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Homework 7 ISLR 12.6.2

12.6.2.

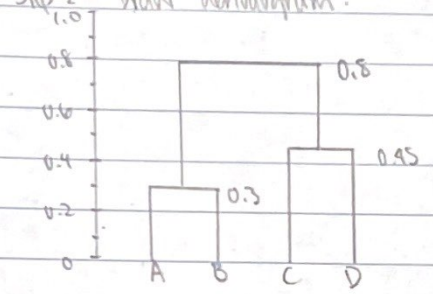
a) Complete linkage (Max)

Step 1 - Look for pair that are most similar (least distance) ⇒ AB join then CD join

$$\begin{array}{c} \\ A \\ B \\ C \\ D \end{array}\begin{array}{c} \begin{array}{cccc} A & B & C & D \end{array} \\ \begin{bmatrix} & 0.3 & 0.4 & 0.7 \\ 0.3 & & 0.5 & 0.8 \\ 0.4 & 0.5 & & 0.95 \\ 0.7 & 0.8 & 0.45 & \end{bmatrix} \end{array} \Rightarrow \begin{array}{c} \\ [A,B] \\ C \\ D \end{array}\begin{array}{c} \begin{array}{ccc} [A,B] & C & D \end{array} \\ \begin{bmatrix} & 0.5 & 0.8 \\ 0.5 & & 0.95 \\ 0.8 & 0.95 & \end{bmatrix} \end{array} \Rightarrow \begin{array}{c} \\ [A,B] \\ [C,D] \end{array}\begin{array}{c} \begin{array}{cc} [A,B] & [C,D] \end{array} \\ \begin{bmatrix} & 0.8 \\ 0.8 & \end{bmatrix} \end{array}$$

*keep largest distance

Step 2 - Draw dendrogram.



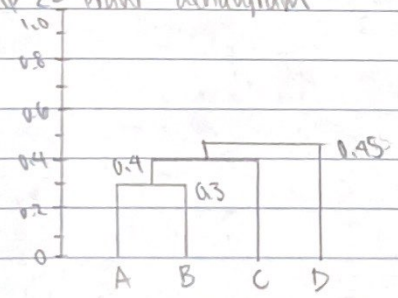
c) Cutting dendogram in a) into 2 clusters would make it into [A,B] and [C,D]: A and B in one cluster C and D in another

b) Single linkage (Min)

Step 1 - Same as a) but keep min distance ⇒ AB join, then join C

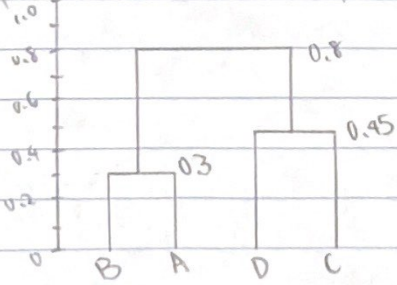
$$\begin{array}{c} \\ A \\ B \\ C \\ D \end{array}\begin{array}{c} \begin{array}{cccc} A & B & C & D \end{array} \\ \begin{bmatrix} & 0.3 & 0.4 & 0.7 \\ 0.3 & & 0.5 & 0.8 \\ 0.4 & 0.5 & & 0.95 \\ 0.7 & 0.8 & 0.45 & \end{bmatrix} \end{array} \Rightarrow \begin{array}{c} \\ [A,B] \\ C \\ D \end{array}\begin{array}{c} \begin{array}{ccc} [A,B] & C & D \end{array} \\ \begin{bmatrix} & 0.4 & 0.7 \\ 0.4 & & 0.45 \\ 0.7 & 0.45 & \end{bmatrix} \end{array} \Rightarrow \begin{array}{c} \\ [A,B]C \\ D \end{array}\begin{array}{c} \begin{array}{cc} [A,B]C & D \end{array} \\ \begin{bmatrix} & 0.45 \\ 0.45 & \end{bmatrix} \end{array}$$

Step 2 - Draw dendrogram



d) Cutting dendogram in b) into 2 clusters would make it into [A,B]C and D. A, B, and C would be in one cluster. D will be in the other cluster.

e) Reposition leaves in a) w/o changing meaning of dendogram.



Swapping leaves within the same node will not change dendogram meaning.