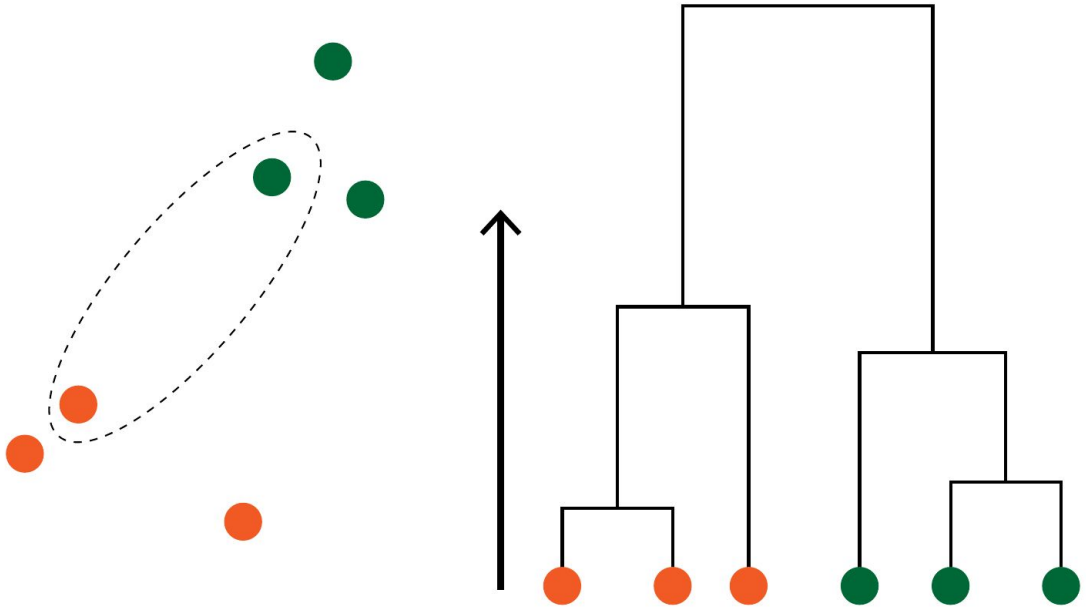
Linkage algorithm



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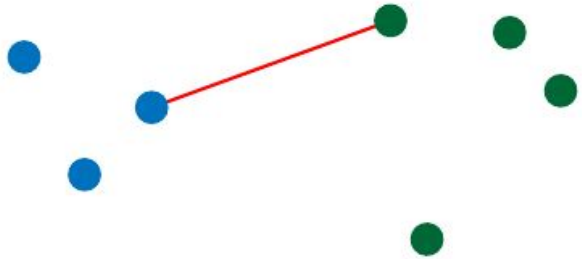
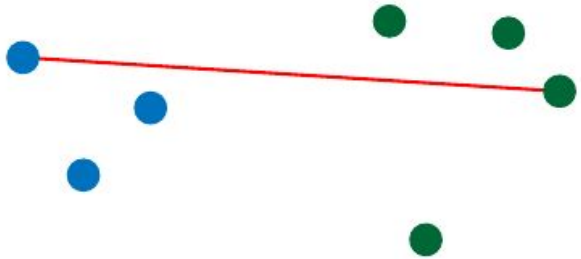
Linkage algorithm

Two strategies to merge clusters:

- Single linkage: closest point distance
- Complete linkage: furthest point distance





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Linkage: pros and cons

Pros

- Clusters are not necessarily globular
- No dependance upon initialisation
- Dendogram shows a good summary

Cons

- Slower than K-means
- Still need to pick a number of clusters
- Assigning a new point is not straightforward
- Sensitive to noise

Hands-on session

hierarchical_clustering.ipynb